Item 22

CITY COUNCIL REPORT

Meeting Date: June 21, 2016
General Plan Element: *Public Services & Facilities*
General Plan Goal: *Meet or Surpass All Applicable Water Quality Standards for Domestic, Commercial, and Industrial Uses*

ACTION

Second Amended and Restated NIBW Area 7 Access and License Agreement with Motorola and Siemens for a Groundwater Extraction and Treatment System.

Adopt Resolution 10482 authorizing the Mayor to execute Contract No. 1998-006-COS-A2, the Second Amended and Restated NIBW Area 7 Access and License Agreement with Motorola and Siemens for a Groundwater Extraction and Treatment System (System).

BACKGROUND

The discovery of solvent-contaminated groundwater in the early 1980's led the United States Environmental Protection Agency (USEPA) to designate an area in south Scottsdale as the North Indian Bend Wash Superfund Site (NIBW). Since that time, even though the City did not cause the contamination, the City has been involved in a variety of cooperative cleanup efforts and continues to facilitate cleanup by others such as Motorola and Siemens.

USEPA identified thirteen source areas within NIBW and established required cleanup, monitoring, and other actions for each area. Area 7, located just east of the City Court building, is the NIBW area associated with Contract No. 1998-006-COS-A2. Due to the City's property ownership within Area 7 and despite the City not having caused the contamination, USEPA pursuant to federal law, designated the City as a Potentially Responsible Party (also known as a PRP). Siemens Corporation, also known as SMI Holding, (Siemens) was also designated as a PRP for Area 7. A series of documents entered in the early 1990's govern the Area 7 work requirements. As a settling defendant for Area 7, the City signed these documents and is bound by them.

Area 7 groundwater cleanup is an important element in long-term cleanup of the larger NIBW site. Localized capture and treatment of Area 7 groundwater is expected to mitigate potential future impacts on the City wells that supply the Central Groundwater Treatment Facility (located at Pima and Thomas) that are used as part of the City's drinking water portfolio. The System, which is visually depicted in Attachment 1, currently includes three groundwater extraction wells, pipelines for untreated water, a treatment facility, pipelines for treated water, and injection wells. The System involves extracting contaminated groundwater, conveying it through pipelines in City right-of-way along Miller Road to the treatment facility, treating it, and then conveying it through another pipeline, and reinjecting the treated groundwater through injection wells.

Area 7 work has been ongoing since 1998 with Siemens (and later Motorola) taking the lead role, both financially and in work performance. For its part, the City has provided use and access to City property and rights-of-way when necessary to facilitate the clean-up efforts. The City has not provided financial support for the project since the late 1990s.

The City first entered into a license agreement with Siemens, Contract No. 980006, in 1998 to provide the company with access to City property and certain rights-of-way to facilitate groundwater cleanup. That license agreement was amended and restated in 2001 as Contract No. 980006A. Since that amended license, Siemens and Motorola entered into an agreement by which Motorola assumed management and financial responsibility for the System. The City has been working effectively with Motorola to facilitate the ongoing Area 7 work.

The term of the first amended agreement has lapsed and a new amendment is necessary to continue the remedy's benefits, add Motorola as a party, update the license fee, incorporate additional infrastructure, and establish a new term.

ANALYSIS & ASSESSMENT

Benefits – The Area 7 system has operated successfully since 1998. Though the system treats a small volume of water (500 gpm), it has removed more than 7,000 pounds of TCE from the groundwater. This system enhances the protection of groundwater supply wells from higher TCE concentrations, mitigates potential future operating impacts at the Central Groundwater Treatment Facility, and further accelerates contamination removal.

Fees – The City is not responsible for any Area 7 clean-up costs. As part of the original, first amended, and now this second amended agreement, an annual license fee is collected. This second amendment increases the annual license fee from $6,638 to $8,037.

Additional Infrastructure – In 2015, the City permitted Motorola to install a new extraction well and additional pipeline in City right-of-way after an exhaustive search for a location on private property. This well was a replacement of a failed well that was installed and used as part of the first amended agreement. The location of this well and pipeline was approved by the USEPA as beneficial to the NIBW remedy.

The agreement provides for additional wells or pipelines, if required, for the remedy or if current infrastructure fails. Motorola will be required to meet city standards for work in our right-of-way and quality of design and installation.

Terms – Due to the long-term projected life of the NIBW cleanup, Contract No. 1998-006-COS-A2 contains a twenty-year term with the option to renew with Council approval if further treatment is deemed appropriate.

RESOURCE IMPACTS

Available funding

All costs are paid by Motorola and other NIBW participating companies.

All future costs for additional infrastructure or operation of the wells, pipelines and treatment facility will also be paid by Motorola and NIBW participating companies.

Staffing, Workload Impact

Minimal staff time is used for oversight of Area 7. Regulatory staffs attend NIBW technical meetings on a monthly basis at which the status of Area 7 is discussed. Operations staff is required to respond in the event of an emergency to shut down the system. All follow-up response requirements are then turned over to Motorola and its contractors.

Future budget implications

There are no future additional budget implications.

Operation and Maintenance Requirements

The City has no responsibility for the operation or maintenance of the Area 7 system.

OPTIONS & STAFF RECOMMENDATION

Recommended Approach

Adopt Resolution 10482 authorizing the Mayor to execute Contract No. 1998-006-COS-A2, the Second Amended and Restated NIBW Area 7 Access and License Agreement with Motorola and Siemens for a Groundwater Extraction and Treatment System.

RESPONSIBLE DEPARTMENT(S)

Water Resources Division

STAFF CONTACTS (S)

Suzanne Grendahl, Water Quality Director
(480) 312-8719, sgrendahl@scottsdaleaz.gov

APPROVED BY

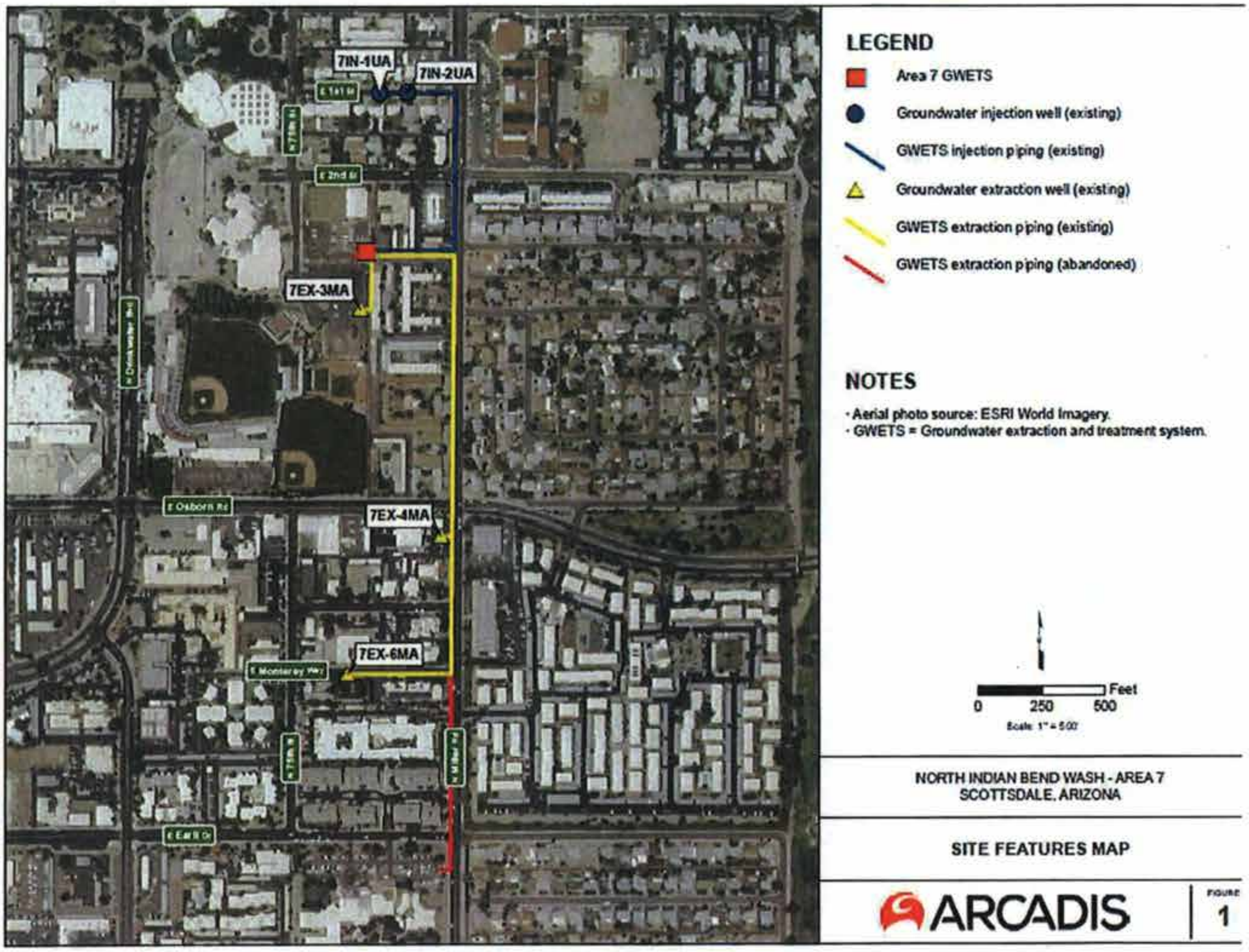
Brian Biesemeyer, Acting City Manager
(480) 312-5683, bbiesemeyer@scottsdaleaz.gov

5-27-2016
Date

ATTACHMENTS

1. Map of Area 7 and associated infrastructure.
2. Resolution No. 10482
3. Second Amended and Restated Area 7 Access and License Agreement for a Groundwater Extraction and Treatment System

Attachment 1



Attachment 1
Map of Area 7 and associated infrastructure
Page 1 of 1

RESOLUTION NO. 10482

A RESOLUTION OF THE COUNCIL OF THE CITY OF SCOTTSDALE, MARICOPA COUNTY, ARIZONA, AUTHORIZING THE MAYOR TO EXECUTE CONTRACT NO. 1998-006-COS-A2, THE SECOND AMENDED AND RESTATED NIBW AREA 7 ACCESS AND LICENSE AGREEMENT WITH MOTOROLA AND SIEMENS FOR A GROUNDWATER EXTRACTION AND TREATMENT SYSTEM.

WHEREAS, Area 7, which is located east of the Scottsdale City Court, is one of several source sites for TCE soil and groundwater contamination within the EPA North Indian Bend Wash Superfund site (NIBW);

WHEREAS, the City owns property within and rights-of-way adjacent to and surrounding Area 7 and is an NIBW party;

WHEREAS, SMI Holding LLC, as the successor-in-interest to Siemens Microelectronics, Inc. (Siemens), is an NIBW party responsible for the cleanup of contaminated groundwater in, and emanating from, Area 7;

WHEREAS, Motorola Solutions, Inc. (Motorola) is also an NIBW party;

WHEREAS, the City, Siemens, and Motorola all deny liability with regard to the NIBW site;

WHEREAS, in 1992 the City and Siemens entered into the Area 7 Participation Agreement, allocating between themselves various specified obligations and responsibilities related to Area 7 remedial work;

WHEREAS, in 1998 the City and Siemens entered into Contract No. 9800006, which granted Siemens access to certain City property for the construction and operation of the groundwater extraction and treatment system (GWET System);

WHEREAS, Siemens constructed and has been operating the Area 7 GWET System in accordance with the terms and conditions of Contract No. 980006;

WHEREAS, in 2001 the City and Siemens amended and restated Contract No. 980006 as Contract No. 980006A1 to allow the Area 7 GWET System to continue operations;

WHEREAS, Siemens and Motorola entered an agreement by which Motorola assumed management responsibility for the Area 7 GWET System;

WHEREAS, the City, Siemens, and Motorola now desire to amend and restate Contact No. 980006A1 as Contract No. 1998-006-COS-A2 to enable Motorola and Siemens to continue Area 7 remedial action work as set forth within the agreement; and

WHEREAS, Contract No. 1998-006-COS-A2 does not require the City to expend funds but allows the City to receive a license fee from Motorola in exchange for the use of City property and rights-of-way;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Scottsdale, Maricopa County, Arizona, as follows:

Section 1. The City Council hereby authorizes, approves and directs the Mayor to execute, on behalf of the City, Contract No. 1998-006-COS-A2, a license agreement between the City, Siemens, and Motorola to conduct Area 7 remedial action work as set forth within the agreement.

Section 2. The City Council authorizes the Water Resources Director to add or delete licensed properties or amend descriptions of properties under the terms of Contract No. 1998-006-COS-A2 and to undertake, direct, and execute any further actions required to implement the intent of this Resolution.

PASSED AND ADOPTED by the Council of the City of Scottsdale, Maricopa County, Arizona this 21st day of June, 2016.

ATTEST:

Carolyn Jagger, City Clerk

CITY OF SCOTTSDALE, an Arizona
municipal corporation

W.J. "Jim" Lane, Mayor

APPROVED AS TO FORM:

Janis L. Bladine
Bruce Washburn, City Attorney
By Janis L. Bladine, Senior Assistant City Attorney

SECOND AMENDED AND RESTATED AREA 7 ACCESS AND LICENSE AGREEMENT FOR A GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

This Second Amended and Restated Agreement (this "Agreement") is made by and among the City of Scottsdale ("City"), an Arizona municipal corporation, SMI Holding LLC ("SMI"), a Delaware corporation and successor-in-interest to Siemens Microelectronics, Inc. ("Siemens"), and Motorola Solutions, Inc. ("Motorola"), a Delaware corporation. The City, SMI, and Motorola shall be individually referred to herein as a "Party" and collectively referred to herein as the "Parties." This Agreement is entered into and effective this 21st day of June, 2016 (also referred to herein as the "Anniversary" date).

RECITALS:

The United States Environmental Protection Agency ("EPA") has determined that remedial action is necessary in the portion of the North Indian Bend Wash National Priorities List Site bounded approximately by Chaparral Road, Scottsdale Road, Pima Road, and McKellips Road in Maricopa County, Arizona (the "NIBW").

In September, 1988, EPA selected a groundwater remedy, commonly known as the Scottsdale Operable Unit ("OU-1") remedy, to capture volatile organic chemicals ("VOCs") in the Middle Alluvial Unit ("MAU") and the Lower Alluvial Unit ("LAU") at NIBW. The OU-1 remedy consists of groundwater extraction from designated City wells, treatment at a central facility with air stripping and vapor/phase carbon adsorption, and delivery of treated water into the City's municipal water supply system.

In 1991, EPA, the Parties, and others entered into a Consent Decree ("CD I") which was entered by the federal district court in 1992 in Civil Action 91-1835-PHX-WPC. CD I implemented a 1988 Record of Decision ("ROD I") which included the OU-1 remedy.

In September, 1991, EPA issued a Record of Decision ("ROD II") specifying additional response actions to address the vadose zone in various areas within the NIBW.

By letters dated September 12, 1991, EPA identified the City and SMI (as well as other persons) as "potentially responsible parties" under the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, with respect to the implementation of vadose zone remediation at, and the reimbursement of oversight costs with respect to, the NIBW location identified in the ROD II as Area 7.

A Consent Decree was lodged on April 23, 1992, in Civil Action No. 91-1835-PHX-FJM ("CD II"), for the purpose of implementing vadose zone work for Area 7 and as identified in the ROD II (the "Area 7 Remedial Action").

Effective April 23, 1992, the City and SMI entered into that certain Area 7 Participation Agreement, (the "Participation Agreement") which allocated between themselves various specified obligations and responsibilities relating to the funding of Area 7 Remediation Costs (as that term is defined therein) and conducting the Area 7 Remedial Action.

Pursuant to the Participation Agreement, a soil vapor extraction system and a groundwater treatment system for the extraction and treatment of groundwater containing VOCs were installed on City-owned property at Area 7.

In December, 1995, SMI installed an initial extraction well to withdraw contaminated groundwater from the MAU immediately south of Area 7.

Thereafter, SMI submitted to EPA and the Arizona Department of Environmental Quality ("ADEQ") for review and approval, a report prepared by LFR Levine-Fricke (formerly known as Levine-Fricke-Recon) entitled *Design Report- North Indian Bend Wash Area 7 Groundwater Extraction and Treatment System,* dated April 3, 1997 (attached hereto as Exhibit "A"), and an addendum to said report dated October 10, 1997 (attached hereto as Exhibit "B") (collectively referred to herein as the *"Design Report").*

The *Design Report* proposed the design, construction and operation of a groundwater extraction and treatment system for the treatment of contaminated groundwater in the Upper MAU in the vicinity of Area 7, reinjection of treated water into the UAU, and discharge of partially treated groundwater to the City sanitary sewer during discreet instances when such water, because of excess VOC or mineral concentrations, cannot be re-injected into the UAU, said system to include influent and effluent pipelines located in City rights-of-way.

In 1999, Siemens Microelectronics, Inc. transferred its Area 7 remedial action obligations to SMI Holding LLC Corporation.

In 2001, SMI reached a settlement agreement with Motorola as to Motorola assuming the management responsibility of Area 7 remedial action work, and references herein to Motorola shall mean Motorola on behalf of itself and SMI.

In 2001, EPA determined the NIBW site remedial action would require additional work and issued a Record of Decision Amendment ("AROD") dated September 27, 2001. The AROD additional work required a modification of CD I.

In 2003, an Amended Consent Decree was lodged with the federal district court in Civil Action No. 91-1835-PHX-FJM ("ACD"), for the purpose of selecting a final remedial action for the NIBW Site and to consolidate previous decisions and voluntary actions regarding both groundwater and soil cleanup actions into one final document.

The City has existing rights-of-way adjacent to and surrounding the City's Area 7 Facility Property as described in this Agreement.

The groundwater extraction and treatment system all associated piping and other appurtenances and infrastructure, and any modifications or improvements made thereto with the City's approval, shall be referred to herein as the "GWET System."

The current Area 7 remediation work includes the GWET System, an ultraviolet light/oxidation ("UV/OX") system, air stripper system, treated water reinjection system, conduit, wires, and well controls.

SMI and Motorola have provided documentation satisfactory to the City evidencing EPA's approval of the design and specifications of the GWET and the other systems and Area 7 remedial action work (attached hereto as Exhibit "C").

The City and Siemens entered into City of Scottsdale Contract No. 980006, the AREA 7

ACCESS AND LICENSE AGREEMENT FOR A GROUNDWATER EXTRACTION AND TREATMENT SYSTEM, effective January 20, 1998. SMI is the successor-in-interest to Siemens.

On or about March 5, 2001, the City and SMI entered into City of Scottsdale Contract No. 980006A1, the FIRST AMENDED AND RESTATED AREA 7 ACCESS AND LICENSE AGREEMENT FOR A GROUNDWATER EXTRACTION AND TREATMENT SYSTEM.

The City, SMI, and Motorola desire to amend and restate Contract No. 980006A1 in its entirety and to enter into this Agreement permitting Motorola to continue to undertake and perform Area 7 remedial action work as further set forth in this Agreement (the "Permitted Uses"). Upon execution of this Second Amended and Restated Agreement, this Agreement shall amend and entirely supersede and replace City of Scottsdale Contract No. 980006A1.

The Parties deny any liability with regard to the NIBW site.

NOW, THEREFORE, in consideration of the foregoing recitals, the additional consideration to be paid by Motorola as provided for herein, the covenants and agreements contained herein, and other good and valuable consideration, SMI, Motorola, and the City agree as follows:

1. **Recitals.** The foregoing recitals are incorporated into this Agreement.

2. **Additional Consideration.** In addition to the consideration set forth above, Motorola shall pay to the City the following amounts:

2.1. **License Fee.** Motorola shall pay to the City during each calendar year this Agreement is in effect, a license fee in the amount of Eight Thousand Thirty-Seven Dollars ($8,037.00) ("License Fee"). The first annual License Fee shall be paid within ninety (90) days of the effective date of this Agreement. The amount of the first annual License Fee shall be prorated for any annual License Fee paid by Motorola for the current calendar year under the terms of Contract No. 980006A1. All subsequent annual License Fees shall be paid to the City on or before each annual Anniversary of this Agreement.

2.1.1. License Fee Adjustments.

2.1.1.1 The License Fee shall be automatically adjusted upward on the second Anniversary of this Agreement on the basis of changes in the United States Consumer Price Index for all Urban Consumers ("CPI-U"), U.S. City Average, all items, published by the United States Bureau of Labor Statistics (the "Cost of Living Index"). The amount of the adjusted annual License Fee (represented by the letter "F" in the formula set forth below) shall be equal to the then-current Cost of Living Index number (represented by the letter "C" in the formula set forth below) divided by the Cost of Living Index number for the month during which this Agreement becomes effective (represented by the letter "M" in the formula set forth below), and multiplied by $8,037.00. This computation is expressed by the following formula:

$$F= (C+M) \times \$8,037.00$$

provided, that in no event shall the License Fee be adjusted downward. If the Cost of Living Index shall no longer be published at the adjustment date, then another similar index published by any federal agency shall be substituted by the City in the City's reasonable discretion.

2.1.1.2 Should the Parties expand the size of the Licensed Properties under Section 7 of this Agreement, the License Fee shall be increased to reflect that expansion.

2.1.2. Setoffs. All License Fees shall be paid in full directly to the City without setoff or deduction of any description. Motorola expressly waives any right of setoff.

3. Creation of License for Access to Area 7 Property. The City hereby grants to Motorola a license to enter upon that certain property described in Exhibit "D" hereto (the "Facility Property") for the following Permitted Uses:

3.1. designing, constructing, installing, operating, maintaining, repairing, decommissioning, disassembling and/or removing certain components of the GWET System, of the design and specifications set forth in the *Design Report* for a combination UV/Oxidation and low profile air stripper polishing system (the "Treatment Facility"); and

3.2. drilling, trenching, installing, testing, maintaining, repairing, decommissioning, disassembling and/or removing pipes and other infrastructure on the Facility Property necessary to deliver groundwater influent for treatment and to transport treated or partially treated water from the Facility Property to connecting pipelines located off the Facility Property for reinjection or discharge, all in accordance with the design and specifications set forth in the *Design Report.*

4. Creation of License for Access to Area 7 Extraction Wells & Associated Pipeline Property. The City hereby grants to Motorola a license to enter upon property occupied by the Area 7 Extraction Wells (the "Extraction Wells" and "Extraction Wells Property," as depicted in Exhibit "E") for the purposes of Extraction Well operation, maintenance, and repair. The City also grants to Motorola a license to enter upon property occupied by the extraction piping connecting the Extraction Wells (the "Extraction Pipeline" and "Extraction Pipeline Property," as depicted in Exhibit "F") for the purposes of pipeline operation, maintenance, and repair.

5. Creation of License for Access to Area 7 Reinjection Wells & Associated Pipeline Property. The City hereby grants to Motorola a license to enter upon property occupied by the Area 7 Reinjection Wells (the "Reinjection Wells" and "Reinjection Wells Property," as depicted in Exhibit "G") for the purposes of Reinjection Well operation, maintenance, and repair. The City also grants to Motorola a license to enter upon property occupied by the reinjection piping located in City right-of-way and connecting to the Reinjection Wells (the "Reinjection Pipeline" and "Reinjection Pipeline Property," as depicted in Exhibit "H") for the purposes of pipeline operation, maintenance, and repair.

6. HDPE Piping. In utilizing HDPE piping, Motorola shall comply with all federal, state, and local laws and regulations including but not limited to the laws, rules, regulations, guidelines, and ordinances of ADEQ, Maricopa County, Maricopa Association of Governments ("MAG"), and the City.

7. Future Pipelines & Wells in City Rights-of-Way. Should future treatment require and Motorola desire to install additional pipelines, wells, and other infrastructure in City rights-of-way, Motorola must obtain an encroachment permit as provided herein. The Parties' Contract Administrators or authorized representatives may jointly agree to add or delete licensed properties or amend descriptions of properties located within Exhibits "D" through "I".

8. Independent Right to Withdraw Groundwater. The pumping, withdrawal, treatment, release, reinjection, discharge and/or use of any groundwater by Motorola pursuant to this Agreement shall not be considered pumping, withdrawal, treatment, release, reinjection, discharge and/or use of groundwater by the City. Motorola has the legal right to withdraw the groundwater pursuant to the ACD, which is separate from and independent of any City withdrawal rights.

9. End-use of Treated Groundwater. Treated groundwater from the Treatment Facility shall be reinjected by Motorola into the Reinjection Wells in accordance with the *Design Report* and this Agreement. In the event Motorola is unable for any reason to reinject the treated effluent into the Reinjection Wells, and the City is unable to accept such discharges pursuant to the terms of Section 10 below, Motorola shall immediately discontinue operation of the GWET System and shall not resume operations of any kind until such time as the Reinjection Wells are again available for use, the City agrees to accept such discharges pursuant to the terms of Section 10, or the City may otherwise approve (in writing) a temporary, alternative end-use.

10. Sanitary Sewer Connection. The City acknowledges that during equipment shakedown, system start-up and maintenance, partially treated groundwater may contain VOC concentrations or other contaminants that would preclude reinjection into the Reinjection Wells. Under such circumstances, Motorola desires to discharge said partially treated groundwater to the City's sanitary sewer.

10.1. Permission to discharge to the City's sewer is revocable at the City's discretion.

10.2. Flows to the City's sewer shall not exceed 200 gallons per minute (gpm). Motorola shall install a City-approved flow meter in the discharge line to measure discharge flow to the sanitary sewer.

10.3. Any sewer discharges shall meet all regulated discharge limits and/or effluent limitations as currently provided in the City of Scottsdale Revised Code and as may be amended in the future. At the City's direction, on an as-needed annual basis, Motorola will provide to the City, sample test results from the discharge to show that the limits have been met.

10.4 Motorola shall provide 24 hour advance notice to the City of any discharges to the sanitary sewer.

10.5. Motorola shall reimburse the City for sewer costs associated with the discharges at the then-current sewer rate for a Commercial Without Dining category, as such rates may be updated from time to time. In the event that such costs increase, the City will notify Motorola in writing of the rate increase, and Motorola will reimburse the City at the new sewer rate.

10.5.1. Motorola shall submit a report on a quarterly basis with detailed discharge totals from metering devices for billing purposes.

11. Application for Issuance of Encroachment Permits. Prior to encroaching upon any City rights-of-way, Motorola must make application to the City for and receive a validly issued encroachment permit in such form(s) as the City may prescribe for permission to work and/or place improvements in its rights-of-way

11.1 Where the City finds that the application conforms to the requirements of Article III, Chapter 47 of the Scottsdale Revised Code, the City shall issue a revocable permit for the encroachment, attaching such conditions as are necessary for the health, safety and welfare of the public and for the protection of the City, including those set forth in Exhibit "J."

11.2 Any encroachment permits issued prior to the term of this Agreement and related to Area 7 are incorporated into this Agreement by this reference. In the event of a conflict between this Agreement and any previously issued encroachment permits, the City, in its sole discretion, shall determine which terms govern the rights and duties of the Parties.

12. Property Condition. Motorola has examined, studied and inspected the Facility Property, Extraction Wells Property, Reinjection Wells Property, the City's rights-of-way, and all other City property identified under this Agreement, and their environs (collectively, the "Licensed Properties," visually depicted in Exhibit "I" Site Features Map), and access to such properties is being licensed in an "as is" condition without any express or implied warranties of any kind, including, without limitation, any warranties or representations as to their condition or fitness for any use. Motorola has obtained such information and professional advice as it has determined to be necessary related to this Agreement.

13. Title. Notwithstanding any provision hereof to the contrary, Motorola's rights to the Licensed Properties are limited to the license rights created by this Agreement. The City and Motorola do not by this instrument intend to create a lease, easement or other real property interest. Motorola shall have no real property interest in the Licensed Properties. Motorola's sole remedy for any material breach or anticipatory breach of this Agreement by the City shall be an action for damages.

14. Reservation of Rights by City. The City retains the right to enter upon the Licensed Properties and all other property provided under this Agreement at any time and for any and all purposes that do not, in the City's reasonable discretion, materially interfere with Motorola's lawful conduct of the Permitted Uses under this Agreement.

15. Maintenance of Property. Motorola, at its sole expense, shall at all times maintain, repair and replace the Licensed Properties, and all facilities and improvements thereat, in a sound, clean and attractive manner, as determined in the City's reasonable discretion.

16. Maintenance and Repair of GWET and Other Systems. Motorola shall be solely responsible for all maintenance and repair (both routine and emergency) of the GWET and other systems, including any wells, pipelines or other appurtenances located within City rights-of-way. In the event of any discharge and/or release or other malfunction or failure of the GWET and/or other systems, and/or any event which potentially affects the public's health, safety and welfare, Motorola shall, at its sole expense, provide all reporting, response, containment, remedial, and restorative actions with respect thereto, and shall, at its sole expense, repair and restore all damage caused (either directly or indirectly) by said discharge, release, failure and/or malfunction. Motorola shall not perform any work within City rights-of-way except in accordance with the terms and conditions of a validly issued encroachment permit as set forth in Section 11.

17. Operation and Maintenance Plan. Motorola shall provide the City with Operations and Maintenance Plans ("O&M Plan") approved in writing by EPA and any other regulatory authority with jurisdiction.

17.1 The O&M Plan shall include provisions addressing the testing, shake-down, start-up, operation, maintenance and repair (routine and emergency) of the GWET and other systems, including those portions of the GWET and other systems located in City rights-of-way, and shall provide for response, containment, and remedial and restorative actions with respect to any discharge and/or release from, or other failure of, the GWET and other systems. The O&M Plan shall provide for notification of City personnel upon any discharge and/or release, or other malfunction or failure of the GWET and other systems, and/or any event which potentially affects the public's health, safety and welfare.

17.2 The O&M Plan shall also identify individuals through whom the City, at any time, may notify Motorola of an emergency or other event requiring immediate response. All provisions of the O&M Plan shall conform to MAG Uniform Standard Specifications and Uniform Standard Details for Public Works Construction, as amended by the latest version of the City's Supplemental Standard Specifications and Supplemental Standard Details (if there is a conflict, the latter shall govern). Motorola shall periodically update the O&M Plans to reflect current conditions and requirements.

18. Notification and Reporting. Motorola shall bear sole responsibility for complying with all local, county, state and federal notification and reporting laws, ordinances, regulations and other rules as are now in effect or as may hereafter be adopted or amended.

19. Compliance with Law. In exercising any rights or discharging any duties under this Agreement, Motorola shall comply with all local, county, state and federal laws, ordinances, regulations and other rules as are now in effect or as may hereafter be adopted or amended.

19.1 Motorola shall bear sole responsibility for all activities relating to the GWET and other systems, including, but not limited to, their design, construction, operation, maintenance, repair, decommissioning, disassembly, removal and well abandonment, and all monitoring and reporting requirements arising therefrom. Without limiting the generality of the foregoing, Motorola shall bear sole responsibility for compliance with any applicable groundwater quality standards associated with reinjection. Motorola acknowledges that this Agreement does not constitute, and the City has not promised or offered, any type of waiver of, or agreement to waive (or show any type of forbearance or favoritism to Motorola with regard to), any law, ordinance, power, regulation, tax, assessment or other legal requirement now or hereafter imposed by the City or any other governmental body upon or affecting Motorola, the Licensed Properties, City rights-of-way, or any other property provided under this Agreement, or Motorola's use of same. Motorola acknowledges that all of its obligations hereunder are in addition to, and cumulative upon (and not to any extent in substitution or satisfaction of), all existing or future laws and regulations applicable to Motorola. Motorola further agrees that this Agreement is not intended to diminish any performances to the City that would be required of Motorola by law if this Agreement had been made between Motorola and a private citizen.

19.2 The City has not relinquished any right of condemnation or eminent domain over the Licensed Properties, City rights-of-way, or any other property provided under this Agreement. If a future public purpose arises which the City or another governmental entity determines will require use of a portion or all of the Licensed Properties, City rights-of-way, and/or any other property provided under this Agreement, Motorola shall execute and deliver to the City without compensation a document confirming that this Agreement is terminated as to such property. This Agreement is not intended in any way to impair the City's power to enact, apply or enforce any laws or regulations, or exercise any governmental powers that may affect in any way Motorola, the Licensed Properties, City rights-of-way, and/or any other property provided under this Agreement. Without limiting in any way the generality of the foregoing, Motorola shall comply with the following subsections.

19.3. Government Property Use Excise Tax. Motorola shall be responsible for any and all government property excise taxes described in A.R.S. §§ 42-6201, *et seq.* or similar laws in force from time to time, to the extent such taxes are assessed or levied during the term of this Agreement. Failure by Motorola to pay the tax(es) after notice and an opportunity to cure is an Event of Default that could result in the termination of this Agreement in accordance with Section 34, below.

19.4. Taxes, Liens and Assessments. In addition to all other License Fees herein provided, Motorola shall pay, when due and as the same become due and payable, all taxes and general and special fees, charges and assessments of every description, which during the term of this Agreement may be levied upon or assessed against the Licensed Properties, City rights-of-way, and/or any other property provided under this Agreement, the operations conducted thereon, any fees paid or other performances under this Agreement by either Party, and all possessory interest in said properties, and improvements and other property thereon, whether belonging to the City or Motorola; and Motorola agrees to indemnify, defend and hold harmless the City and said properties and improvements and other property thereon, from any and all such taxes and assessments, including any interest penalties and other expenses which may be imposed, and from any lien therefor or sale or other proceedings to enforce payment thereof. Motorola shall have the right to contest, but not the right to refuse to timely pay, any taxes and assessments. Motorola shall pay to the City any occupancy tax as the same may be applicable to this Agreement. The City shall have the right from time to time to require that all of the foregoing payments be made by Motorola through the City. Motorola shall pay all other taxes and assessments of any kind whatsoever which may be imposed on the City or Motorola as a consequence of this Agreement.

19.5. Permits. Motorola shall obtain, at its sole expense, all required local, county, state and federal approvals, licenses and permits, and any other necessary rights, for the design, construction, operation, maintenance, repair, decommissioning, disassembly, and/or removal of the GWET and other systems, including well drilling, installation, testing, operation, maintenance, repair, closure and abandonment, and further including the pumping, withdrawal, extraction, treatment, release, transport, discharge and/or reinjection of groundwater, and/or the injection of ozone. Without limiting the generality of the foregoing, Motorola shall obtain at its sole expense all building or other permits in connection with all construction performed by Motorola and shall comply with all zoning, building safety, fire and similar laws and procedures of every description. Motorola shall provide copies of said approvals, licenses and permits to the City at least seven (7) calendar days prior to exercising any rights under said approvals, licenses and permits.

20. Security. Motorola shall physically secure the Licensed Properties at all times throughout the term of this Agreement, and shall secure City rights-of-way in accordance with the terms and conditions of any encroachment permits issued by the City to Motorola.

21. Notice to Public. Motorola shall, as directed by the City, distribute written notices to residents and businesses within a 100-yard radius of the Licensed Properties, City rights-of-way, all pipeline routes, the reinjection sites, and any other property provided under this Agreement, at least seven (7), but not more than ten (10), calendar days prior to commencing construction of any of the Permitted Uses. The notice shall explain in detail the activities that will occur during each phase of the licensed activities, and shall specify the daily and total duration thereof (including a weekly schedule). If any material changes occur in the schedule of activities, Motorola shall give the City prior written notice and shall distribute supplemental written notices to the affected residents and businesses at least two (2), but not more than four (4), calendar days prior to commencing with the rescheduled activities. Any question as to the materiality of a change in scheduling shall be resolved by the City in the exercise of its sole discretion. All notice(s) shall include the names and telephone numbers of contact persons from Motorola and the City. Motorola shall provide copies of all proposed notice(s) to the City for its review and approval at least seven (7) calendar days prior to the proposed distribution date. If the City fails to comment on the proposed notices prior to the proposed distribution date, the notices are deemed approved by the City and Motorola may distribute the notices as proposed as if approval by the City had actually been given. After the notices have been distributed, if the City, in its sole discretion, determines that any construction activities, either at the Licensed Properties, City rights-of-way, pipeline routes, or any other property provided under this Agreement, will cause unreasonable noise or other disturbance to a neighboring resident or business, the City may require Motorola to alter its construction methods or its work hours in order to minimize the unreasonable noise or other disturbance.

22. Hours of Operation. Unless otherwise approved in writing in advance by the City, all Permitted Uses shall be limited to Monday through Friday from 7:00 a.m. to 6:00 p.m. Notwithstanding the foregoing, the GWET and other systems may be operated on a continuous 24-hour cycle during the term of this Agreement. The City reserves the right, in its reasonable discretion, to require Motorola, at Motorola's sole expense, to modify the GWET and other systems in order to minimize any unreasonable noise or other disturbance.

23. Limitation of Licenses and Exceptions. Motorola's use and occupation of the Licensed Properties, City rights-of-way, and any other property provided under this Agreement shall in all respects conform to the provisions of all and each of the following subsections.

23.1. Permitted Uses. Motorola shall use the Licensed Properties, Facility Property, City rights-of-way, and any other property provided under this Agreement solely in furtherance of the Permitted Uses. No other activity shall be conducted at or from the said properties. The Permitted Uses are further restricted as expressly specified elsewhere in this Agreement and in the following subsections.

23.1.1. Except for persons observing demonstrations of Motorola's operations, Motorola shall exclude all persons from the Licensed Properties, City rights-of-way, and any other property provided under this Agreement, except for Motorola's agents, employees, consultants, contractors, representatives, successors or assigns and other persons whose presence at said properties is necessary to carry out the Permitted Uses.

23.1.2. No alcohol use is permitted at or on the Licensed Properties, City rights-of-way, or any other property provided under this Agreement.

23.1.3. Except as required to achieve the purposes for which the GWET System is designed (i.e., the transport by pipeline of contaminated groundwater for treatment and subsequent reinjection), no hazardous materials (as defined hereinafter) may be produced, transported, treated, used, stored, discharged or released from, on, onto, in or about the GWET or other systems, the Licensed Properties, City rights-of-way, or any other property. Motorola shall immediately notify the City of any release or discharge of any hazardous materials.

23.2. Neighborhood Relations. Motorola shall conduct its activities in coordination with the

City as necessary to maintain good relations with all occupants and/or owners of real property surrounding the GWET and other systems, the Licensed Properties, City rights-of-way, pipeline routes, and any other property provided under this Agreement. Motorola shall immediately give to the City notice of any actual or threatened dispute, violation or other disagreement relating to the GWET and/or other systems, the Licensed Properties, City rights-of-way, pipeline routes, or any other property provided under this Agreement, and/or relating to the design, construction, operation, maintenance, repair, decommissioning, disassembly and/or removal of the GWET and other systems (including well drilling, installation, testing, operation, maintenance, repair, closure, and abandonment).

24. Liens. Motorola shall not agree to or suffer or permit to be created or enforced against the Licensed Properties, City rights-of-way, the Reinjection Wells, or any other property provided under this Agreement, or any parts of any of the foregoing, or any equipment or other personal property attached thereto or otherwise installed or used thereon or in connection therewith, any mortgage, security interest, judgment, deed of trust, lien, claim or demand of any nature whatsoever (collectively "Liens"), and shall promptly discharge, at its sole expense, any and all Liens. Motorola shall notify the City promptly of any and all Liens. Motorola agrees to pay, indemnify, defend and hold the City, the GWET and other systems, the Licensed Properties, City rights-of-way, and other City property free and harmless from all liability and against any and all Liens, together with all costs and expenses in connection therewith, including, but not limited to, attorney fees and expenses, fees and expenses of expert witnesses and consultants, arbitration fees, court costs and the cost of appellate proceedings. The City shall have the right at any time to post and maintain such notices, pay such amounts, file or record such notices, or take such other actions as the City may deem necessary to protect the City against all Liens.

25. Copies of Reports. Motorola shall provide the City with copies of all reports prepared for ADEQ, ADWR, EPA or other local, county, state or federal agency, relating to the permitting, approval, design, construction, installation, testing, shake-down, start-up, operation, maintenance, repair, decommissioning, disassembly, and/or removal of the GWET and other systems (including well drilling, installation, testing, operation, maintenance, repair, closure and abandonment). Motorola shall provide said reports to the City simultaneously upon their first submission to any governmental agency or within fifteen (15) calendar days of their preparation, whichever occurs sooner. Upon request, Motorola shall provide the City with all raw data upon which said reports were based, as well as any other raw data obtained during testing, shake-down, start-up, operation, monitoring or sampling of the GWET and other systems or any of their respective components. Motorola shall provide said raw data within fifteen (15) calendar days of the City's request.

26. Term and Termination of Agreement. The initial term of this Agreement shall be twenty (20) years from the Effective Date; provided the Parties may agree to renew this Agreement for successive twenty (20) year terms. Notwithstanding the foregoing, this Agreement shall earlier terminate upon any of the following: (i) when Motorola permanently stops using or operating either the GWET and/or the other systems (such permanency determined by exercise of the City's reasonable discretion); (ii) when EPA issues a Certificate of Completion (or other such similar document) with respect to the extraction and/or treatment of contaminated groundwater in the upper middle alluvial unit ("UMAU") in the vicinity of Area 7 or with respect to the operation of the GWET and/or the other systems; or (iii) at the City's option, upon a material breach of this Agreement by Motorola and/or an Event of Default as defined in Section 34, below.

29. Closure, Removal and Restoration. In the event Motorola: (i) permanently discontinues use or operation of any of the Extraction Wells or Reinjection Wells (such permanency determined by exercise of the City's reasonable discretion); or (ii) permanently discontinues use or operation of either the GWET and/or the other systems, (such permanency determined by exercise of the City's reasonable discretion), Motorola shall, at its sole expense, abandon the subject well(s) within ninety (90) calendar days in accordance with all applicable local, county, state and federal laws, ordinances, rules and regulations. Motorola shall notify the City in writing within ten (10) calendar days of its decision to discontinue any uses or operation(s) described above. In addition, upon permanently discontinuing use or operation of any well(s), Motorola shall, at its sole expense, decommission, disassemble and/or remove those parts of the GWET and/or the other systems, which are no longer necessary for their operation (e.g., pipelines). Upon permanently discontinuing use or operation of the GWET and/or other systems, Motorola shall, at its sole expense, decommission, disassemble and/or remove the GWET and/or other systems, as applicable, in its/their entirety (including, but not limited to, all components, fixtures, above and below surface pipes, infrastructure, equipment and appurtenances) and restore the Licensed Properties, City rights-of-way, the reinjection sites, and other affected City property to the condition in which they existed on the effective date of this Agreement, or in such better condition as they may hereafter be placed during the term of this Agreement.

30. Repair and/or Restoration. Motorola agrees to repair, replace and/or restore any property (whether real or personal and whether City-owned or otherwise) which is disturbed or damaged in any way by any activities under this Agreement, including, but not limited to, removal and/or remediation of any releases or discharges of hazardous materials (as defined hereinafter).

31. Indemnification of City. Motorola and its successors, assigns and guarantors shall indemnify, defend and hold the City, its agents, employees, officials, directors, officers and representatives harmless from and against any and all claims (and settlements paid in settlement of claims), demands, charges, penalties, obligations, fines, administrative and judicial actions or proceedings, suits, liabilities, judgments, damages, and losses of any kind or nature (including, without limitation, personal injury, bodily injury, sickness, disease, death, property damage, destruction or other impairment of any description (including, without limitation, loss of use), environmental damage, cleanup, response, removal and remediation costs) (and including damage to City property), and all costs and/or expenses of any kind or nature (including, but not limited to, attorney fees and expenses, fees and expenses of expert witnesses and consultants, arbitration fees, court costs and the cost of appellate proceedings) (collectively, "Damages") imposed upon or incurred by or asserted against the City, its agents, employees, officials, directors, officers or representatives by reason of this Agreement and/or any license or permit granted under it, or the discharge of any duties or the exercise of any rights or privileges pursuant or incidental to this Agreement, or, without limiting the generality of the foregoing, arising, directly or indirectly, in whole or in part, out of or in connection with any of the following:

31.1. design, construction, installation, operation, maintenance, repair, decommissioning, disassembly and/or removal of the GWET and/or other systems (including well drilling, installation, testing, operation, maintenance, repair, closure and abandonment), or any other work or thing done in, on or about the GWET and/or other systems, the Licensed Properties, City rights-of-way, other City property, or any other real property by Motorola or any of its agents, employees, consultants, contractors, representatives, successors or assigns;

31.2. any negative impacts on water quality as a result of, or related to Permitted Uses;

31.3. any use, non-use, possession, occupation, alteration, repair, condition, operation, maintenance or management of the Licensed Properties, City rights-of-way, other City property, or any other real property by Motorola or any of its agents, employees, consultants, contractors, representatives, successors or assigns, or any nuisance made or suffered thereon by Motorola or any of its agents, employees, consultants, contractors, representatives, successors or assigns, or any failure by Motorola to keep said property, or any access road, parking area or space comprising a part thereof, in a safe condition;

31.4. any negligence on the part of Motorola or any of its agents, employees, consultants, contractors, representatives, successors or assigns;

31.5. any fire, accident, injury (including death) or damage caused by Motorola or any of its agents, employees, consultants, contractors, representatives, successors or assigns, to any person or property occurring in, on or about GWET and/or other systems, the Licensed Properties, City rights-of-way, other City property, or any other real property, in, on or about any access road, parking area or space comprising a part thereof;

31.6. the release, discharge, use or storage of hazardous materials (as hereinafter defined) upon, about or beneath the Licensed Properties, City rights-of-way, the Reinjection Wells, other City property, or any other real property, by Motorola or any of its agents, employees, consultants, contractors, representatives, successors or assigns;

31.7. any failure on the part of Motorola to perform or comply with any of the terms contained in this Agreement;

31.8. any lien or claim which may be alleged to have arisen against or on the GWET or other systems, the Licensed Properties, City rights-of-way, other City.property, any other real property, or any of the assets of, or funds appropriated to the City, or any liability which may be asserted against the City with respect thereto, to the extent such lien or claim arises from acts or failures to act by Motorola or any of its agents, employees, consultants, contractors, representatives, successors or assigns during the term of this Agreement, or from Motorola's failure to perform or comply with any of the terms contained in this Agreement;

31.9. any transaction relating to or arising out of this Agreement, or any activities performed by Motorola, its agents, employees, consultants, contractors, representatives, successors or assigns which are permitted or required by the terms of this Agreement, including the reinjection of water into the UAU and the discharge of effluent from the GWET System into the City's Sanitary Sewer.

31.10. The obligations of Motorola under this Section shall apply to all Damages of any kind whatsoever, even though caused solely or partially by the acts, mistakes, errors, omissions or negligence of the City, its agents, employees, officials, directors, officers or representatives, or anyone for whose acts, mistakes, errors, omissions or negligence the City or Motorola may be liable, including, without limiting the generality of the foregoing, Damages which are imposed upon or incurred by or asserted against the City, its agents, employees, officials, directors, officers or representatives as a result of, or arising from, any release or discharge from the GWET System, or as a result of, or arising from, any negative effects on water quality from operation of the other systems.

31.11. The obligations of Motorola under this Section shall not in any way be affected by the absence of any insurance coverage or by the failure or refusal of any insurance carrier to perform any obligation on its part under insurance policies affecting the GWET or other systems, the Licensed Properties, City rights-of-way, other City property, or any other property.

31.12. If any claim, action or proceeding is made or brought against the City by reason of any event to which reference is made in this Section, then, upon demand by the City, Motorola, at its sole cost and expense, shall resist and defend such claim, action or proceeding in the City's name, if necessary, through counsel reasonably approved by the City, even if such claim, action or proceeding is groundless, false or fraudulent. Notwithstanding the foregoing, the City may engage its own attorneys at its own expense to defend it or to assist in its defense. The City shall cooperate in the defense of any claim, action or proceeding the defense of which is accepted by Motorola and shall make records and employees of the City available under reasonable terms and conditions to Motorola and its attorneys for the purposes of providing information and/or witnesses. Motorola shall pay and discharge, when and as the same become due, any and all such resulting Damages or other sums due against or incurred by the City or any other indemnitees.

31.13. Any settlement of claims shall fully release and discharge the indemnified parties from any further liability for those claims. The release and discharge shall be in writing and shall be subject to the approval of the City, which approval shall not be unreasonably withheld or delayed. If the City unreasonably refuses to approve such settlement and subsequently a judgment is entered in excess of the settlement proposal, Motorola shall be liable only for the amount of the proposed settlement. If Motorola neglects or refuses to defend the City as provided in this Agreement, then (i) any arbitration award or judgment against the City for a claim covered by this Agreement shall conclusively establish Motorola's liability to the City in connection with such recovery, and (ii) if the City desires to settle such dispute, the City shall be entitled to settle the dispute in good faith, after consultation with Motorola, and Motorola shall be liable for the amount of such settlement.

31.14. The indemnifications contained in this Agreement shall survive the termination of this Agreement and shall inure to the benefit of the City, its agents, employees, officials, directors, officers and representatives.

31.15. For purposes of this Agreement, "hazardous material" means any hazardous or toxic substance, waste or material:

31.15.1. the presence of which requires investigation, removal and/or remediation under any federal, state or local statute, regulation, ordinance, order, action, policy or common law; or

31.15.2. which is or becomes subject to regulation under any federal, state or local statute, regulation, rule or ordinance or amendments thereto including, without limitation, the Arizona Hazardous Waste Management Act, A.R.S. §§ 49-901, *et seq.*, the Resource Conservation and Recovery Act, 42 U.S.C. §§6901, *et seq.*, the Toxic Substances Control Act, 15 U.S.C. §§ 2601, *et seq.*, and the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§ 9601, *et* seq.); or

31.15.3. which, without limitation, contains trichloroethene ("TCE"), 1,1, 1 - trichloroethane ("TCA"), 1,1 - dichloroethene ("DCE"), tetrachloroethene ("PCE"), 1 ,2- dichloroethene, chloroform, gasoline, diesel fuel or other petroleum hydrocarbons, polychlorinated biphenyls ("PCBs"), asbestos, urea formaldehyde foam insulation or radon gas.

32. Insurance. Motorola shall insure the GWET and other systems, the Licensed Properties, City rights-of-way, other City property, and any other property used by Motorola and/or any of its agents, employees, consultants, contractors, representatives, successors or assigns, and Motorola's activities under this Agreement and/or any license or permit granted under it, or the discharge of any duties or the exercise of any rights or privileges under this Agreement, at Motorola's sole expense as follows:

32.1. Insurance Required. As of the effective Date of this Agreement, Motorola carries, and shall, throughout the term of this Agreement and any extension, maintain insurance in the amounts and provide the coverages as stated in Exhibit "K". All of Motorola's insurance is in full force and effect, all premiums due have been paid, and Motorola is not in default with respect to any policy of insurance. Motorola shall deliver to the City its certificate(s) of insurance, which certificate(s) will be subject to the inspection and approval of the City for adequacy and protection. The policies and insurance required by this Agreement shall include the City as an additional insured by blanket endorsement and shall provide that the City will be given at least thirty (30) days prior written notice of cancellation of the policy or policies, or any non-payment of premiums. Motorola's fulfillment of its insurance requirements under this Agreement will also be credited against Motorola's insurance requirements under any other agreement between the Parties, this being intended to assure that all such agreements are covered by the same insurance.

32.2. Insurance Proceeds. All insurance proceeds (whether actually paid before or after termination of this Agreement) shall be paid per policy terms and conditions.

32.3. Risk of Loss. Motorola assumes the risk of any and all loss, damage or claims to the GWET and other systems, the Licensed Properties, City rights-of-way, other City property, and any other property, or related to the use of said system and properties by Motorola, its agents, employees, consultants, contractors, representatives, successors or assigns throughout the term hereof. The City expressly disclaims any representation that required insurance is adequate to protect any person or property against any risks related to the GWET and other systems, the Licensed Properties, City rights-of-way, other City property, and any other property, or any activities, uses or improvements related to said systems and properties. Motorola's obligations to indemnify do not diminish in any way Motorola's obligations to insure; and Motorola's obligations to insure do not diminish in any way Motorola's obligations to indemnify. Motorola's obligations to indemnify and provide insurance are in addition to, and do not limit, any and all other liabilities or obligations of Motorola under or connected with this Agreement. Motorola shall be responsible for any and all damages to its property and equipment used in the scope of this Agreement and shall hold harmless and indemnify the City regardless of the cause of such damages. In the event the City secures other insurance related to the GWET and other systems, the Licensed Properties, City rights-of-way, other City property, and any other property, Motorola shall effect an endorsement under such policy waiving any and all insurer's rights of subrogation against the City and the other Additional Insureds.

33. Effect on Participation Agreement. This Agreement is not intended to, and shall not in any way, alter, amend or modify the terms of the Participation Agreement, or the rights and responsibilities of the parties thereunder.

34. Breach by Motorola. Motorola shall comply with, perform and do each performance and thing required of Motorola herein and Motorola's failure to do so shall be a breach by Motorola of this Agreement.

34.1. Events of Default. This entire Agreement is made upon the condition that each and every one of the events specified in the following subsections (as well as any other grounds for termination specified in this Agreement) shall be deemed an "Event of Default" and a material breach by Motorola of Motorola's material obligations under this Agreement.

34.1.1. If Motorola shall be in arrears in the payment of License Fees and shall not cure such arrearage within fifteen (15) days after the City has notified Motorola in writing of such arrearage.

34.1.2. If Motorola shall abandon the Licensed Properties and/or any other property provided under this Agreement.

34.1.3. If Motorola, its agents, employees, consultants, contractors, representatives, successors or assigns shall fail to maintain any insurance required by this Agreement.

34.1.4. If any representation or warranty made by Motorola, its agents, employees, consultants, contractors, representatives, successors or assigns in connection with this Agreement or the negotiations leading to this Agreement shall prove to have been false in any material respect when made.

34.1.5. If Motorola shall fail to obtain or maintain any licenses, permits, or other governmental approvals from the City or any other governmental or regulatory body, or to timely pay any taxes, fees, charges or assessments with respect to this Agreement, the Licensed Properties, and/or any other property provided under this Agreement, or the use of same by Motorola, its agents, employees, consultants, contractors, representatives, successors or assigns.

34.1.6. If there should occur any discharge or release from the other systems, or from the GWET System, other than as required to achieve the purposes for which the GWET System is designed (i.e., the transport by pipeline of contaminated groundwater for treatment and subsequent reinjection), or any discharge or release onto, into or about the Licensed Properties, City rights-of-way, or any other property. Motorola shall immediately notify the City of any release or discharge.

34.1.7. If Motorola shall fail (or neglect) to timely and completely do or perform or observe any other provisions contained herein and required on its part to be kept *or* performed and such failure or neglect shall continue for a period of fifteen (15) days after the City has notified Motorola in writing of Motorola 's default hereunder.

34.1.8. If Motorola shall persist in a pattern of repeated failure (or neglect) to do or perform or observe any provision contained herein.

34.2. City Remedies. Upon the occurrence of any Event of Default or at any time thereafter, the City may, at its option and from time to time, exercise any or all or any combination of the following remedies in any order and repetitively:

34.2.1. The City's right to terminate this Agreement for nonpayment of License Fees or for any other Event of Default is hereby specifically provided for and agreed to.

34.2.2. Without demand or notice, enter into and upon the Licensed Properties, City rights-of-way, and/or any other property provided under this Agreement, or any part thereof, and expel Motorola and those claiming by, through or under it, and remove their effects, if any, forcibly if necessary, without being deemed guilty of trespass and without prejudice to any other remedy.

34.2.3. Pay or perform, for Motorola's account and at Motorola's expense, any or all payments or performances required hereunder to be paid or performed by Motorola.

34.2.4. Abate at Motorola's expense any violation of this Agreement.

34.2.5. Notwithstanding anything in this Agreement to the contrary, upon prior written notice to Motorola, unilaterally and without Motorola's or any other person's consent or approval, draw upon, withdraw or otherwise realize upon or obtain the value of any insurance policies held or obligated by Motorola, the City or any third party pursuant to this Agreement (whether or not specifically mentioned herein), and use the proceeds for any remedy permitted by this Agreement. Motorola hereby irrevocably grants to the City a power of attorney coupled with an interest to act for Motorola in all respects with respect to any of the foregoing.

34.2.6. Refuse, without any liability to Motorola therefor, to perform any obligation imposed on the City by this Agreement.

34.2.7. Be excused from further performance under this Agreement.

34.2.8. Insist upon Motorola's full and faithful performance under this Agreement and upon Motorola's full and timely payment of all License Fees during the entire remaining term of this Agreement.

34.2.9. Assert, exercise or pursue, at Motorola's expense, any and all other rights or remedies, legal or equitable, to which the City may be entitled or which are otherwise permitted by law.

34.3. Notice of Breach. Motorola shall promptly give notice to the City of any event or circumstance which is (or which with the passing of time or the giving of notice or both will become) an Event of Default under this Agreement.

34.4. Non-waiver. Motorola acknowledges its unconditional obligation to comply with this Agreement. No failure by the City to demand any performance required of Motorola under this Agreement, and no acceptance by the City of any imperfect or partial performance under this Agreement, shall excuse such performance or impair in any way the City's ability to insist, prospectively and retroactively, upon full compliance with this Agreement. No acceptance by the City of License Fees or other performances hereunder shall be deemed a compromise or settlement of any right the City may have for additional or further payments or performances. Any waiver by the City of any breach of condition or covenant herein contained to be kept and performed by Motorola shall not be deemed or considered as a continuing waiver and shall not operate to bar or otherwise prevent the City from declaring a default for any breach or succeeding breach either of the same condition or covenant or otherwise. No statement, bill or notice by the City concerning payments or other performances due hereunder, or failure by the City to demand any performance hereunder, shall excuse Motorola from compliance with this Agreement nor estop the City (or otherwise impair the City's ability) to at any time correct such notice and/or insist prospectively *and* retroactively upon full compliance with this Agreement. No waiver of any description (INCLUDING ANY WAIVER OF THIS SENTENCE OR SUBSECTION) shall be effective against the City unless made in writing by a duly authorized representative of the City specifically identifying the particular provision being waived and specifically stating the scope of the waiver. MOTOROLA EXPRESSLY DISCLAIMS AND SHALL NOT HAVE THE RIGHT TO RELY ON ANY SUPPOSED WAIVER OR OTHER CHANGE OR MODIFICATION, WHETHER BY WORD OR CONDUCT OR OTHERWISE, NOT CONFORMING TO THIS SUBSECTION.

34.5. Reimbursement of the City's Expenses. Motorola shall pay to the City upon demand any and all amounts expended or incurred by the City in performing Motorola's obligations.

34.6. Delivery of Possession. Motorola shall, at the expiration of the term hereof or upon any sooner termination thereof, without demand, peaceably and quietly quit and deliver up the Licensed Properties, City rights-of-way, and any other property provided under this Agreement to the City thoroughly cleaned, maintained and repaired and in as good condition as the same now are or in such better condition as the same may hereafter be placed by Motorola or the City.

35. Assignment. This Agreement is not assignable by Motorola (and any assignment shall be void at the City's election) except in strict compliance with the following subsections.

35.1. Assignments Prohibited. Motorola shall not make or suffer to occur any assignment of this Agreement or any rights or interests hereunder without first receiving from the City written notice of the City's consent to the assignment. Without limiting the generality of the foregoing, references in this Agreement to assignments by Motorola shall be deemed to apply to all of the following transactions, circumstances and conditions:

35.1.1. Any voluntary or involuntary assignment, transfer, pledge, or lien of the Licensed Properties and/or any other property provided under this Agreement or any interest therein or any rights under this Agreement.

35.1.2. The use, occupation, management, control or operation of the Licensed Properties, City rights-of-way, and/or any other property provided under this Agreement or any part thereof by anyone other than those persons expressly authorized under this Agreement.

35.1.3. Any direct or indirect transfer of the management or control of Motorola or the Licensed Properties, City rights-of-way, or any other property provided under this Agreement.

35.1.4. Any assignment for the benefit of creditors, voluntary or involuntary.

35.1.5. Any bankruptcy or reorganization.

35.1.6. The occurrence of any of the foregoing by operation of law.

35.2. Assignment Remedies. The City may, in its sole discretion and in addition to all other remedies available to the City under this Agreement or otherwise and in any combination, collect License Fees from the assignee or occupant and apply the net amount collected to the License Fees required to be paid.

35.3. Effect of Assignment. No assignment, transfer, occupancy or collection shall be deemed a waiver of the prohibition on assignments or any other provision of this Agreement, or the acceptance of the assignee or occupant as a successor to Motorola, or a release of Motorola from the further performance by Motorola of the provisions of this Agreement. The consent by the City to an assignment shall not relieve Motorola from obtaining the consent in writing of the City to any further assignment. Upon any assignment(s) of its interest(s) hereunder, Motorola shall not be released of any liability but shall remain fully and personally obligated under this Agreement.

35.4. Enforceability after Assignment. No consent by the City to any assignment shall be deemed to expand or modify this Agreement. This Agreement shall control any conflict between this Agreement and the terms of any assignment. This Agreement shall be enforceable personally and in total against Motorola and each successor, partial or total, and regardless of the method of succession, to Motorola's interest hereunder. Each successor having actual or constructive notice of this Agreement shall be deemed to have agreed to the preceding sentence.

35.5. Grounds for Refusal. No assignments of this Agreement are contemplated or bargained for. The City has the absolute right for any reason or for no reason in its sole discretion to give or withhold consent to any assignment or to impose any conditions upon any assignment.

35.6. Assignment by the City. The City shall have the right from time to time to assign its interests in this Agreement to the then owner of fee title to the Licensed Properties and/or any other property provided under this Agreement. Upon any such assignment, the City's liability with regard to this Agreement shall terminate.

36. Future Agreement(s). Motorola hereby acknowledges, understands and agrees that the rights granted it by the City under this Agreement shall in no way, either during the term of this Agreement or otherwise, obligate the City to enter into any future negotiations or agreement(s) with Motorola regarding: (1) the activities licensed or permitted by this Agreement; (2) the drilling, installation, testing or operation of any additional extraction or reinjection wells; or (3) the installation, testing and operation of any additional form of groundwater pumping, withdrawal, extraction, transport, treatment, discharge and/or reinjection system.

37. Governing Law. The validity, construction, interpretation and administration of this Agreement will be governed by the laws of the State of Arizona. The parties agree that in the event any action is commenced in connection with this Agreement, venue for such action or proceeding shall be proper only in a court of competent jurisdiction located in Maricopa County, Arizona, and the parties hereby waive any right to object to such venue.

38. Attorney Fees, Expenses and Court Costs. In the event that either the City or Motorola shall commence an action to enforce the terms and conditions of this Agreement or any encroachment permits issued pursuant to this Agreement, or to obtain damages against the other party arising from any default under or violation of this Agreement or any encroachment permits issued pursuant to this Agreement, then the prevailing party shall be entitled to and shall be paid reasonable attorney fees and expenses, fees and expenses of expert witnesses and consultants, arbitration fees, court costs and the cost of appellate proceedings.

39. Severability. In the event any term, condition, covenant, stipulation, agreement or provision herein contained is held to be invalid or unenforceable for any reason, the invalidity of any such term, condition, covenant, stipulation, agreement or provision shall in no way affect any other term, condition, covenant, stipulation, agreement or provision herein contained. Further, this Agreement shall be deemed automatically reformed to secure to the City to the very maximum extent permitted by law the legal, equitable, practical and other benefits of the written provisions of this Agreement.

40. Incorporation of Exhibits. All exhibits attached hereto are incorporated into this Agreement.

41. Time of Essence. Time is of the essence of each and every provision of this Agreement.

42. Section and Subsection Headings. The section and subsection headings contained herein are for convenience in reference only and not intended to define or limit the scope of any provision of this Agreement.

43. No Third Party Beneficiaries. No person or entity shall be a third party beneficiary to this Agreement.

44. Binding Effect. This Agreement, and the terms, provisions, covenants and conditions hereof, shall be binding upon and shall inure to the benefit of the parties hereto and their respective heirs, legal representatives, successors and assigns, subject, however, to the restrictions on assignment contained herein.

45. Amendments. Any and all amendments to this Agreement must be in writing and signed by duly authorized representatives of the City, Motorola, and SMI.

46. Relationship Created. It is specifically acknowledged and agreed between the City and Motorola that the sole and exclusive relationship between the parties under this Agreement is that of licensor and licensee and indemnitor and indemnitee. Nothing contained within this Agreement shall be deemed or construed to create a partnership, joint venture, principal and agent, landlord and tenant, or any other relationship between the City and Motorola.

47. No Effect on Relationship Between Motorola and SMI. Motorola's obligations to SMI under its separate agreement with SMI are not affected by the terms of this Agreement and that other separate agreement shall remain in full force and effect only as to and between Motorola and SMI.

48. Further Assurances. Motorola agrees to do such further acts and things and to execute and deliver such additional agreements and instruments as the City may reasonably require to consummate, evidence, confirm or carry out this Agreement.

49. Construction. Whenever the context of this Agreement requires, the singular shall include the plural, and the masculine shall include the feminine. This Agreement shall be construed according to its plain meaning and neither for nor against any party hereto.

50. Survival of Liability. All warranties and indemnities of Motorola hereunder shall survive termination of this Agreement for any reason.

51. Approvals and Inspections. All approvals, reviews and inspections by the City under this Agreement or otherwise are for the City's sole benefit and not for Motorola's benefit.

52. Statutory Cancellation Right. In addition to its other rights hereunder, the City shall have the rights specified in A.R.S. § 38-511.

53. Entire Agreement. This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof and supersedes any prior agreement, understanding, negotiation or representation regarding the Licensed Properties, City rights-of-way, and/or any other property provided under this Agreement.

54. Contract Administrators. The City Contract Administrator shall be the Water Resources Director or designee. The City Contract Administrator shall be authorized to represent the City on all matters relating to the performance and enforcement of this Agreement. Within 30 days of Agreement execution, Motorola and SMI shall each designate contract administrators and shall send notice to the other Parties of their designated contract administrators along with contact information. Contract administrators shall be authorized to represent each respective Party on all matters relating to the performance and enforcement of the Agreement. The Parties shall notify each other within 30 days of change in contract administrator.

55. Notices. Except as otherwise provided, any notices or other communications contemplated by, required or made pursuant to this Agreement shall be in writing, and shall be hand-delivered or mailed by registered or certified mail, return receipt requested, postage prepaid addressed to:

To the City:
Water Resources Division Director
City of Scottsdale
9379 E. San Salvador
Scottsdale, Arizona 85258

Copies to:
City Attorney
City of Scottsdale
3939 North Drinkwater Boulevard
Scottsdale, Arizona 85251

To Motorola:
Motorola Solutions, Inc.
Attention: Terry A. Bell
1303 E. Algonquin Road
Schaumberg, Illinois 60196

To SMI:
SMI Holding LLC
Attention: Susan O'Connor
Vice President, SMI Holding LLC
3850 Quadrangle Blvd., MC SRE-222,
Orlando, FL 32817
Email: sue.oconnor@siemens.com

or to such other street address as may be designated by the respective parties in writing from time to time. Notices shall be deemed effective when received, and shall be deemed received when personally delivered or seventy-two (72) hours after they are postmarked, if mailed.

56. Counterparts. This Agreement may be executed in counterparts and each counterpart executed by any of the undersigned, together with all other counterparts so executed, shall constitute a single instrument and agreement of the undersigned.

57. Authority of Parties. Any individual executing this Agreement on behalf of any party hereby represents and warrants that he or she is duly authorized to execute this Agreement on behalf of said party.

EXECUTED as of the date first written above.

SMI HOLDING LLC

By: Samuel R. O'Connor

VICE PRESIDENT, SMI HOLDING LLC

SMI HOLDING LLC

By: ______________________

SMI HOLDING LLC

By: ______________________

SMI HOLDING LLC

By: ______________________
Alan B. Cardenas
Secretary

MOTOROLA SOLUTIONS, INC.

By: Terry A. Bell
Terry A. Bell

CITY OF SCOTTSDALE

ATTEST:

W.J. "Jim" Lane, Mayor

Carolyn Jagger, City Clerk

REVIEWED AND APPROVED:

Brian K. Biesemeyer, Director
Water Resources Division

Katherine Callaway

Katherine Callaway
Risk Management Director

APPROVED AS TO FORM:
Bruce Washburn, City Attorney

By: Janis L. Bladine
Janis L. Bladine
Senior Assistant City Attorney

List of Exhibits

Exhibit	Paragraph	Description
A	Recitals	Design Report- North Indian Bend Wash Area 7 Groundwater Extraction and Treatment System, dated April 3, 1997
B	Recitals	October 10, 1997 Addendum to Design Report
C	Recitals	EPA's approval of the design and specifications of the GWET and the other systems and Area 7 remedial action work
D	3.0	Facility Property Description
E	4.0	Extraction Wells and Extraction Wells Property
F	4.0	Extraction Pipeline and Extraction Pipeline Property
G	5.0	Reinjection Wells and Reinjection Wells Property
H	5.0	Reinjection Pipeline and Reinjection Pipeline Property
I	12.0	Site Features Map
J	11.1	Additional Encroachment Permit Conditions
K	32.1	Insurance Requirements

Exhibit A
Design Report- North Indian Bend Wash Area 7 Groundwater Extraction and Treatment System, dated April 3, 1997

Design Report
North Indian Bend Wash - Area 7
Groundwater Extraction and Treatment System

April 3, 1997
1583.97-009

Prepared for

Siemens Components, Inc.
10950 North Tantau Avenue
Cupertino, California

Levine·Fricke·Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

Printed on recycled paper

October 31, 1997 LFR 1583.98-9

Mr. Paul Norman
City of Scottsdale
3939 Civic Center Blvd
Scottsdale, Arizona 85201

Subject: Location of Re-injection Wells and Sanitary Sewer Connection for Discharge of Treated Effluent from NIBW Area 7 MAU Groundwater Extraction and Treatment System, Scottsdale, Arizona

Dear Paul,

This letter is submitted to you on behalf of Siemens Microelectronics and is a description of the subject locations.

Subject to utility clearance, the re-injection wells will be located within an area bounded as follows.

Found COS monument at intersection of 1st Street and 75th Street. Centerline (CL) of 1st Street defined by line between monument at 1st/75th and 1st/Miller. From 1st/75th monument, 656.79 feet, S 89°57'50" E to CL monument at 1st/Miller.

SW corner of "Area for Reinjection Wells" is 222.85 feet, S 89°57'50" E from 1st/75th monument. Area bound by line N 0°2'10" E, 14.59 feet (to front of curb), line S 89°58'16" E, 66.58 feet (along front of curb), line S 0°2'10" W, 14.60 feet (to 1st Street CL), line N 89°57'50" W, 66.58 feet (to SW corner of "Area for Reinjection Wells").

This area is basically the area in the pavement on the north side of the CL of 1st Street in front of the building at 7522 E. 1st Street. Mike Mahoney and I discussed that LFR/Siemens will make every effort possible place the wells a close to curb as possible. We will not be able to make this determination until utility clearance has been accomplished.

The sanitary sewer connection will be made at COS Sanitary Sewer manhole located in west side of Miller Road adjacent to Circle K located at 3640 North Miller Road. There are not any other manholes in this immediate vicinity, so I think this will suffice.

Please feel free to call me if there is any additional information I may provide.

Sincerely,

Ned Overs, P.E.
Senior Project Engineer

Cc: Mike Mahoney, COS
Mary Stockel, Siemens

Levine·Fricke·Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

October 10, 1997 1583.98-009

Ms. Emily Roth
United States Environmental Protection Agency
Office of Superfund Programs
75 Hawthorne Street (H-7-2)
San Francisco, California 94105-3901

Subject: Addendum to NIBW Area 7 MAU Groundwater Response Action Design Report

Dear Ms. Roth:

On behalf of Siemens Components, Inc. (Siemens), this letter is submitted as an addendum to the report entitled "Design Report, North Indian Bend Wash Area 7, Groundwater Extraction and Treatment System," dated April 3, 1997 ("the Design Report"). The Design Report described Siemens' proposed plan to implement the Area 7 Middle Alluvial Unit (MAU) groundwater response action. This addendum addresses end-use of the treated groundwater and control of air stripper off-gas emissions. Two minor changes in construction of the treatment plant are also included in this addendum.

Treated Groundwater End-Use

In Section 8.6 of the Design Report, discharge of treated groundwater to Salt River Project's (SRP's) *irrigation network* at Osborn and Thomas Road was described as the selected alternative for groundwater end-use. In this scenario, treated groundwater from Area 7 would be conveyed by underground pipeline to SRP's junction box located at Osborn and Thomas Road. From the junction box, the water would gravity flow into North El Dorado Park Lake through SRP's system. North El Dorado Lake is used for irrigation water in the park and at a neighboring golf course, although demands from those users are less than the proposed delivery rate of 385 gallons per minute (gpm) from the Area 7 treatment system. As a result, Area 7 treated water would be the sole source of water to North El Dorado Lake and a flow-through situation would occur where excess water would discharge into a small creek and continue to other lakes in NIBW. Ultimately, any excess water that reached the southern end of NIBW would be pumped by SRP to the Grand Canal for use as irrigation water.

Since developing that alternative, Siemens has consulted with the City of Scottsdale, ADEQ, Arizona Department of Water Resources (ADWR), and EPA to examine other options and re-evaluate end-use alternatives for treated groundwater. All of those parties expressed interest in direct groundwater recharge as an alternative. Therefore, with the assistance of the City of Scottsdale, suitable locations for recharge wells were identified and a new recharge end-use alternative was developed.

Recharge of Treated Groundwater

Siemens is proposing that the selected alternative for treated groundwater end-use be changed from delivery to SRP's irrigation system to direct recharge to the Upper Alluvial Unit (UAU) north of Area 7. Direct groundwater recharge at existing SRP well No. 22.3E, 7N was considered in the original Design Report, but was excluded because the water would be reinjected into contaminated areas and may impact the existing OU-1 extraction and treatment remedy. With the assistance of the City of Scottsdale, however, suitable locations for UAU recharge wells have been identified north of Area 7. Recharge to the UAU north of Area 7 will not negatively impact existing remedies. In fact, recharge in this area may expedite the remediation of the saturated UAU beneath Area 7 through flushing from upgradient. Direct recharge to the UAU will also conserve the local groundwater resource for its maximum beneficial use.

Figure 1 shows the location of proposed UAU recharge wells north of NIBW Area 7 on 1st Street. At the proposed recharge well location, the UAU is likely to be either unsaturated or have a thin saturated zone (less than 10 feet) just above the UAU/MAU contact. UAU sediments are expected to consist of highly permeable sand and gravel deposits from approximately 50 feet below ground surface (bgs) to 150 feet bgs. Above 50 feet bgs, the UAU is predominately silt and clay. Based on aquifer testing at 7EX-1UA, the saturated UAU in the vicinity of the recharge area has a hydraulic conductivity of approximately 300 feet/day. At a recharge rate of approximately 385 gpm, the unconfined and unsaturated UAU should readily accept the recharge water without substantial mounding using a single recharge well. A second recharge well located approximately 20 to 50 feet away from the first is proposed as a back-up to reduce down time in the event that periodic well maintenance is needed to enhance recharge capacity.

The proposed recharge wells will have a minimum diameter of eight inches and will be constructed as shown in Figure 2. The recharge wells will be completed with slotted casing from approximately 55 feet bgs to the base of the UAU. An injection pipe will be located inside the well casing to a depth of approximately 10 feet above the base of the well. A high-water level monitoring device will be installed in each recharge well. Activation of the high-level alarm will shut down the extraction wells. Periodic inspection and maintenance, including disinfection of the recharge wells, will be performed if the ability of the well to transmit water to the alluvial unit appears to decrease with time.

Permitting

According to ADWR, the extraction and recharge activities will be conducted in response to a CERCLA action and are exempt from permitting within that agency. Similarly, ADEQ has advised that no aquifer protection (AP) permitting will be required for the proposed recharge activities unless water quality in the UAU is being degraded by the recharge activities. With respect to naturally occurring constituents (TDS, metals, nitrates, and common cations and anions), groundwater in the MAU is generally of higher quality than groundwater in the UAU. The groundwater extracted from the MAU will be treated to reduce VOCs to drinking water standards before being recharged to the UAU. As such, it is not anticipated that water quality in the UAU will be degraded by these recharge activities.

Monitoring

The existing UAU monitor well network will be used to monitor water quality in the UAU in the vicinity of Area 7, downgradient of the recharge wells. The wells will be monitored on a semi-annual basis in accordance with the current sampling schedule for the NIBW monitor well network. Water quality of treatment system effluent will be monitored more frequently in accordance with sampling schedules to be outlined in the treatment system operations and maintenance manual that will be developed and submitted to EPA for approval.

Treatment System VOC Emissions Control

The proposed treatment system design included two vapor-phase granular activated carbon (GAC) adsorbers in a series configuration to remove VOCs from the air stripper off-gas prior to discharge to the atmosphere. Air quality modeling was conducted to determine the acceptable VOC emission rate from the treatment system that would not pose a significant health risk to nearby receptors in the vicinity of Area 7. Appendix H of the Design Report presents the methods and results of the air quality modeling. The modeling data indicated that up to 1.49 pounds of trichloroethene (TCE) could be discharged to the atmosphere while still meeting the acceptable risk criteria based on Arizona Ambient Air Quality Guidelines. The proposed strategy for the VOC emission control system was to remove the GAC adsorbers when the VOC emissions were less than 1.49 pounds per day.

Although the emissions limit developed from the air quality modeling complies with Arizona Ambient Air Quality Guidelines, several issues regarding the acceptability of this limit have arisen since publication of the Design Report. In order to expedite approval and implementation of the Area 7 MAU groundwater response action, Siemens has agreed not to remove the GAC adsorbers upon meeting specific emissions criteria as proposed. Siemens may choose to re-address this issue with EPA at a later date after reviewing the operating and monitoring data from the proposed system.

Treatment Plant Design Modifications

The foundation for the treatment plant building will be a flat concrete slab designed to support the planned pre-fabricated metal structure and groundwater treatment equipment. The on-site inventory of hydrogen peroxide for the UV/Oxidation system will be stored in a double-contained cross-linked polyethylene tank located on a separate concrete foundation outside to the south of the building.

The extracted groundwater conveyance piping will be SDR-21 high density polyethylene (HDPE) piping rated for 80 pounds per square inch (psi) working pressure. The maximum operating pressure within the conveyance piping is estimated at less than 20 psi at the well head for well 7EX-4MA.

Siemens would like to begin implementation of the Area 7 MAU groundwater response action as soon as possible. We will appreciate your timely approval of the Design Report and this addendum for NIBW Area 7 MAU groundwater response action.

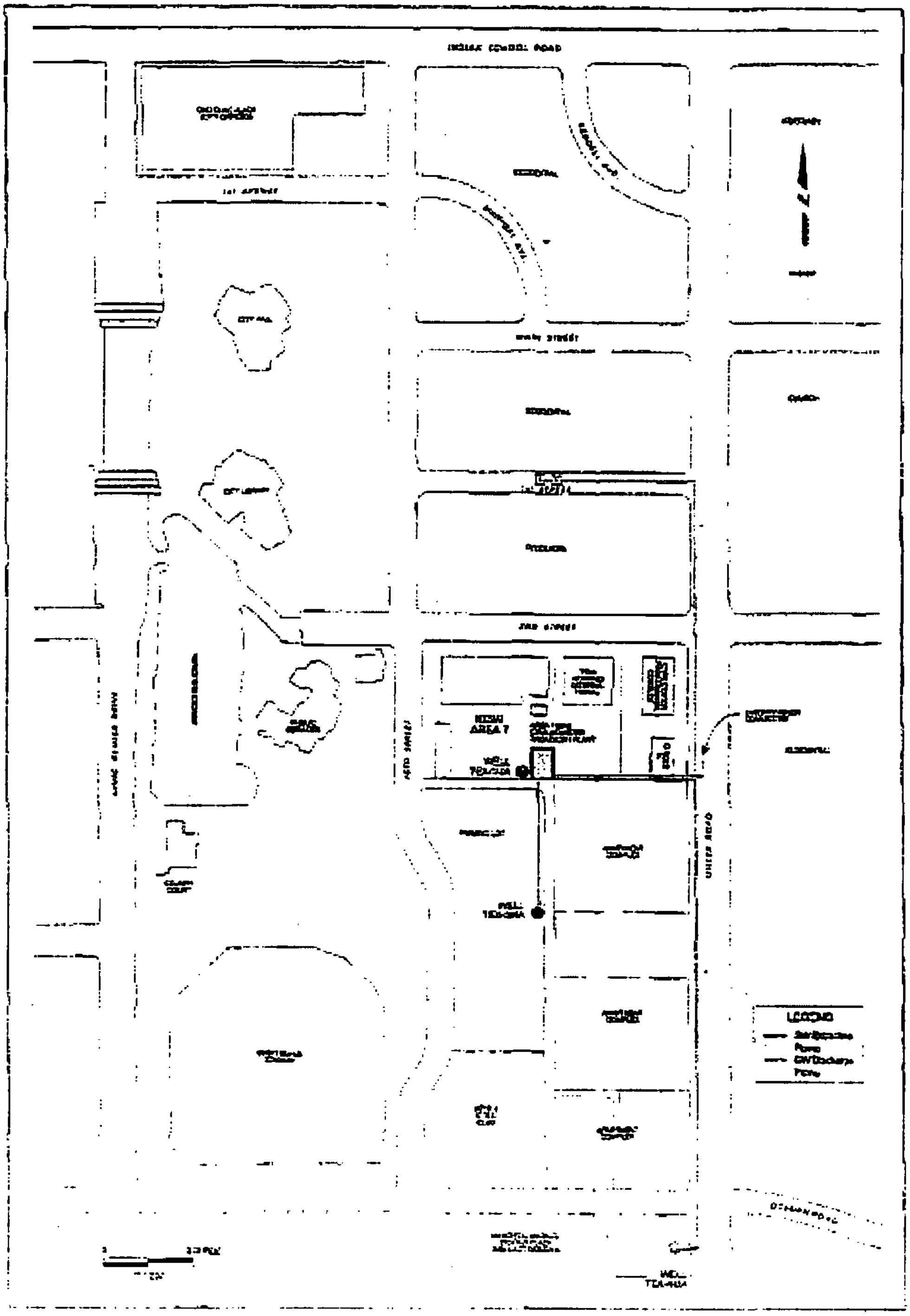
Please call Bradley D. Cross, R.G., Principal Hydrogeologist, at (602) 905-9311 or me at (916) 786-0320 if you have any questions.

Sincerely,

James A. Lutton, P.E.
Senior Associate Engineer

Attachments

cc: John Wyss, Siemens Components, Inc.
Mary Stockel, Siemens Corporation
Mike Vandenbergh, Latham and Watkins
Ed Pond, ADEQ
Winifred Au, CH2M Hill
Tim Graves, CH2M Hill
Maria Mahar, COS
Kevin Wanttaja, SRP



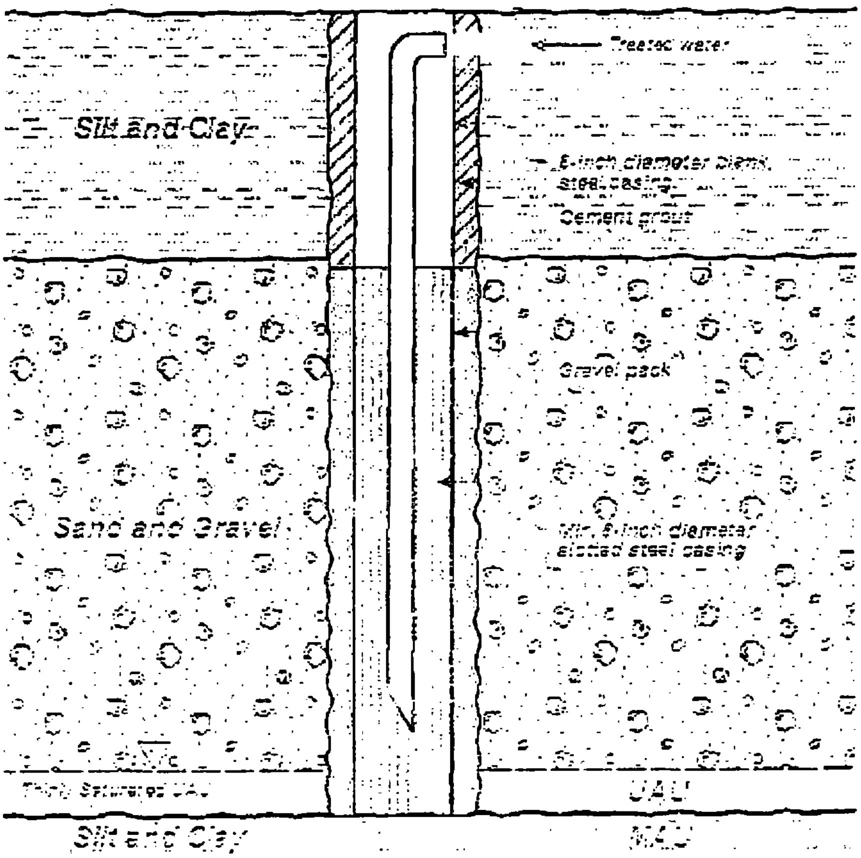
NIBW Area 7 - Site Plan Showing Well and Pipe Locations

Levine-Fricke-Recon

Figure 1

Exhibit A

Attachment 3



Generalized Construction Schematic for Recharge Well

Levine·Fricke·Recon

Project No. [illegible]

SIEMENS · NORTH INDIAN BEND WASH

Figure 2

CONTENTS

TABLES

FIGURES

APPENDICES

CERTIFICATION

All engineering information, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by a Levine·Fricke·Recon Arizona Professional Engineer.

Mark D. Knox **Principal Engineer** **Arizona Professional Engineer (26751)**	**Date**

1.0 INTRODUCTION

Groundwater monitoring has indicated the presence of volatile organic compounds (VOCs) in Middle Alluvial Unit (MAU) groundwater in the immediate vicinity of a former facility that has been designated by the U.S. Environmental Protection Agency (EPA) as North Indian Bend Wash (NIBW) Area 7 (Figure 1). The NIBW Consent Decree for Operable Unit- (OU-) II identifies Siemens as a responsible party for remedial investigation and response activities at NIBW Area 7. As such, Siemens has initiated an evaluation of potential response actions to address the VOCs in upper MAU groundwater beneath Area 7.

A conceptual work plan for groundwater extraction and treatment (GWET) to address the presence of VOCs in the upper MAU near Area 7, dated September 22, 1995, was submitted to EPA for review and comment. A more detailed work plan for MAU GWET was prepared and submitted to EPA on March 8, 1996. That work plan summarized the results of remedial investigations associated with the installation and testing of a single extraction well and proposed a response action based on an evaluation of groundwater treatment and end-use alternatives. Subsequent to the submittal of that work plan, additional investigations have been conducted to develop and design an effective source-area remediation program for Area 7.

1.1 Purpose of Report

The purpose of this report is to document upper MAU groundwater investigations and treatment system evaluations for source area groundwater remediation at Area 7. The objective of source area remediation at Area 7 is to enhance the NIBW OU-1 remedy by containing the source and capturing high concentrations of VOCs in the upper MAU near the source, rather than depending on VOC mass to migrate to the OU-1 extraction wells for removal and treatment. While the existing remedy provides adequate containment of VOCs in the upper MAU beneath Area 7, GWET at the source will be more efficient and cost effective, and will significantly expedite reduction of mass in the MAU groundwater.

1.2 Scope of Report

This Design Report describes field investigation activities and results, evaluation of response actions, and the selected approach to reduce VOCs in upper MAU groundwater in the vicinity of Area 7.

2.0 BACKGROUND

In 1981, VOCs, primarily trichloroethene (TCE), tetrachloroethene (PCE), 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), and chloroform, were detected in water samples collected from several Scottsdale and Phoenix drinking-water supply wells, at concentrations exceeding drinking water standards set by the Arizona Department of Health Service. EPA subsequently designated a 10-square-mile area in Scottsdale, Arizona, as the NIBW Study Area. The NIBW was added to the National Priorities List of Superfund sites in September 1983.

2.1 Site History

2.1.1 Administrative Record

EPA began the Remedial Investigation (RI) for the NIBW Study Area in June 1984. Twelve areas within the NIBW have been investigated separately as part of the RI. These areas have been designated by number (Area 1 through Area 12). The approximate locations of NIBW Areas 1 through 12 are shown on Figure 1. In addition, EPA investigated activities at several City of Scottsdale (COS) groundwater supply wells.

In April 1988, COS issued the Scottsdale Operable Unit (OU-I) Feasibility Study for Remediation of Groundwater in the Southern Scottsdale Area. The report evaluated alternatives for a response action with the objective of protecting unaffected water supply wells, providing long-term management of VOC-affected groundwater, and providing a potable water source to COS utilizing existing facilities. The Final Record of Decision for the Scottsdale Operable Unit was issued by EPA in September 1988. The selected alternative included groundwater extraction from the MAU and Lower Alluvial Unit (LAU) at COS Wells No. 31, 71, 72, and 75, treatment of extracted water using air stripping with air emission controls, and end-use of treated water through distribution to the COS water system.

EPA released the overall Remedial Investigation/Feasibility Study report for the second operable unit of NIBW in April 1991 (NIBW RI/FS). The NIBW RI/FS focused on the presence of VOCs in the vadose zone and saturated portions of the Upper Alluvial Unit (UAU). In September 1991, EPA issued the NIBW Record of Decision (OU-II ROD), selecting remedial actions for the vadose zone and saturated portions of the UAU. The OU-II ROD determined that the fate of VOCs in the saturated portion of the UAU will be monitored, and that soil vapor extraction (SVE) was required at NIBW areas where vadose-zone modeling indicates that VOCs in the vadose zone pose a significant threat to groundwater quality.

2.1.2 *Existing OU-I Remedy*

The existing NIBW OU-1 remedy relies on groundwater extraction from four COS water supply wells and treatment at the Central Groundwater Treatment Facility (CGTF). The original four wells that supplied water to the CGTF were COS Wells 31, 71, 72, and 75. COS 6 was also connected to the CGTF for use as a back-up well.

In 1994, the CGTF began operating. Based on water-level monitoring data, it became apparent that VOCs in the MAU would be contained by the remedy. However, this was not the case for the LAU where VOCs were migrating north toward the Paradise Valley well field. The northernmost extraction well in the LAU was COS 75, a well that produced most of its yield from the MAU. To enhance capture in the LAU, a replacement well for COS 75 was installed (named COS 75A) that was screened only in the LAU.

2.1.3 Impact of Area 7 on the OU-1 Remedy

Since sources at Area 7 do not directly impact the LAU, only the upper MAU portion of the OU-1 remedy is relevant to this report. As such, the OU-1 wells that presently affect containment of VOC mass from Area 7 include COS wells 71, 72, 31, and 6 (when operating). Monitoring well data (M-12MA, PG-55) and repeated geophysical testing indicates that COS 72 is relatively clean in the MAU and captures little mass from Area 7. Based on our current understanding, COS wells 71, 31, and 6 presently appear to capture mass from Area 7 in the MAU.

2.2 NIBW Area 7 Previous Investigations

Previous work completed at Area 7 as part of the NIBW RI/FS or the OU-II ROD Statement of Work (SOW) included a soil-vapor survey, vadose-zone soil sampling and analysis, vadose-zone soil-vapor monitoring, and vadose-zone modeling. Additionally, Levine·Fricke·Recon (LFR) conducted a groundwater investigation of the UAU beneath NIBW Area 7 in 1993, after water-level monitoring of the UAU indicated that groundwater levels beneath Area 7 had risen.

2.2.1 Previous Vadose-Zone Investigations

On the basis of initial results of vadose-zone modeling conducted by EPA, the NIBW RI/FS report concluded that VOCs were present in the vadose zone at concentrations that pose a significant threat to groundwater quality beneath Area 7. As a result, the OU-II ROD determined that SVE was required at Area 7 to reduce the threat of VOCs to the underlying groundwater. Additional work included installation of three new vadose-zone monitoring wells, soil-gas sampling, and modeling to estimate the threat to groundwater for the VOCs detected in the vadose zone. The numerical modeling was conducted in accordance with the OU-II ROD SOW and Appendix K of the RI/FS, using physical property and soil-gas chemical data collected during this phase of the investigation.

The results of the numerical modeling indicated that concentrations of TCE in the vadose zone of Area 7 represent a threat to underlying groundwater and that remediation of the TCE was warranted. The results of the numerical modeling are presented in the Design Analysis Report. Detailed SVE design criteria, SVE equipment descriptions, an operation and maintenance (O&M) plan, monitoring procedures, and proposed operating strategies for the proposed SVE system were included in the Design Report. The Design Report was approved by EPA on February 8, 1994, and the SVE system was installed during June and July 1994. Details of the SVE system equipment and installation are included in the Area 7 Installation Report dated September 14, 1994.

2.2.2 Previous Groundwater Investigations

Prior to initiation of vadose-zone SVE at Area 7, a regional rise in the UAU groundwater elevation resulted in increased saturation of the UAU beneath Area 7. An investigation was conducted to determine an appropriate response to the resulting increase of VOC concentrations in the UAU groundwater. The investigation included the installation of two groundwater monitoring/extraction wells, a 22-hour pumping test, groundwater modeling to estimate the area of capture during sustained pumping from the UAU, and an evaluation of groundwater treatment and disposal alternatives.

The results of this investigation indicated that approximately 10 to 15 parts per million (ppm) of TCE were present in UAU groundwater beneath Area 7, and that extraction of this groundwater was feasible. Groundwater modeling further indicated that an extraction rate of 25 gallons per minute (gpm) from a single well at Area 7 would likely capture TCE-affected UAU groundwater in the vicinity of Area 7 that exceeds 1 ppm.

Air stripping was selected for treatment of the extracted groundwater, and granular activated carbon (GAC) was selected for treatment of the air stripper off-gas. Since GAC was also being used for the SVE system off-gas, a single unit to treat both flow streams was designed.

Detailed results of the groundwater investigation are included in the "Work Plan to Extract and Treat Upper Alluvial Unit Groundwater, Area 7 of the North Indian Bend Wash Superfund Site, Scottsdale, Arizona," dated December 23, 1993. Details of the UAU groundwater remedial system are also described in the Area 7 SVE Design Report and Installation Report.

2.3 Site Geology and Hydrogeology

Soil types encountered during drilling of borings at Area 7 include sediments of the UAU and MAU. The contact between those two units generally occurs at approximately 150 feet below ground surface (bgs). Groundwater is presently encountered at approximately 135 feet bgs. Historically, the UAU has been unsaturated for short periods of time.

2.3.1 Upper Alluvial Unit

Descriptions of the lithology encountered during the advancement of the borings for vadose-zone monitoring wells are presented in the Area 7 SVE Design Analysis Report. In developing a lithologic framework for vadose-zone modeling, the lithology in the unsaturated UAU beneath Area 7 was characterized as having two distinct zones: A and B.

Zone A consists of approximately 55 to 65 feet of sandy silts with minor amounts of clay and minor to moderate calcium carbonate cementation. Contained within Zone A is a 15- to 25-foot-thick interval of caliche/duripan, characterized by hard, light-colored silts with minor amounts of sand and clay and high amounts of calcium carbonate cementation.

Zone B directly underlies Zone A and is characterized by interbedded sands, gravels, and cobbles with occasional thin, laterally discontinuous, finer-grained sediment intervals to depths of approximately 150 feet bgs.

2.3.2 Middle Alluvial Unit

The lithology encountered during advancement of borings in the MAU indicated that soils predominantly consist of clayey silt starting at approximately 151 feet bgs with thin interbeds of fine- to coarse-grained sand. The interbedded sands are typically less than 10 feet thick and are saturated. According to the RI/FS, the MAU varies in thickness from 250 to 800 feet throughout the NIBW. The base of the MAU in the vicinity of Area 7 is approximately 650 feet bgs.

Water-yielding sediments within the MAU are considered to be a confined or semi-confined. The horizontal direction of groundwater flow in the MAU in the vicinity of Area 7 is generally to the south, but varies according to pumping stresses in nearby water-supply wells. The Arcadia well field is located approximately 5,000 feet northwest of Area 7. Four of the CGTF extraction wells generally form an arc approximately 4,000 to 5,000 feet south and east of Area 7. COS 75 is located approximately 3,000 feet northeast of Area 7. Groundwater gradients beneath Area 7 and the immediate vicinity have historically been relatively flat. As a result, the highest detected concentrations of VOCs are still found in monitoring wells in the vicinity of Area 7 even though suspected sources have not been present for more than 30 years.

2.4 Previous Remedial Activities at Area 7

The soil-vapor and UAU GWET systems were installed at Area 7 during June and July 1994. Construction activities included installation of the SVE wells, connection of the SVE and groundwater wells to the treatment system equipment, trenching, construction of the equipment foundations, field installation of the extraction and treatment equipment, and utility connections. Start-up of the treatment systems was initiated in August 1994 and routine operation commenced on August 24, 1994.

2.4.1 Remedial System Design

2.4.1.1 Summary of Soil-Vapor Extraction System

The SVE system consists of two SVE wells (7SVE-1 and 7SVE-2), each containing three nested subwells including an A-zone subwell and two B-zone subwells. The total depth of the SVE wells is approximately 145 bgs. Two vacuum blower skids are used to separately extract vapor from each zone. Each SVE subwell is separately piped to a manifold located near the SVE system equipment skids. The subwells are connected to common headers at the manifold, which are connected to the respective blower skids. The extracted soil vapors from the SVE skids are joined, processed through an aftercooler, and then discharged to the vapor treatment system. The A-zone system is capable of extracting up to 200 cubic feet per minute (cfm) of soil vapor and the B-zone system is capable of extracting up to 400 cfm of soil vapor.

2.4.1.2 *Summary of UAU Groundwater System*

Groundwater is extracted from the UAU beneath the Site from Well 7EX-1UA using a submersible pump at flow rates up to 35 gpm. The total depth of Well 7EX-1UA is approximately 150 feet bgs. The groundwater is pumped to a packed column, induced draft air stripper where VOCs are removed from the groundwater. The air stripper system was designed to treat the groundwater using an air-to-water ratio of approximately 40:1. The blower is capable of producing air flow rates greater than 200 cfm. The treated groundwater is discharged to the sanitary sewer at the Site. The process vapor from the air stripper is joined with the extracted soil vapor and processed through the vapor treatment system, then discharged to the atmosphere.

2.4.1.3. *Summary of Vapor Treatment System*

The soil-vapor treatment system includes an aftercooler to reduce vapor temperature, a series (lead/lag) GAC system each containing 3,000 pounds of GAC to remove VOCs, and a continuous VOC detector located at the midpoint between the GAC vessels to monitor for breakthrough. The treated vapor is discharged to the atmosphere through a 12-foot-high stack.

2.4.1.4 *Summary of Remedial System Controls*

The treatment system equipment is integrated and controlled by a programmable logic controller (PLC). The PLC governs system start-up, operation, and shutdown. The PLC is linked with a personal computer (PC) at the Site. The PC supports local operator interface, monitoring, and remote access via modem. The PLC continuously monitors various operating parameters, such as flow rates, pressures, liquid level status, temperature, and equipment status. Remote access to system status, recorded data, and operational instructions is available through the PLC. In the event an alarm condition occurs, the PLC will initiate a system shutdown sequence.

2.4.2 Soil-Vapor and UAU Groundwater System Operation

Routine O&M of the existing SVE and UAU groundwater system began on August 24, 1994. The remedial systems were operated continuously, except for shutdowns due to maintenance, until October 2, 1996 when the system was shutdown to monitor for VOC rebound. The system is currently shutdown until monitoring data indicate that VOC concentrations in the vadose-zone soil vapor has stabilized. In accordance with the

SOW, operating and monitoring reports have been submitted on an approximately semi-annual basis. The semi-annual operating and monitoring reports dated May 26, 1995, February 29, 1996, July 25, 1996, and January 29, 1997 contain detailed descriptions of the operating and monitoring data from the systems.

2.4.3 Summary of Soil-Vapor and UAU Groundwater System Results

Monitoring data collected from the SVE system indicates that VOC concentrations in vadose-zone soil vapor have been reduced up to 99% in many areas. Pressure monitoring and VOC data indicated that the SVE system had an influence in the vadose zone across the entire Site. SVE system monitoring data indicates that more than 6,500 pounds of TCE have been removed from the vadose zone since the remedy was initiated.

The analytical data collected from the UAU groundwater system indicates that TCE concentrations in the UAU in the vicinity of Area 7 have decreased more than 96% from 15 ppm to 0.55 ppm, between July 1994 and October 1996.

Groundwater threat modeling using VLEACH indicate that the vadose-zone TCE threat to UAU groundwater beneath Area 7 has been reduced from greater than 0.3 ppm prior to initiation of SVE to less than the Maximum Contaminant Level (MCL) of 0.005 ppm in October 1996.

Based on the data from the SVE and UAU groundwater systems, the objectives of the existing remedial systems have been satisfied.

Data collected from the SVE and UAU groundwater systems are summarized in Appendix A of this report.

3.0 AREA 7 MAU FIELD INVESTIGATIONS

The September 1995 MAU work plan described the procedures to implement an effective source-area extraction program in three phases. The first phase included installation and testing of a single extraction well to a depth of approximately 350 feet bgs, the anticipated vertical extent of VOC concentrations of concern for source area remediation.

Extraction well 7EX-3MA was installed in January 1996 in the parking lot adjacent to the southern boundary of Area 7. Depth-specific soil and groundwater samples collected during drilling, using the SimulProbe™ sampling technique, confirmed that significant reductions in VOC concentrations decreased significantly vertically between 300 and 350 feet bgs. The base of the screen interval was therefore set at 350 feet bgs to avoid creating vertical conduits to cleaner zones below.

Following initial testing at 7EX-3MA, a more detailed work plan for MAU GWET was prepared and submitted to EPA on March 8, 1996. That work plan summarized the results of an aquifer test during which 7EX-3MA was pumped for a continuous duration of approximately 20 hours and proposed a response action based on an evaluation of groundwater treatment and end-use alternatives. After submitting that work plan, LFR proposed installing a second extraction well to expedite the source-area extraction program.

In October 1996, extraction well 7EX-4MA was installed approximately 1150 feet south of Area 7, near monitoring well W-2MA. While installing 7EX-4MA, VOC concentrations detected in depth-specific soil and groundwater samples decreased significantly beneath 250 feet bgs. As such, the base of the screen interval was set at approximately 300 feet bgs. Following installation, a second aquifer test was conducted using 7EX-4MA as the pumping well. Upper MAU aquifer properties in the general vicinity of Area 7 were then assessed by integrating data from both aquifer tests. Those results were subsequently incorporated into the design of the Area 7 GWET system.

3.1 GROUNDWATER EXTRACTION WELL INSTALLATION

Layne-Western Exploration Drilling Company of Tempe, Arizona drilled the soil borings for groundwater extraction well 7EX-3MA and 7EX-4MA using an AP1000 Percussion Hammer drill rig under the direction of a geologist registered in the State of Arizona. Drilling of the boring for 7EX-3MA was conducted from December 18 to 22, 1995; and drilling of the boring for 7EX-4MA was conducted from October 25 to 27, 1996.

All down-hole drilling equipment including drive casing and soil sampling equipment was steam cleaned prior to use at the well location. Prior to each sampling event, all sampling equipment was decontaminated by washing with laboratory-grade soap and water, followed by a double decontamination rinse using de-ionized water.

Soil samples were collected during drilling at selected intervals based on field observations. Unsaturated soil samples were collected from 7EX-3MA using a standard 2.5-inch outer diameter (O.D.) stainless steel split-spoon sampler lined with stainless steel sampling tubes. Soil and groundwater samples were concurrently collected below the static water level using a SimulProbe soil/groundwater sampler. The SimulProbe sampler consists of an 18-inch-long by 3.0-inch-O.D. stainless steel split spoon sampler fitted with a 19-inch-long stainless steel water canister (Figure 3).

Soil samples were collected in stainless steel tubes, which were capped with Teflon tape and sealed with silica gel tape (7EX-3MA) or paraffin wax (7EX-4MA), labeled using a permanent marker for identification, and placed in a chilled cooler. Soil samples selected for chemical analysis from 7EX-3MA were immediately submitted under strict chain-of-custody protocol to the on-site mobile laboratory. No samples were collected for chemical analysis from 7EX-4MA.

Portions of each soil sample from 7EX-3MA, along with material collected in the sampler drive shoe, were placed in individual plastic bags for head-space analysis of VOCs using a Mini RAE photoionization detector (PID). These results are recorded on the lithologic logs presented in Appendix B along with blow counts, sampling depths, and other pertinent information.

Within saturated soils, groundwater samples were collected in the SimulProbe sampler immediately after driving the probe and collecting a soil sample. Groundwater samples were collected by pulling back the tool approximately 3 inches to expose a lower screen near the drive shoe. The sample entered the canister under hydrostatic pressure through Teflon tubing and an electronically-controlled (7EX-3MA) or pressure-controlled (7EX-4MA) valve. When the chamber filled, the valve on the canister was closed to prevent any water exchange between the water canister and the ambient groundwater in the borehole.

To prevent cross contamination with ambient groundwater in the borehole, a large latex shield was placed over the full length of the SimulProbe sampler prior to lowering the assemblage into the borehole. A rubber Gooch Tube was placed over the drive shoe to prevent the shield from tearing as it was lowered into the borehole. Depth-specific in-situ groundwater samples were collected in advance of the drive casing using a SimulProbe sampler at the following depths: 147, 230, 250, 290, and 350 feet bgs from well 7EX-3MA; and 220, 253, and 370 feet bgs from well 7EX-4MA.

After reaching the final depth of the boring, a groundwater extraction well was constructed in the borehole. A copy of the lithologic log with as-built well construction details is presented in Appendix B. Construction details for wells 7EX-3MA and 7EX-4MA are summarized in the Well Installation and Sampling Parameters table in this section.

The well casing and screen materials used to construct wells 7EX-3MA and 7EX-4MA consisted of the following:

- Well Casing: 6-inch-inside-diameter (-I.D.) schedule 40 steel casing with welded joints and end cap
- Well Screen: 6-inch-I.D. schedule 40 steel wire wrap screen with 0.02-inch slot spacing
- An artificial sand pack consisting of No.3 Monterey Sand was placed from the bottom of the borehole to above the screened portion of the well. No. 20 silica sand was placed above the No.3 Monterey Sand to act as a block for the well seal.
- A layer of bentonite cement was placed above the silica sand to seal the top of the screened interval.
- A grout seal was pumped immediately on top of the bentonite seal to approximately 2 feet bgs using the drive casing as a tremmie. The well was completed at ground surface with a traffic-rated christy box, installed flush to existing grade.

After installation, wells 7EX-3MA and 7EX-4MA were developed to remove fines from the immediate vicinity of the boreholes and increase the effective radii of the wells.

Extraction well 7EX-3MA was developed by Saguaro Environmental Services under the direction of LFR on January 8 and 9, 1996, by bailing the well and then pumping. Groundwater pH, temperature, specific conductance, and clarity were measured throughout well development. Approximately 4,500 gallons of water were pumped from the well as part of the development procedure. One groundwater sample was collected and submitted for chemical analysis at the end of well development.

Extraction well 7EX-4MA was developed by Layne Environmental Services under the direction of LFR on November 6,1996, by bailing, surging, and pumping the well. The extraction well was first bailed to remove sand and silt that had settled to the bottom of the well. After this initial bailing, the well was surged with a rubber swab and then bailed again until no additional sand and silt accumulated in the well. Then, using an electric submersible pump, groundwater was pumped from the well to remove additional fines until the water appeared clear. Groundwater was collected at intervals during the pumping and analyzed for pH, temperature, and conductivity. The turbidity of the water was also noted. Development continued until the pH, temperature, and conductivity readings were fairly consistent.

Approximately 1,500 gallons of water were pumped from the well as part of the development procedure. One groundwater sample was collected and submitted for chemical analysis during well development. The results of the sample analyses are discussed in Section 5 and summarized in Table 1.

Well Installation and Sampling Parameters

Well Installation and Sampling Parameters	Well 7EX-3MA	7EX-4MA
Total boring depth	353 feet bgs	370 feet bgs
Total casing length	348 feet	304 feet
Depth to first groundwater	141 feet bgs	130 feet bgs
Static depth to groundwater	160.4 feet bgs	161.78 feet bgs
Screen interval	167 to 348 feet bgs	194 to 304 feet bgs
Filter pack: No. 2 Silica Sand	159 to 161 feet bgs	168 to 177 feet bgs
Filter pack: Monterey Sand	161 to 253 feet bgs	180 to 304 feet bgs
Borehole Annulus Diameter	10 inches	10 inches
Casing Diameter	6 inches	6 inches
Grout Seal	2 to 145 feet bgs; Enviroplug grout	2 to 168 feet bgs; Volclay non-cement
Soil sample collection intervals	20 feet	variable
Drilling specifications	140 lb. hammer; 30-inch drop	300 lb. hammer; 30-inch drop

3.2 Laboratory Analyses

3.2.1 Depth-Specific Samples

A selected number of soil and groundwater samples collected during the drilling of 7EX-3MA were submitted and analyzed on-site by Transwest Geochem's mobile laboratory using the following analytical methods:

- EPA Method 601/8010 for halogenated organic compounds using gas chromatography with electrolytic conductivity detection
- EPA Method 602/8020 for aromatic organic compounds using gas chromatography with photoionization detection

Groundwater samples collected from 7EX-4MA were submitted and analyzed by Onsite Environmental Laboratory of Tempe, Arizona (Onsite) using the following analytical methods:

- EPA Method 601/8010 for TCE, PCE, and TCA using gas chromatography

The test results for soil samples submitted for chemical analysis are summarized in Table 3. Test results for groundwater samples collected during the drilling are summarized in Table 1. Laboratory reports for soil and groundwater sample analyses, including chain-of-custody documentation, are presented in Appendix C.

3.2.2 Soil Physical Properties

In addition to soil chemistry, a select number of soil samples collected during the drilling of 7EX-3MA were submitted to PTS laboratories, Inc. of Santa Fe Springs, California for the following types of physical testing:

- grain-size testing using ASTM D-422
- bulk-density testing using USRB 5372
- permeability testing using ASTM D-2434
- specific-gravity testing using ASTM D-854

Results of soil physical property testing are summarized in Table 4. The laboratory report is presented in Appendix C.

3.2.3 Extraction Well Groundwater Samples

Groundwater samples were also collected during well development and during the aquifer tests conducted by LFR. The samples from Well 7EX-3MA were submitted to Transwest Geochem in Scottsdale, Arizona, for analysis for halogenated hydrocarbons using EPA Method 601 using gas chromatography with electrolytic conductivity detection. The samples from Well 7EX-4MA were submitted to Onsite for analysis for TCE, PCE, and TCA using EPA Method 601/8010.

Three groundwater samples from Well 7EX-4MA (D-7EX-A, D-7EX-B, and D-7EX-C) were collected during well development. Samples D-7EX-A and D-7EX-B were analyzed for TCE, PCE, and TCA. In addition, sample D-7EX-B was analyzed for general water chemistry. Sample D-7EX-C was analyzed for Total Organic Carbon. One groundwater sample was also collected from 7EX-4MA at the end of the aquifer test. This sample was submitted to Onsite and analyzed for TCE, PCE, and TCA.

4.0 AQUIFER TESTS

Aquifer tests were conducted after installation of extraction wells 7EX-3MA and 7EX-4MA. Both aquifer tests were conducted using several neighboring monitoring wells as observation wells. General information regarding the design and configuration of the various pumping and observation wells is shown on Figure 4. During testing, water from 7EX-3MA was conveyed to temporary above-ground storage tanks and then to the

Area 7 UAU groundwater treatment facility for treatment before disposal in the municipal sanitary sewer. Water from 7EX-4MA was conveyed to a portable GAC adsorber for treatment and then discharged to the sanitary sewer. Effluent from the GAC adsorber was sampled and analyzed by an on-site laboratory to verify that discharges to the sanitary sewer were within COS allowable levels for the VOCs of concern (i.e., 0.7 ppm for TCE).

During each aquifer test, electronic data loggers were used in the pumping well and observation wells to obtain detailed drawdown data. In-line flow meters and totalizers were used to monitor extraction rates. Samples of extracted groundwater were periodically collected and analyzed using an on-site laboratory to monitor water quality.

The aquifer test at 7EX-3MA was preceded by a short-term step drawdown test to assess well efficiency and yield. After a sufficient recovery period, a 20-hour aquifer test was conducted at an extraction rate of approximately 175 gpm. At well 7EX-4MA, the initial step test commenced at a pumping rate of 50 gpm. After approximately one hour, the pumping rate was increased to approximately 70 gpm. During that second step, effluent samples from the portable GAC adsorber indicated that breakthrough may have occurred sooner than anticipated. Consequently, the 70 gpm pumping rate was maintained for the remainder of the test. The test was terminated after approximately four hours when VOC concentrations in the GAC adsorber effluent approached the limit for disposal to the sanitary sewer.

4.1 Well 7EX-3MA

LFR performed a stepped aquifer test and a constant-rate aquifer test on well 7EX-3MA on January 9 through January 12, 1996. The stepped aquifer test was performed to evaluate the effect of pumping versus drawdown on Well 7EX-3MA, and to establish a sustainable pumping rate for the constant-rate aquifer test. The constant-rate aquifer test was performed to estimate effective MAU aquifer parameters in the immediate vicinity of the well.

For both tests on 7EX-3MA, the pumping rate was measured using a 0-300 gpm Signet flow meter plumbed into the extraction line. The published accuracy of the flow meter is +/- 5 percent. The flow rate was verified using a flow totalizer also plumbed into the extraction line. The pump inlet was set at approximately 210 feet bgs for both tests.

Water extracted from Well 7EX-3MA was temporarily contained in a series of Baker Tanks and treated at the existing Area 7 UAU groundwater treatment facility. A total of approximately 179,000 gallons of water were pumped during these two tests.

4.1.1 Stepped Aquifer Test

LFR performed a stepped aquifer test at extraction well 7EX-3MA on January 11, 1996. The stepped aquifer test consisted of pumping groundwater from 7EX-3MA at four concurrent pumping rates or steps. Each step was pumped for 150 minutes. The following average pumping rates were estimated for the steps:

Step 1: 72.5 gpm

Step 2: 147 gpm

Step 3: 201 gpm

Step 4: 250 gpm

Drawdown and recovery in the pumping well were monitored using a 30 pounds per square inch (psi) pressure transducer connected to a data logger and a portable computer. Water level responses in two nearby monitoring wells (D2MA and SVM7-209) were also monitored using 5 psi pressure transducers connected to a multi-channel datalogger.

The water level in the pumping well dropped below the top of the pump level and the transducer approximately 10 minutes into the fourth step. The test was terminated immediately with a total pumping time of 460 minutes.

Time-drawdown data collected during the stepped aquifer test and recovery data collected from the pumping well and the two observation wells at the end of pumping are provided in Appendix D. The results of this test are discussed in Section 5.

4.1.2 Constant-Rate Aquifer Test

After the stepped aquifer test, a constant-rate pumping test was performed on Well 7EX-3MA. The constant-rate test consisted of pumping 7EX-3MA at a constant pumping rate of 175 gpm for 1,045 minutes.

Drawdown and recovery in the pumping well were monitored using a 30-psi pressure transducer connected to a data logger and a portable computer. Water level responses in four nearby monitoring wells (W1, W2, D2MA, and SVM7-209) were also monitored using 5-psi pressure transducers connected to single channel dataloggers.

Time-drawdown data collected during the constant-rate aquifer test and recovery data collected for the pumping well and the four observation wells at the end of pumping are provided in Appendix D. The results of the tests are discussed in Section 5.

4.2 Well 7EX-4MA Stepped Aquifer Test

LFR performed a stepped aquifer test on Well 7EX-4MA on December 11, 1996. The stepped aquifer test was performed to evaluate the effect of pumping versus drawdown on well 7EX-4MA, and to establish a sustainable pumping rate. The stepped aquifer test was also used to estimate effective MAU aquifer parameters in the immediate vicinity of the well.

The pumping rate was measured using a 0-100 gpm Signet flow meter plumbed into the extraction line. The published accuracy of the flow meter is +/- 5 percent. The flow rate was verified using a flow totalizer also plumbed into the extraction line. Water was pumped from Well 7EX-4MA at two rates (50 gpm and 70 gpm) during the test. The pump inlet was set at approximately 275 feet bgs for both tests.

Drawdown and recovery in the pumping well were monitored using a 50-psi pressure transducer connected to a datalogger and a portable computer. Water level responses in two nearby monitoring wells (W1MA and W2MA) were also monitored using 15-psi pressure transducers connected to a datalogger.

The test was terminated during the second step with a total pumping time of 220 minutes. Approximately 14,200 gallons of water were pumped from Well 7EX-4MA during the test.

Time-drawdown data collected during the stepped aquifer test and recovery data collected for the pumping well and the two observation wells at the end of pumping are provided in Appendix D. The results of the tests are discussed in Section 5.

5.0 FIELD INVESTIGATION RESULTS

This section summarizes the results of LFR field activities.

5.1 Soil Sample Results From Well 7EX-3MA

Laboratory results for soil samples submitted for chemical analysis are summarized in Table 2. These results are discussed below. No soil samples were analyzed from Well 7EX-4MA.

5.1.1 Chemical Testing

TCE was detected in five of the nine soil samples submitted for chemical analysis using EPA Method 8010 for halogenated organic compounds. Detected concentrations of TCE ranged from 0.18 to 0.44 mg/kg. As indicated in Table 2, TCE was not detected in soil collected from the UAU at 147 feet bgs. TCE was detected in the shallow MAU soils collected between 200.5 and 270.5 feet bgs and in saturated sandy soil collected at 350 feet bgs.

No other halogenated compounds and no aromatic compounds were detected above laboratory detection limits in soil samples submitted for analysis using EPA Method 8020.

5.1.2 Physical Testing

Soil samples collected from depths of 40, 180, 220, and 310 feet bgs were submitted to PTS Laboratories, Inc. of Santa Fe Springs, California for physical analysis. Table 4 summarizes the physical testing results. USCS soil identifications for samples from 40, 180, 220, and 310 feet bgs are CL w/sand, CH w/sand, CL sandy, and CL sandy, respectively. The median grain size for these samples are 0.025, 0.019, 0.035, and 0.032 millimeters, respectively. A complete grain size distribution is included in Appendix C. Estimated hydraulic conductivities of soil samples tested in the laboratory ranged from approximately 1x10^{-6} cm/sec to 1x10^{-5} cm/sec (0.003 feet/day to 0.03 feet/day).

5.2 Groundwater Samples

Laboratory results for groundwater samples collected during drilling using the SimulProbe and during development and the aquifer tests are described below and summarized in Tables 1 and 3.

5.2.1 Well 7EX-3MA

5.2.1.1 UAU Groundwater

TCE was detected in UAU groundwater samples collected from 147 feet bgs at concentrations of 1.5 and 1.6 ppm. The concentrations detected correlate well with water quality data collected during the same period of time at nearby monitoring well PG-10UA and extraction well 7EX-1UA.

5.2.1.2 MAU Groundwater

TCE was detected in upper MAU groundwater samples at concentrations ranging from 2.0 ppm at 230 feet bgs to 0.56 ppm at 350 feet bgs. As summarized in Table 3, TCE concentrations decrease with depth in the upper MAU from 2.0 and 2.5 ppm at 230 and 245 feet bgs to 0.43 and 0.56 ppm at 290 and 350 feet bgs, respectively. These groundwater samples correspond with saturated sands occurring at approximately 225-235, 246-255, 287-295, and at 341-353 (+) feet bgs.

Attempts to collect groundwater samples in clayey silt at 200, 270, 310, and 330 feet bgs failed due to lack of free groundwater in the clayey material.

TCE was detected in the sample collected during development at a concentration of 6.60 ppm. Eight samples were collected during the aquifer tests. TCE concentrations ranging from 2.4 to 8.1 ppm were detected.

5.2.2 Well 7EX-4MA

TCE was detected in upper MAU groundwater at concentrations ranging from 0.0015 ppm at 370 feet bgs to 13.0 ppm at 220 feet bgs. As summarized in Table 3, TCE concentrations decrease with depth in the upper MAU from 13.0 and 0.17 ppm at 220 and 253 feet bgs to 0.0015 ppm at 370 feet bgs, respectively. These groundwater samples correspond with saturated sandy intervals occurring at approximately 220-230, 250-260, and at 370 feet bgs.

Attempts to collect groundwater samples in clayey silt at 280 feet bgs failed due to lack of free groundwater in the clayey material.

Three groundwater samples (D-7EX-A, D-7EX-B, and D-7EX-C) were collected during well development. TCE was detected at a concentration of 2.60 ppm and 2.30 ppm in samples D-7EX-A and D-7EX-B, respectively. PCE was detected at a concentration of 0.016 ppm from sample D-7EX-A. The results of the general water chemistry analyses are summarized in Table 5.

TCE was detected in the sample collected at the end of the aquifer test at a concentration of 6.40 ppm.

6.0 EVALUATION OF AQUIFER TESTING

Aquifer-test data were analyzed using the AQTESOLV™ aquifer test solver program (version 2.01), developed by Geraghty & Miller, Inc. (1995). The conceptual model shown in Figure 4 was used to evaluate the data from both extraction wells.

A summary of the results of aquifer testing was submitted to EPA in a letter report dated March 4, 1997. That report is included in Appendix E. As summarized on Table 6, estimated values for transmissivity ranged from 427 square feet per day (ft^2/d) to 2,406 ft^2/d. Based on an aquifer thickness of 190 feet, hydraulic conductivity values calculated from the test data range from 2.3 to 12.7 ft^2/d. Estimated values for storativity ranged from 0.0001 to 0.003.

6.1 Estimate of Hydraulic Capture

To estimate the horizontal extent of groundwater capture for MAU extraction wells 7EX-3MA and 7EX-4MA, groundwater-flow and particle-tracking simulations were performed using FLOWPATH (Version 5.02), a two-dimensional finite difference groundwater flow computer model developed Waterloo Hydrogeologic, Inc. (1995). FLOWPATH is a widely recognized computer model, which has been used to simulate similar hydrogeologic conditions at sites located throughout the United States. FLOWPATH has been validated against other commonly used codes including MODFLOW (McDonald and Harbaugh, 1984), GWPATH (Shafer, 1987), and RESSQ (Javandel and Tsang, 1986). The primary input parameters, boundary conditions, model calibration, and results of the simulations performed are summarized in the following sections.

6.1.1 Model Input Parameters

The conceptual groundwater flow model was developed using hydraulic conductivity, porosity, groundwater elevation data, and pumping records obtained from a variety of sources including:

- COS pumping records
- Groundwater pumping test results for 7EX-3MA and 7EX-4MA (LFR, 1997)
- Quarterly groundwater monitoring reports by South Pass Resources, Inc.

The hydraulic conductivity value specified for the upper MAU in the immediate vicinity of the two extraction wells ranged between 5 and 7 ft/d, which is comparable to the hydraulic conductivity values estimated by LFR using data from recent aquifer tests. The hydraulic conductivity values for other portions of the model domain varied from a low of 0.5 ft/d to a high of 35 ft/d. The hydraulic conductivity values were selected based on a combination of conceptual model interpretation and calibration.

The pumping rates for COS wells located in the immediate vicinity of Area 7 were based on the monthly pumping records obtained from COS. For wells that withdraw water from more than one aquifer zone, the amount of withdrawal from the upper MAU was estimated by comparing the proportion of screen in the upper MAU to the total screened depth. For pumping wells where borehole flow surveys have been conducted, these flow survey data were used to estimate withdrawal from the upper MAU. The following pumping rates in COS wells located in the immediate vicinity of Area 7 were used to represent October pumping conditions:

COS 6	150,000 gallons per day (gpd; 104 gpm)
COS 31	300,000 gpd (208 gpm)
COS 71	400,000 gpd (277 gpm)
COS 72	300,000 gpd (208 gpm)

The thickness of the simulated portion of the upper MAU was specified as 190 feet in the vicinity of the Area 7 pumping wells. The MAU thickness varied across the model domain from 50 to 190 feet. The perimeter boundary conditions consisted of a combination of specified flux, no-flux, and specified hydraulic heads, based on regional hydrogeologic interpretations.

6.1.2 Model Calibration

The flow model developed using the boundary conditions and hydrogeologic information listed above was calibrated by comparing predicted water levels to groundwater elevations measured in October 1996 in MAU monitoring wells located in the vicinity of Area 7. Model calibration was achieved by adjusting the hydraulic conductivity values and COS pumping rates within the reasonable limits until the differences between observed groundwater elevations and computed groundwater elevations were within acceptable limits.

As shown by the degree of similarity between observed and computed groundwater elevation data indicated on Figure 5, the model appears to reproduce MAU groundwater flow conditions reasonably well. Field observations have shown that the groundwater elevations in monitoring wells located in the vicinity of Area 7 are very sensitive to variations in pumping within the MAU (on the order of 5-10 feet), and it is not known exactly which wells were pumping when the water levels in many of the MAU monitoring wells were measured. For these reasons, the calibration is considered adequate, rather than exact. Calibration residuals for 35 observation wells located throughout the model domain are less than 5 for root mean square error (Figure 6).

6.1.3 Capture Zones: 7EX-3MA and 7EX-4MA

To estimate the zone of contribution of groundwater for MAU extraction wells 7EX-3MA and 7EX-4MA, the effects of pumping were simulated using FLOWPATH's reverse particle-tracking algorithm. This technique simulates particles released at the well head, which are tracked upgradient to delineate the contribution area for the well. Using the model calibrated to October 1996 groundwater conditions, the following extraction rates were simulated:

7EX-3MA	225 gpm
7EX-4MA	125 gpm

The predicted zone of contribution for both extraction wells is presented on Figure 7. Figure 7 also shows the extent of the interpreted 1.0 ppm TCE isoconcentration contour in the upper MAU. As shown, the zone of capture for extraction well 7EX-4MA overlaps that of 7EX-3MA and generally provides adequate capture of areas of high TCE concentration in the MAU underlying Area 7.

It is important to note that October 1996 represents an average regional pumping scenario and that conditions in the MAU are actually transient and subject to COS pumping demands. The modeling approach discussed herein is only intended to estimate capture from extraction wells 7EX-3MA and 7EX-4MA in a general way. Actual performance of the proposed GWET system will be monitored using the existing MAU monitoring network. Water levels and VOC concentrations will be monitored periodically in accordance with the OU-I monitoring program. That data will be evaluated to assess the performance of the Area 7 MAU GWET system. Performance of the Area 7 MAU GWET system will be evaluated with respect to stated objectives on a 6-month basis in accordance with the existing MAU monitoring program.

7.0 EVALUATION OF REMEDIAL ALTERNATIVES FOR AREA 7 MAU

Groundwater remedial alternatives to address VOCs present in upper MAU groundwater were reviewed and evaluated for potential implementation at NIBW Area 7. Based on an evaluation of available remedial technologies, GWET was selected for implementation at Area 7. The following sections provide a brief description of the technologies evaluated, criteria for evaluating each technology, and rationale for selecting groundwater extraction.

7.1 Objective for Groundwater Remediation

The objective of source area remediation at Area 7 is to enhance the NIBW OU-1 remedy by capturing and removing high concentrations of VOCs in the upper MAU near the source, rather than depending on VOC mass to migrate to the OU-1 extraction wells for removal and treatment. While the existing remedy provides adequate containment of VOCs in the upper MAU beneath Area 7, GWET at the source will be more efficient and cost effective, and will significantly expedite reduction of mass in the MAU groundwater.

7.2 Description of Remedial Alternatives

This section presents a description of the remedial technologies that were evaluated. The evaluated technologies were limited to those with proven field-scale effectiveness. Emerging technologies without proven field-scale track records were not included in this evaluation.

The evaluated technologies fall into two primary categories: 1) extraction and treatment, and 2) in-situ treatment. Extraction technologies include extraction from wells, and from trenches. Treatment options for extracted groundwater are presented in Section 8.0. In-situ treatment technologies include injection of chemicals into the aquifer to induce oxidation, dehalogenation, or enhanced biodegradation of the contaminant.

7.2.1 Extraction Methods

Groundwater extraction has been used with mixed results. In some cases, the VOC concentration in the groundwater has been reduced to levels below MCLs or other regulatory guidelines. In many cases, however, groundwater extraction may continue for many years while the VOC concentrations in the groundwater may not satisfactorily decline to acceptable levels.

7.2.1.1 Wells

Groundwater extraction wells are widely used to remove VOC-affected groundwater. The technology uses a well, which is screened across the affected saturated sediments where groundwater is pumped to the surface by a submersible pump. When the groundwater is at the surface, treatment is required to reduce the VOC concentrations to levels protective of the end user prior to discharge. As the groundwater is extracted, the groundwater level around the extraction well is lowered, resulting in the groundwater capture area moving toward the extraction well. The VOCs and groundwater in the capture zone are removed from the aquifer.

Groundwater extraction removes VOC mass from the aquifer mainly through the more permeable sediments across from the screened interval. VOC mass in finer grained, less permeable sediments is not easily removed, especially in heterogeneous stratified zones. Concentrations of VOCs in groundwater in the aquifer typically decrease quickly during the early stages of pumping, then taper off during long-term pumping. Decreases in VOC concentrations are typically due to removal of soluble VOC mass in the groundwater in the vicinity of a source area, mixing of less affected water in the affected aquifers, and mixing of less affected water from different water-bearing stratifications at the well. Rapid decreases have generally been observed at sites where VOC-affected groundwater is limited or significant pumping utilizing many extraction wells in the affected area is sustained.

After much of the equilibrated soluble VOC mass has been removed, less-affected groundwater is flushed past VOC-sorbed soil particles where the VOCs slowly dissolve into the groundwater. Hence, the VOC concentrations gradually decrease as the VOC mass is slowly removed from the soil matrix. During long-term pumping, massive amounts of groundwater are usually extracted yielding few pounds of VOCs.

7.2.1.2 Trenches

A trench system for groundwater extraction typically consists of a trench installed laterally at the downgradient edge of a VOC plume long enough to capture the VOC-affected water flowing in that direction. The trench is typically backfilled with more permeable material than the surrounding sediments. One or more groundwater extraction wells with submersible pumps are installed in the trench to maintain a slight uniform drawdown across the length of the trench. Enough water is extracted to maintain control of the plume and minimize VOCs from migrating downgradient of the trench. The trench system is intended only to control migration of the plume, however, and may not address source areas or hot spots.

7.2.1.3 Funnel-and-Gate Systems

A funnel-and-gate system consists of two or more slurry walls installed at an angle relative to the direction of groundwater flow. Several walls can be installed if the VOC plume is very wide. The slurry walls are typically constructed by backfilling a trench with dense, very low permeable material to prevent VOC-affected groundwater from passing through the wall. The gate is an opening between the two slurry walls. One or more groundwater extraction wells and pumps are installed in the gate to extract VOC-affected groundwater and minimize downgradient migration of the VOCs. Like trench systems, the funnel-and-gate approach is intended primarily to control migration of the VOC-affected groundwater and not to remove VOC mass or reduce concentrations in the most affected areas.

7.2.2 In-Situ Technologies

In-situ VOC treatment can be accomplished by introducing a variety of reactive agents into the aquifer using either wells, trenches, or a funnel-and-gate system. The in-situ VOC treatment methods evaluated include chemical oxidation, biological degradation, and dehalogenation. Oxidation, dehalogenation, and biological degradation have proven to be effective in destroying VOCs. Successful implementation of these in-situ technologies, however, has been limited by aquifer heterogeneities which prevent uniform distribution of the injected agent.

7.2.2.1 Chemical Oxidation

Chemical oxidation can be accomplished by introducing chemical agents into the groundwater to oxidize the VOCs. Common oxidizing agents include hydrogen peroxide, potassium permanganate, and ozone. Other chemicals, such as iron with hydrogen peroxide in Fenton's reaction can be introduced as catalysts for powerful non-specific oxidation reactions.

As groundwater flows past an injection system containing oxidizing agents, untreated VOC-affected groundwater contacts the chemicals. The lateral influence of treatment from the injection point can vary depending on the groundwater gradient and characteristics of the sediments. As the groundwater flows past the injection point, untreated water from upgradient in the immediate vicinity of the system is subjected to the oxidizing environment. The oxidizing chemicals can be introduced to the aquifer through strategically placed wells or trenches located throughout the VOC plume. A passive system at the edge of a plume can be implemented using either a line of wells or a trench to minimize downgradient migration of the VOCs. A variation of this system is to combine extraction and injection to "flush" the oxidizing chemicals through the affected sediments and increase the rate of treatment.

7.2.2.2 Biological Degradation

In-situ biological treatment using indigenous micro-organisms can be used to reduce concentrations of VOCs in affected aquifers. Unlike petroleum hydrocarbons, chlorinated VOCs resist aerobic biological degradation in the environment. Various types of aerobic bacteria including methanotrophs, however, have been shown to reduce VOCs such as TCE using cometabolic degradation (i.e., the bacteria use compounds other than the chlorinated VOCs as growth substrates, which induce non-specific enzymes to fortuitously degrade the chlorinated VOCs). In the field, this process is accomplished by injecting methane (or another easily biodegradable substrate) and oxygen into the aquifer to promote the growth of the methanotrophs. Special monitoring and population enhancement may be required to minimize decimation of the bacteria population as some intermediate products may exhibit toxicity to the bacterium.

7.2.2.3 *Dehalogenation*

The dehalogenation of chlorinated VOCs in anaerobic environments have been successfully performed in reactors and demonstrated in the environment. In-situ, this technique requires an environment with little or no oxygen and has typically been demonstrated in areas where another easily biodegradable substrate has been oxidized in an aerobic environment before the conditions changed to anaerobic.

Reductive dehalogenation of chlorinated VOCs by metals have been successful in the field. Metals such as iron are used in a porous media where an electro-chemical corrosion process takes place. The driving forces of the reaction are anodic metal dissolution, which provides electrons that are swapped with hydrogen ions in the water and results in dechlorination of the VOCs. The byproducts are non-toxic hydrocarbons and chlorine ions. Since the reaction rates are relatively slow, this method has been successfully demonstrated using the trench technique, as described above, with the electron-donor metal mixed with the backfill in the trench. The reaction occurs as the groundwater slowly passes through the trench.

7.3 Criteria for Evaluating Remedial Technologies

The following criteria were used to evaluate remedial technologies for Area 7 MAU groundwater remediation:

- Effectiveness
- Implementation feasibility
- Cost

7.3.1 Effectiveness

The effectiveness of remedial technologies was evaluated based on: 1) the potential for the process option to meet the remedial objective and to handle the estimated areas or volumes of media; 2) the potential impacts to human health and the environment during implementation; and 3) the reliability and proven history of the process option with respect to the chemicals and conditions at the Site.

7.3.2 Implementation Feasibility

Implementation feasibility was evaluated based on the technical and institutional requirements for employing each remedial technology, including: 1) ability to obtain the necessary permits; 2) availability of treatment, storage, and disposal services; and 3) availability of necessary equipment and skilled workers.

7.3.3 Cost

The evaluation of remedial alternatives was a simple analysis of relative, "order-of-magnitude" costs, based primarily on engineering judgment. If more costly process options for a given remedial technology did not seem likely to yield significant advantages, that technology was eliminated from consideration.

7.4 Evaluation of Area 7 MAU Groundwater Remedial Action

The following table summarizes the results of our evaluation.

Groundwater Remedial Action Evaluation Results

Technology Type	Technology	Effectiveness	Implementation Feasibility	Cost
Extraction	Wells	Proven effective in capturing/removing VOC mass in MAU sediments	Proven feasibility	Relatively inexpensive
	Trenches	Proven effective in capturing/removing VOC mass	Infeasible due to depth of VOC-affected groundwater (350')	Very expensive due to high cost of trenching
	Funnel-and-gate system	Proven effective in capturing and removing VOC mass in shallow groundwater	Infeasible due to depth to MAU groundwater (350')	Very expensive due to high cost of trenching
In-Situ Treatment	Chemical Oxidation	Likely limited by aquifer heterogeneities, which can prevent even chemical distribution	Feasible	Relatively inexpensive
	Biological Degradation (Introduce nutrients/other materials)	Likely limited by aquifer heterogeneities, which can prevent even chemical distribution	Feasible	Relatively expensive due to trenching costs
	Dehalogenation	Recently proven at sites with relatively shallow depth to groundwater; does not reduce VOC mass in source area in short term.	Marginal due to depth of VOC-affected groundwater (350') and site geology.	Relatively inexpensive

7.5 Selection of Area 7 MAU Groundwater Remedial Alternatives

The remedial alternatives selected for VOC-affected upper MAU groundwater at NIBW Area 7 is groundwater extraction. This alternative was selected for the following reasons:

- Pumping from the two existing MAU groundwater extraction wells will provide adequate capture of VOC-affected groundwater in the upper MAU to minimize further downgradient migration and reduce the VOC load on the CGTF;
- The technology has been successful in reducing VOCs in UAU groundwater at Area 7;
- Groundwater extraction will remove VOC mass from the aquifer; and
- Groundwater extraction is the most cost-effective technology that is capable of meeting the objective for NIBW.

8.0 GROUNDWATER TREATMENT ALTERNATIVES

Groundwater extracted from the upper MAU will require treatment to reduce concentrations of VOCs to levels protective of the end uses prior to discharge. The following sections describe the treatment technologies developed and evaluated for the Area 7 MAU response action.

8.1 Development of Groundwater Treatment Alternatives

Development of initial design parameters for a groundwater treatment system at Area 7 were based on the results of the aquifer testing described in Section 4.0. The aquifer testing data indicated that adequate drawdown in the wells could be achieved at the maximum pumping rates listed in the TCE Concentration and Flow-Rate Design Basis table in this section. The maximum groundwater extraction flow rate is estimated at 385 gpm. Although 385 gpm will be the maximum groundwater extraction flow rate, the treatment plant hydraulic design capacity is increased to 460 gpm (120 percent) to accommodate recycling.

The maximum flow rates estimated from the aquifer test data represent ideal conditions. Actual groundwater drawdown and production from each well during sustained pumping will be used to determine the optimum flow rate.

TCE was the only VOC detected in upper MAU groundwater samples during the aquifer tests, so the maximum concentrations of TCE were used to estimate maximum VOC mass loading on the treatment system. The Design Basis Table shows the TCE concentration with respect to each groundwater extraction well. The weighted average for initial TCE concentrations in the extracted groundwater is estimated at 6.87 ppm.

TCE Concentration and Flow-Rate Design Basis

Well	Initial Maximum TCE Concentration (ppm)	Maximum Flow Rate (gpm)	Maximum TCE Mass Rate (pounds/day)
7EX-3MA	8.1	225	21.88
7EX-4MA	6.4	125	9.60
7EX-1UA	0.65	35	0.27
Total	6.87	385	31.76

Dilution within the aquifer and wellbore typically result in decreasing VOC concentrations within a relatively short period of time after pumping begins. Therefore, these values represent maximum concentrations and are expected only during the first stages of pumping.

For the purposes of developing design criteria and evaluating the efficiency and effectiveness of potential treatment technologies, an effluent TCE concentration of 0.005 ppm was used.

8.2 Description of Groundwater Treatment Alternatives

Groundwater treatment is typically implemented in conjunction with a groundwater extraction system to reduce concentrations of VOCs in extracted groundwater prior to discharge. Several groundwater treatment technologies were evaluated based on cost, ease of installation and operation, waste generation, aesthetics, and effectiveness for reducing VOC concentrations. These technologies included air stripping; ultraviolet oxidation (UV/Ox); GAC adsorption; and selected combinations of these technologies. Other treatment technologies such as oxidation using cavitation, resin adsorption, and *macro porous polymer extraction were initially evaluated, but rejected due to cost,* general industry acceptance, and lack of experience at other Superfund sites. Air stripping, GAC, and UV/Ox have all been used at numerous Superfund sites and have proven to be effective in reducing concentrations of VOCs in groundwater.

8.2.1 Adsorption

Adsorption occurs when VOCs contact activated sites where the chemicals are transferred from the carrier phase to an adsorptive media such as GAC. A typical adsorption system includes an adsorber where the process medium is filtered through a bed of GAC. Adsorber design is based on hydraulic loading and the anticipated mass of VOCs. Criteria used in design of a GAC system include specific adsorption capacities of VOCs on GAC, hydraulic flow rate of the process medium, influent concentrations, desired effluent VOC concentrations, and mass rate of VOCs.

The adsorption capacity of a VOC on GAC is determined through laboratory tests on waste streams. Standard isotherms for VOCs have been used to estimate the mass of GAC that will be spent given a particular VOC concentration and flow rate. The adsorption capacity of most VOCs tends to decrease as VOC concentrations decrease in the influent stream. In vapor-phase applications, relative humidity greater than 50 percent and high temperatures can significantly reduce VOC adsorption capacity on GAC. Pound for pound, adsorption using GAC removes VOCs more efficiently from vapor streams than from aqueous streams.

VOC breakthrough occurs near the end of bed life when many of the activated sites are occupied and VOCs begin passing through the bed. If the bed size and mass loading are adequately designed, breakthrough may not occur for months during normal operation. During breakthrough, VOC concentrations in the effluent will increase to the same levels as influent VOC concentrations. At that point, the GAC is considered saturated. When GAC is spent, it is removed from the vessel and transported to an off-site facility where it is regenerated or disposed. Transport to such facilities increases the potential for off-site spills and contamination. On-site regeneration eliminates this problem, but construction of an on-site regeneration facility is generally cost-prohibitive unless very large quantities of GAC are used.

Adsorption systems typically consist of two adsorbers in series with taps for collecting samples before, between, and after the adsorbers. The lead/lag configuration enables VOCs that break through the primary adsorber to be removed from the process stream in the secondary adsorber. After the spent GAC is replaced with regenerated GAC, operation resumes with the secondary adsorber becoming the primary adsorber and the regenerated GAC serving as the secondary adsorber. Pre-filtration and/or scale and bio-fouling control may be required to minimize plugging of the GAC bed from fine-grained particles, calcium carbonate scaling (in water applications), and bacteria. Problems associated with scaling and bacteria build-up can generally be prevented by frequent maintenance.

Pre-filtration is necessary to remove fine particles that can collect on the upper layers of the GAC bed. Plugging by small particles increases the back pressure required to pump the water through the bed and reduces the efficiency of the GAC. Filtration can be accomplished using a multi-media filter. A multi-media filter uses gradiated sand and anthracite in a packed-bed configuration to remove entrained solid particles from the water. The sizes and depth of the media are based on the particle sizes of the suspended solids. Multi-media filters typically require periodic back flushing to remove collected particles. The back flushing process simply pumps water backwards through the filter and into a settling tank. The back-flushed water is then filtered and treated through the treatment system. If a significant amount of suspended solids are produced, the solids are typically settled out in a separate tank and then dewatered.

In an aqueous-phase application and using the previously defined design basis, the estimated initial TCE adsorption capacity on GAC is approximately 9 percent by weight. Estimates of GAC usage for treatment of upper MAU groundwater indicate that approximately 355 pounds of GAC will initially be spent on a daily basis during normal operation. Although the adsorption efficiency decreases with decreasing concentrations, the overall usage rate may decrease as the TCE concentrations in the groundwater decrease over time.

Preliminary design of an aqueous-phase adsorption system includes two parallel multi-media filters, two downflow adsorbers approximately 120 inches in diameter and 12 feet high, each containing approximately 20,000 pounds of GAC. The piping and appurtenances will add another two feet to the overall height of the equipment.

8.2.2 Air Stripping

8.2.2.1 Packed Column

Air stripping using a packed tower is commonly used for remediating groundwater affected by VOCs. Air stripping transfers VOCs from groundwater to air by maximizing the contact surface area between groundwater and a stream of air. In packed-column air strippers, air passes through the column countercurrent to the water flow direction. The column is filled with specially design packing which provides a medium that creates a thin film of water. The relative volatility and vapor-liquid equilibrium constant of the VOC dictates the mass transfer rate and degree of completion of the VOC transfer between the aqueous and vapor phases. Air stripping has been used at several sites in NIBW to reduce VOC concentrations in extracted groundwater.

If the scaling potential of the groundwater is high, then pretreatment of the water is required to minimize calcium carbonate build-up and plugging of the packing material. Typically, scale is formed when carbon dioxide is removed from the water during the stripping process, which increases the pH and allows calcium carbonate to precipitate. The scaling potential of Area 7 MAU groundwater is considered relatively high, and controls would be required to minimize scale. Common methods to control calcium carbonate scale include decreasing the pH by adding acid or using a poly-phosphate or other chemical scale inhibitor to minimize formation of calcium carbonate. A food-grade poly-phosphate chemical scale inhibitor was successfully used in the Area 7 UAU groundwater system, and this method of controlling calcium carbonate scale would be preferred for the MAU system.

The primary components of an air stripper consist of a packed column, a clear well (sump), a discharge pump, and an air blower. Preliminary design of an air stripper for this application includes a column with an overall height of approximately 45 feet, including the distributor and clear well, and a diameter of approximately 60 inches. The air-to-water ratio will be approximately 48, and the air flow rate through the column air stripper system is estimated at approximately 2,500 cfm.

To reduce overall height, multiple shorter towers in series could be implemented instead of one very tall tower. Additionally, a subgrade structure may be installed to house and support the air-stripper towers to reduce the overall height. The latter approach was used at well COS 6 to reduce the overall height of the treatment facility.

8.2.2.2 Low-Profile

A low-profile air stripper removes VOCs from groundwater by a method similar to a packed column air stripper, but a series of shallow aeration trays is used instead of random packing. The trays contain small perforations and are fitted with baffles that direct water flow to maximize the exposure of water over the perforations. Air flows countercurrently through the perforations creating a light foam where the VOCs are converted from aqueous phase to vapor phase.

The advantage of a low-profile air stripper is the proven technology of air stripping without the height of a packed column. The disadvantage is that tray air strippers are less efficient at removing VOCs than packed columns and require a much higher air flow to achieve desired VOC reduction. As a result, vapor treatment may be more expensive due to the lower VOC concentrations in the off-gas.

The components of a low-profile air stripper include a blower, several baffled aeration trays, a clear well, and a discharge pump. Initial design of a low-profile air stripper system includes two units in parallel, each with four trays measuring approximately 7 feet x 13 feet x 9 feet high and an air-to-water ratio of approximately 90. A discharge stack will increase the overall height. The total air flow rate through both air strippers is estimated at approximately 4,800 cfm.

8.2.2.3 Vapor Treatment

The vapor stream leaving the air stripper may require treatment to reduce VOC emissions to the atmosphere to levels that comply with local regulations. A common treatment of the process vapor from an air stripper is vapor-phase GAC adsorption. As previously described, vapor-phase VOC adsorption capacity on GAC is typically higher than aqueous phase. Thus, this technique is more cost effective than aqueous-phase adsorption.

If vapor-phase GAC is used to reduce VOC emissions, the relative humidity must be reduced to maximize adsorption of the VOCs. The relative humidity of air stripper off-gases can range from 80 to 100 percent. Methods for reducing the relative humidity include increasing the temperature of the vapor stream or condensing the water from the vapor.

Increasing the temperature is generally accomplished using a vapor heater and heat exchanger. Propane, natural gas, or electricity are used as fuel to heat the vapor stream. Vapor temperatures above 120 degrees Fahrenheit (°F) significantly reduce VOC adsorption capacities and 120°F is generally regarded as a maximum process temperature for adsorption. A condenser chills the vapor to below its dew point where the water is condensed and removed from the vapor. Depending on the relative humidity of the vapor stream and dew point temperature, cold water in a heat exchanger may be used. In some cases, however, a refrigeration unit may be required to chill the vapor enough to remove the required amount of water. The temperature of the vapor stream is then increased to ambient conditions. Due to it's simplicity and reliability, a vapor heater is generally preferred if the temperature at which 50 percent relative humidity occurs is less than 120°F.

Air Stripping Design Parameters

-	Packed Column	Low Profile
Air-to-Water Ratio	48	90*
Height (in feet)	45	9
Air Flow Rate (cfm)	2,500	4,800*
Vapor Pre-Treatment (btu/hour)	100,000	175,000
GAC Vapor Treatment System Units	2	2
GAC Unit Size	8' diameter, 14' high	8' diameter, 14' high
GAC System Capacity (lbs)	2 x 10,000	2 x 10,000
Initial VOC Adsorption Capacity (% wt.)	25	16
Estimated Initial GAC Usage (lbs/day)	130	200

*Air-to-water ratio and air flow is shown as a combined total through two units.

8.2.3 Ultraviolet Oxidation

Ultraviolet/oxidation (UV/Ox) technology has been used to destroy VOCs by breaking down the VOC molecule to carbon dioxide and water. UV/Ox creates unstable hydroxyl radicals in water with the addition of an oxidizing agent, such as ozone or hydrogen peroxide, in the presence of ultraviolet light. The unstable hydroxyl radicals react and mineralize the organic compounds. UV/Ox technology is particularly effective on unsaturated chlorinated organic compounds such as TCE. Oxidation by-products such as low molecular weight carboxylic acids, which are non-toxic and biodegradable, may be present in the effluent. High concentrations of oxidizable inorganic compounds may affect the performance of the system and require more oxidizing agent and ultraviolet light to achieve the desired results.

Destruction of TCE using UV/Ox is typically completed in a fraction of a second. Since the reaction is fast, the size of the reaction vessel size is relatively small (i.e., 30 to 50 gallons). The treatment system equipment typically consists of one or more reactors, one or more UV lamps, transformers, an oxidant storage and injection system, and a recycle loop.

A primary benefit of this technology is that the VOCs are destroyed and treated groundwater is disinfected. Additionally, no waste products are produced, which reduces waste management liability and costs. UV/Ox may be very expensive if used alone, and if complete removal of VOCs from the groundwater is required.

Preliminary design of a UV/Ox system includes a 180-kilowatt unit with two reactors, each with three 30-kilowatt UV lamps, and injection of up to 150 ppm of hydrogen peroxide. The total size of the UV/Ox system for this application will be approximately 9 feet x 10 feet x 8 feet high. Additionally, due to the small size of a UV/Ox system, the equipment is generally designed for indoor installation. The indoor design would require that a small building be erected on the site to minimize the unit's exposure to weather.

8.2.4 Ultraviolet Oxidation with Polishing

UV/Ox and polishing incorporates two treatment technologies in series to substantially decrease the capital and operating costs associated with operating only a UV/Ox system. Typical hybrid systems include a small UV/Ox reactor and an air stripper or aqueous-phase GAC.

The benefit of the hybrid treatment system is that approximately 90% of the VOCs can be destroyed with the UV/Ox system and the remainder are reduced or removed using air stripping or aqueous-phase adsorption. Each of the treatment systems can be smaller, thus reducing operating costs. If aqueous-phase adsorption is used for polishing, the GAC usage and frequency of servicing is significantly reduced. If air stripping is used for polishing, off-gas treatment may not be required if the VOC mass processed and emitted to the atmosphere complies with local regulations and established national health and risk guidelines.

Preliminary design of a UV/Ox hybrid system includes a 60-kilowatt unit with two reactors, each with one 30-kilowatt lamp. The UV/Ox system would be approximately 4 feet x 7 feet x 8 feet high. The adsorber polishing system includes one 120-inch-diameter vessel, containing approximately 10,000 pounds of GAC. Note that the GAC adsorber would be similar in size to the adsorbers for the treatment alternative of using only GAC, due to the same hydraulic loading requirements. The low-profile air stripper polishing system would include one unit containing four aeration trays with total dimensions of approximately 7 feet x 13 feet x 9 feet high. The air-to-water ratio is estimated at approximately 47 for a total air flow of approximately 2,400 cfm.

8.3 Analysis of Treatment Alternatives

An evaluation was performed to compare the treatment technologies using site-specific criteria. For the purpose of this evaluation, five independent criteria were used to objectively evaluate each treatment technology and combination of the treatment technologies. The five criteria included cost, waste generation, implementability, reliability, and aesthetics.

8.3.1 Summary Analysis

- Cost includes the capital costs for site work, treatment equipment, tankage, controls, construction, permits and negotiations, start-up, and engineering. O&M costs include routine labor, utilities, supplies/chemicals, and GAC servicing.
- Waste generation includes the relative amount of waste generated at the site and requirements for handling, transportation, and off-site disposal or regeneration. Regenerating GAC adds liability, potential safety hazards, and potential impacts at the off-site regeneration facility.
- *Implementability includes simplicity of design and the ease of construction*, permitting, and installation within the treatment plant area at Area 7.
- Reliability includes history of performance and the ability of the treatment alternative to minimize exceedances of discharge limitations.
- Aesthetics includes profile views, height of equipment, and ease of blending treatment plant equipment with the surrounding structures, both existing and planned. Aesthetics is a concern for the Area 7 MAU groundwater treatment plant because the plant will be located in an area that COS is planning to improve within the next several years.

The following table summarizes the evaluation of each treatment technology and the following sections describe key elements.

Summary of Treatment Technologies

Technology	Cost	Waste Generation	Implementability	Reliability	Aesthetics
Aqueous-Phase Adsorption	Low capital cost; high costs for GAC regeneration	Low adsorption efficiency spends large quantities of GAC	May require pre-filter; low system maintenance	Lead/lag system most reliable; fouling can degrade performance	Large diameter and tall vessels; very quiet
Packed-Column Stripping with Vapor Treatment	Medium capital cost; ongoing costs for GAC regeneration	Better adsorption efficiency than aqueous-phase adsorption reduces quantity of spent GAC	May need subgrade structure or multiple short towers to lower height	Proper design can ensure reliability; scaling can reduce performance; no backup	Excessively tall; requires enclosure for equipment to reduce noise
Low-Profile Stripping with Vapor Treatment	Medium-high capital cost for two strippers and larger GAC system; ongoing costs for GAC regeneration	Better adsorption efficiency than aqueous-phase adsorption, but lower VOC concentration increases GAC usage over packed-column	Needs parallel trains for hydraulic and VOC loading; may need enclosure for noise control	Less efficient; needs more air than packed-column; parallel units allow continued partial operation if one unit is shut down; no backup	Low profile; small enclosure for equipment; large GAC vessels located outside; can be noisy with two blowers
UV/Ox	Very high capital cost; chemical and electrical costs are high if complete removal of VOCs is required	Destroys VOCs; does not generate waste; no VOC emissions	Small system; needs enclosure; requires handling large quantities of H_2O_2; minimal pretreatment	Increased performance at lower flows; lamp output good indicator of performance; no backup	Very small; enclosure conceals equipment and blends with surrounding structures; very quiet
UV/Ox with GAC	Medium-high capital cost; reduced costs for ongoing GAC service	Destroys approximately 90% of VOCs; significantly reduces spent GAC	Needs enclosure for protection of UV/Ox; less H_2O_2 needed	Very reliable with GAC as back-up	Small enclosure; large GAC vessels located outside; quiet
UV/Ox with Low-Profile Stripping	Medium-high capital cost; may require temporary GAC for emissions control	Destroys approximately 90% of VOCs; temporary GAC for emissions control	Most equipment inside enclosure; less H_2O_2 needed; may need temporary vapor treatment until VOC loadings decrease	Reliable with air-stripping back-up; requires more system controls	Large enclosure; minimal impact on neighborhood; structure blends with surroundings

8.3.2 Cost Analysis

A cost analysis was performed to compare the relative capital and operating costs associated with each groundwater treatment alternative. The cost estimates are considered order-of-magnitude approximations and are based on preliminary vendor quotes, standard cost data, costs for similar systems or work at other sites, and engineering judgment. As such, the actual costs may vary from the estimates provided in this report. The actual costs for the selected treatment alternative will be based on approved scope, legal issues, final engineering design, actual groundwater flow rates and VOC concentrations, and actual labor and material costs.

Costs associated with the treatment technologies include capital equipment such as reactors, GAC systems, pre-treatment systems, plant piping, pumps, and equipment enclosures for weather protection and noise abatement. Estimates for the groundwater pumps, well heads, trenching, and piping were included for completeness; however, those costs will not vary for different treatment technologies.

Contractor's fee includes construction expenses such as temporary facilities, tools, equipment rentals, taxes, and overhead. Contractor's fee is listed as 10 percent of the fixed capital. Engineering and oversight includes various activities associated with implementing the response action at Area 7. The engineering and oversight activities were calculated using percentages of the fixed capital cost. Project management was estimated as a percentage of the engineering and oversight costs. The following is a list of the activities and associated percentages of the costs.

• Design and Drafting	10%
• Permitting and Property Access	5%
• Construction Oversight and Management	6%
• Start-Up and Monitoring	4%
• Reports and Manuals	3%
• Project Management	8% (engineering and oversight)

VOC concentrations typically decrease rapidly during the first stages of groundwater extraction, then stabilize and slowly decrease over the long term. Decreasing VOC concentrations will significantly affect the amounts of GAC, peroxide, and electricity required to adequately and efficiently reduce VOC concentrations during long-term pumping.

Sustained pumping has not been performed in the MAU near Area 7, so limited data is available to estimate the decrease of VOC concentrations in extracted MAU groundwater over time. For the purposes of estimating and comparing operating costs, the average TCE concentration in the groundwater is estimated at 6.87 ppm for the first year, 3.50 ppm for the second year, 1.75 ppm for the third year, 0.85 ppm for the fourth year, then 0.50 ppm for years five through ten. These values were selected due to the proximity of the extraction wells from the suspected source area and analyses of depth-specific samples collected during installation of extraction wells 7EX-3MA and 7EX-4MA. The actual TCE concentrations during long-term pumping may vary. These averages were selected only for the purposes of estimating and comparing costs. The operation and maintenance costs include labor, administration, power, chemical, and GAC usage and subcontractor services over the life of the project based on the pumping rate and estimated VOC concentration in the groundwater. Operation and maintenance labor, administration, and miscellaneous supplies were estimated for each treatment alternative based on level of effort typically required for these types of systems. These costs were assumed to be constant throughout the life of the project. Present worth costs were calculated using a discount rate of 6 percent and project duration of 10 years. A summary of the estimated costs are provided in the following table:

Estimated Cost Comparison for Groundwater Remediation Technologies

	UV/Ox	UV/Ox with Air Stripper	UV/Ox with GAC	Liquid-Phase GAC	Air-Stripper Column†	Air-Stripper Tray
FIXED CAPITAL COSTS						
Groundwater Extraction System (pumps, trenching, piping)	357,300	357,300	357,300	357,300	357,300	357,300
Groundwater Treatment System Equipment (reactors, strippers, tanks)	273,000	223,000	133,000	18,000	168,000	138,000
Liquid-Phase GAC System Equipment	—	—	50,000	105,000	—	—
Vapor-Phase GAC System Equipment	—	35,000	—	—	55,000	100,000
Preliminary Site work (building, foundation, paving)	85,000	85,000	85,000	45,000	70,000	70,000
Pre-treatment Systems (filter, scale control/softening, and injection systems)	8,000	8,000	14,000	10,000	4,000	4,000
Additional Treatment Equipment (process pumps, piping, valves, ducting)	21,000	21,000	21,000	13,000	21,000	21,000
Electrical Service and Instrumentation	85,000	125,000	125,000	85,000	115,000	115,000
Contractor's Fees (10% of above costs)	82,900	85,400	78,500	63,300	79,000	80,500
Engineering, Oversight, Start-up, Reports	275,800	284,300	261,300	210,800	262,900	267,900
TOTAL CAPITAL COSTS	1,188,000	1,224,000	1,125,000	907,000	1,132,000†	1,154,000
ANNUAL OPERATION AND MAINTENANCE COSTS						
Power/nat. gas (pumps, blowers, misc.)	42,000	64,800	40,800	37,200	69,100	95,200
Operator labor, maintenance supplies, and chemicals (based on $60/hour labor rate)	49,900	53,100	56,000	36,400	64,400	64,900
Power, Peroxide, UV Lamps, Year 0-1	217,800	56,600	56,600	—	—	—
Power, Peroxide, UV Lamps, Year 1-2	182,800	37,700	37,700	—	—	—
Power, Peroxide, UV Lamps, Year 2-3	157,100	23,800	23,800	—	—	—
Power, Peroxide, UV Lamps, Year 3-4	136,500	13,400	13,400	—	—	—
Power, Peroxide, UV Lamps, Year 4-5	121,600	7,800	7,800	—	—	—
Power, Peroxide, UV Lamps, Year 5-10	503,600	39,200	39,200	—	—	—
GAC Servicing, Year 0-1	—	15,800	115,900	477,800	100,800	113,400
GAC Servicing, Year 1-2	—	15,800	58,000	239,300	63,000	63,000
GAC Servicing, Year 2-3	—	—	30,200	119,300	37,800	37,800
GAC Servicing, Year 3-4	—	—	30,200	83,100	25,200	25,200
GAC Servicing, Year 4-5	—	—	22,700	68,900	12,600	17,600
GAC Servicing, Year 5-10	—	—	113,400	344,700	63,000	88,200
TOTAL O&M COSTS (Present Worth*)	2,170,00	1,346,000	1,472,000	2,013,000	1,587,000	1,886,000
ESTIMATED TOTAL COST	3,358,000	2,570,000	2,597,000	2,920,000	2,719,000	3,040,000

*6%, 10 years

†Costs for subgrade structures or multiple short columns have not been included. Installation of these facilities will increase the overall costs for the air-stripper column alternative.

Cost Estimating Assumptions

Design flow rate of 385 gpm; initial influent TCE concentration of 6.87 ppm.

Power costs @ $0.10/Kw-hr

GAC servicing estimated at $2.10 per pound for spent GAC removal, replacement, regeneration.

The adsorption capacity for vapor-phase and liquid-phase GAC was estimated using TCE isotherms and was adjusted to reflect decreasing TCE concentrations over time.

Natural gas costs for dehumidifier system for air stripper column/tray technologies @ $0.50 per therm.

With regard to implementability and aesthetics, subgrade structures may be required to reduce the overall height of tall equipment such as columns and vessels. These factors were not included the cost analysis due to uncertainty regarding COS's requirements, preferences, and future plans for the area.

Vapor-phase GAC was included in the cost estimate for UV/Ox and air stripping for the first two years of operation due to the initial high concentrations of TCE. The estimate assumed that after two years the TCE concentration in the air stripper off-gas would be low enough that the health or risk impacts would be negligible.

8.3.3 Numerical Evaluation

The evaluation criteria were weighted based on relative importance to Siemens, COS, and overall compliance with remedial objectives. The weighting factors for each criteria are as follows:

Capital Cost	20%
O&M Cost	20%
Waste Generation	20%
Implementability	10%
Reliability	15%
Aesthetics	15%
Total Weight	100%

Costs were weighted heavily in consideration of the financial burden for Siemens. Waste generation was weighted heavily due to the added liability and repugnancy associated with on-site handling, transporting, and disposing of wastes at an off-site facility. Reliability and aesthetics were weighted equally due to the importance of meeting discharge requirements and unobtrusively blending the treatment plant with the surrounding neighborhood. Implementability was weighted lowest since all of the treatment technologies are reasonably implementable at Area 7 and, considering the overall scope of the response action, implementing the groundwater treatment system is relatively insignificant compared to the other factors.

This evaluation numerically ranked the individual criteria for each treatment alternative from 1 to 5, with 5 being the highest score. Each grade was then multiplied by the criteria weighting factor. The sum of the weighted grades was computed for each alternative. The following table summarizes the numerical evaluation of the groundwater treatment alternatives.

Numerical Evaluation of Groundwater Treatment Alternatives

Criteria	Capital Cost	O&M Cost	Waste Generation	Implement-ability	Reliability	Aesthetics	Overall Rating (5 max)
Weight	20%	20%	20%	10%	15%	15%	
Adsorption							
Liquid-Phase GAC	5	1	1	5	5	4	3.25
Air Stripping							
Packed-Column with VGAC	4	2	3	4	3	1	2.80
Low-Profile with VGAC	3	2	2	4	3	4	2.85
UV/Oxidation							
UV/Ox	1	1	5	3	3	5	2.90
UV/Ox with Tray Stripper	2	3	4	3	4	4	3.30
UV/Ox with LGAC	2	3	3	3	5	4	3.25

8.4 Selection of Preferred Treatment Alternative

Based on the evaluation of the groundwater treatment alternatives, UV/Ox with air-stripping polishing was selected as the preferred alternative. The basis for selection include:

- Most system equipment can be installed inside an enclosure, which reduces visual impacts and controls noise.
- The overall cost for UV/Ox with air stripping is competitive with other treatment technologies.
- Off-gas treatment would be temporary until VOC concentrations decrease to levels where the vapor emissions would comply with allowable health and risk guidelines.

8.5 Treatability Study and Performance Estimates

A treatability study was conducted by Calgon Carbon Oxidation Technologies (CCOT; formerly Solarchem Environmental Systems) using groundwater collected from well 7EX-3MA. The treatability study testing procedures and results are presented in Appendix F.

Based on the treatability test results, CCOT verified that their preliminary design recommendation of a 60-kilowatt Rayox system would adequately reduce VOC concentrations to levels where efficient polishing can be accomplished using one low-profile air stripper. The results of the treatability study indicated that based on the maximum treatment system flow rate of 385 gpm and initial influent TCE concentration of 6.87 ppm, the effluent TCE concentration would be approximately 0.91 ppm, an 87 percent reduction. These results are based on laboratory analyses performed by CCOT. Results of analyses of replicate samples performed by Barringer Laboratories (an independent laboratory) indicated much lower VOC concentrations in the study effluent. Using the Barringer data, the 60-kilowatt Rayox system would reduce the TCE concentration from 6.87 ppm to approximately 0.115 ppm, a 98% reduction. Based on these discrepancies, CCOT believes that their UV/Ox performance estimates are conservative and the actual reactor effluent VOC concentration is likely to be less than the estimate derived from their study. Therefore, the VOC reduction through the 60-kilowatt Rayox UV/Ox system is anticipated to be between 87 and 98 percent.

Based on the results of the CCOT study, the performance of a low-profile air stripper was estimated using an air stripping model developed by North East Environmental Products (NEEP). Results of the air stripper performance estimates indicate that TCE can be reduced from 1.0 ppm to less than 0.005 ppm using a NEEP Model 41241 low-profile tray stripper. The NEEP Model 41241 has a maximum hydraulic capacity of 550 gpm and uses up to 2,400 cfm of air. The results of the air stripper modeling are also provided in Appendix G.

Due to the nature of treatment using UV/Ox technology, VOC destruction efficiency is based on the UV dose per unit volume of water. Therefore, reduction of influent flow rate and/or an increase in UV lamp power output can increase VOC destruction efficiency if VOC concentrations temporarily fluctuate during initial stages of pumping.

8.6 Treated Groundwater End-Use

Several end-use alternatives have been evaluated with COS and SRP regarding beneficial use of the treated groundwater. Three beneficial use alternatives were identified as discharge to COS storm sewer for use in NIBW, discharge to SRP at 75th Street and Thomas Road for use in the SRP irrigation network, and reinjection at SRP 22.3E,7N.

Treated water discharged to COS storm sewer and use in NIBW would require piping from Area 7 to a storm sewer manway located at 75th Street and Osborne Road. The treated water would flow east to an outfall in NIBW at Osborne Road where it would be used by the Continental Golf Course and in the lakes in NIBW; the remaining would be used by SRP further downstream. SRP conducted a test by diverting approximately 500 gpm of water through their irrigation system to an outfall near the storm sewer outfall at NIBW and Osborne Road. The results of the SRP test indicated that the continuous addition of up to 500 gpm would not significantly affect the water levels in the NIBW system. Accounting for the water at this location, however, would be difficult to coordinate with Siemens, COS, and SRP.

Returning the treated water to the UAU and/or MAU at SRP 22.3E,7N (Civic Center Drive and Thomas Road, south of the Area 7) was also considered. Reinjection, however, may affect pumping from the COS wells in the Central Groundwater Treatment Facility network and the residual VOC plume in the MAU. Additionally, this alternative would not be useful since the need for water in the Scottsdale area is high and the treated water could be used for other purposes.

The alternative selected as the most cost effective, convenient, and beneficial use is to discharge the treated groundwater directly to SRP's irrigation network at Osborne and Thomas Roads. The water will enter SRP's system through a distribution vault located on the northwest corner of the intersection. From the distribution vault, the water will gravity drain to NIBW through an outfall located on the north side of Thomas Road at NIBW. The treated water will be used by SRP's customers along NIBW and Grand Canal. The treated water will be accounted and used by SRP beginning at the distribution vault discharge point. Siemens has secured an access agreement with SRP for this alternative.

8.7 Development of Discharge Requirements

Limitations for discharge of the treated water and process vapor were developed to comply with NIBW objectives, local regulations, and national standards.

8.7.1 Groundwater Discharge Requirements

Prior to removal from the irrigation system by SRP, the treated water is likely to flow through areas where fish or other aquatic life may be present. Thus, the VOC limitation for the treated water must be protective of fresh water aquatic life. Therefore, the maximum daily limit for TCE will be 0.020 ppm and the maximum daily limit for PCE will be 0.011 ppm.

Although the above limitations are protective of fresh water aquatic life, the treatment plant is designed for reductions of VOCs to less than 0.005 ppm.

Discharge of the treated water to the SRP irrigation network requires a National Pollution Elimination System (NPDES) Permit. The limitations discussed in this section have been proposed in an NPDES permit application previously submitted to the Arizona Department of Environmental Quality.

8.7.2 Treatment System Vapor Discharge Requirements

A screening level model was used to determine the maximum VOC rate that could be emitted at Area 7 and minimize impacts to the surrounding receptors. Air quality modeling was conducted to determine a VOC mass emission rate from the treatment plant that would not pose a significant threat to receptors in the vicinity of Area 7. The air modeling report is included in Appendix H.

The Industrial Source Complex - Short Term (ISCST) model was used to identify the highest VOC concentration impacts from the discharge stack at Area 7. The ISCST model calculated the 1-hour, 24-hour, and annual average impacts to surrounding receptors. The results were compared to Arizona guidelines for the 1-hour, 24-hour, and annual average impacts. The 1-hour and 24-hour averages are meant to protect against acute toxic effects. The annual average is based on EPA unit risk factors and is intended to limit excess incremental cancer risk to 1 in a million over a 70-year expected lifetime.

The model used site-specific data such as building dimensions, proximity of receptors, and local meteorological data. The model estimated the mass emission rate that would not significantly affect surrounding receptors at different stack heights and diameters. A maximum air flow rate of 2,400 cfm from the air stripper was used as a basis for the discharge. The 16-foot stack height was selected so that the top of the stack was above any equipment or structures in the treatment plant area. The 18-foot height was selected to compare the effects of stack height on nearby receptors. Stack diameters of 10 inches and 11 inches were selected to compare the allowable TCE mass emission rate, versus material and pumping costs.

Modeling results indicated that the 1-hour and 24-hour impacts were significantly below the allowable Arizona guidelines.

Modeling results indicated that the maximum annual average impacts were northeast of the planned treatment plant location. The following table shows the allowable TCE emissions rate (pounds per day) that could be released from the Area 7 MAU groundwater treatment plant based on the Arizona maximum allowable annual average exposure with respect to stack height and diameter.

		Stack Height (feet above grade)	
		16	**18**
		(pounds per day)	
Stack Diameter	**10**	1.67	1.89
(inches)	**11**	1.49	1.73

A comparison of the results indicates that the preferred alternative would be an 11-inch-diameter stack with a height of 16 feet. The lower stack is preferred to minimize height and visual impact. Based on the air modeling results and the selected stack parameters, up to 1.49 pounds of TCE can be emitted from the Area 7 MAU treatment plant and the excess incremental cancer rate for nearby receptors will be less than one in a million. Note that the annual average value is based on a receptor exposed to the maximum emission for a 70-year period. This is considerably over-conservative since the Area 7 MAU response action is not intended to last that long and the average VOC emission during the entire response action will likely be lower than the maximum allowed.

The initial maximum TCE mass rate is estimated at 31.76 pounds per day. Assuming that the UV/Ox system will reduce the VOC concentration by the conservative 87 percent (see section 8.5), the VOC mass rate processed through the air stripper is estimated at approximately 4.13 pounds per day. Based on the estimated performance of the air stripper, the maximum initial VOC mass emission rate to the atmosphere will exceed the estimated acceptable rate of 1.49 pounds per day. Therefore, off-gas controls will be installed on the system temporarily until VOC mass processed through the air stripper is less than 1.49 pounds per day. Upon confirmation that the VOC mass processed through the air stripper is consistently less than 1.49 pounds per day, the off-gas controls will be removed and the air stripper off-gas will be directly discharged to the atmosphere.

8.7.3 Compliance with Local Regulations

Maricopa County Air Pollution Control Division (MCAPCD) regulations require a permit for vapor discharges from remediation systems if the process vapor contains greater than three pounds per day before controls. A permit would be required for the proposed treatment system if the VOC mass processing rate through the air stripper exceeds three pounds per day. Based on the maximum TCE mass extraction rate and estimated performance of the UV/Ox system, the air stripper may process slightly more than three pounds of VOCs per day during the initial stages of the Area 7 MAU groundwater response activities. MCAPCD will be notified of the plans for the proposed system and an application will be filed.

Additionally, implementation of temporary off-gas controls will comply with MCAPCD regulations and appease Concerned Citizens of Scottsdale, a group of local residents.

9.0 REMEDIAL SYSTEM DESIGN

The Area 7 MAU GWET system has been designed to address the objectives described previously in this report. Groundwater extraction will be performed using two MAU groundwater extraction wells, 7EX-3MA and 7EX-4MA, and the existing UAU groundwater extraction well, 7EX-1UA. The major components of the GWET system include submersible water pumps, well head equipment, piping from the well heads to the treatment plant, an equalization tank, a UV/Ox reactor, a low-profile air stripper, vapor-phase GAC, and a treated groundwater discharge system. Appurtenant equipment such as valves, sampling ports, and instrumentation will also be installed on the system. Figure 2 shows the locations of the groundwater extraction wells, extraction and discharge system pipe routing, and treatment plant. A conceptual process illustration is shown on Figure 8. A conceptual treatment plant plan and elevation view are shown on Figure 9. General Plans for the Area 7 MAU GWET system are included in Appendix I. A brief narrative of the major components is included in the following sections.

9.1 Groundwater Extraction Wells

Groundwater extraction well 7EX-3MA is located approximately 350 feet south of Area 7 on the east side of the parking lot of Scottsdale Stadium. Groundwater extraction well 7EX-4MA is located approximately 1,150 feet south of Area 7 on the northwest corner of Angus Drive and Miller Road. Groundwater extraction well 7EX-1UA is located near the southwest corner of Area 7 immediately east of the treatment plant.

9.1.1 Pumps and Risers

Submersible groundwater extraction pumps will be installed in each groundwater extraction well. The following table summarizes the guidelines used for the design of the submersible pumps.

Groundwater Extraction Pump Design Guidelines

Well	Screened Interval (ft. bgs)	Average Flow Rate (gpm)	Design Flow Rate (gpm)	Static Water Level (ft. bgs)	Pumping Water Level (ft. bgs)	Pump Intake Depth (ft. bgs)	Well Head Pressure (ft. W.C)	Est. Motor Size (hp)
7EX-3MA	167-348	200	225	160	225	275	35	25
7EX-4MA	190-289	100	125	165	195	245	45	15
7EX-1UA	130-150	35	35	140	141	145	15	3

The pump motors for 7EX-3MA and 7EX-4MA will be driven by variable frequency drives to maintain consistent groundwater drawdown in each well and reduce costs by eliminating the need to choke the pump to reach a desired flow rate.

Due to the distance of well 7EX-4MA from the treatment plant, a large diameter power conductor would be necessary to deliver the required power to the pump motor. To minimize excessive costs for conductors and conduits, a separate electrical service entrance will be provided for the drive at well 7EX-4MA. The drive will be housed in an above ground locking NEMA-4 electrical panel located near the well. The existing submersible pump in 7EX-1UA is included in the above table for completeness.

The risers for wells 7EX-3MA and 7EX-4MA will be 3-inch- diameter semi-rigid hose or steel pipe. The riser for the existing pump in well 7EX-1UA is 2-inch-diameter steel pipe.

9.1.2 Well Head Equipment and Piping

Each well head assembly will include a local pressure indicator, a check valve, and a manual shut-off valve. The nominal pipe size for each MAU well head assembly is 3-inch-diameter steel and 2-inch-diameter PVC 40 for the existing UAU well head. Each well head assembly will be installed inside a traffic-rated concrete vault flush-mounted (plus 1 inch) to minimize disturbance to the well head and accumulation of surface water run-off.

Water extracted from each well will be transported to the treatment plant in separate pipes. The header pipes from wells 7EX-3MA and 7EX-4MA will be 4-inch- diameter SDR 17 high-density polyethylene (HDPE) pipe. The header piping from 7EX-1UA will be 2-inch-diameter SDR 17 HDPE pipe. HDPE piping was selected for its durability, strength, and ease of installation.

The header piping from well 7EX-3MA will be routed east to the alley, then directly north to the treatment plant. The header piping from well 7EX-4MA will be routed from the well east to Miller Road, north along Miller Road, then west to the treatment plant through the alley on the south side of Area 7. The header piping from well 7EX-1UA will be conveniently rerouted within the treatment plant compound.

The trench for the pipe routed in Miller Road will be located on the west side of the street as close as practicable to the curb to minimize disturbance to traffic during installation and maintenance.

Junction boxes will be located approximately every 500 feet to provide access to the pipes for clean-out and pump-out. Upon installation, the header pipes will be pressure tested up to 100 psi for a minimum of two hours to verify tightness.

9.2 Groundwater Treatment System

The groundwater treatment system will consist of an equalization tank, transfer pump, UV/Ox reactor, chemical scale inhibitor pre-treatment injection system, a low profile air stripper with integral sump, an air blower, a second transfer pump, and discharge system. A process and instrumentation diagram is presented in figures PI-01, PI-02, and PI-03 in Appendix J.

9.2.1 Groundwater Treatment System Equipment

A brief description of the major equipment used in the treatment system is listed below and is referenced on the Process and Instrumentation Diagram.

Major Equipment

Tag	Equipment Type	Description/Function
P-1UA	Submersible Pump	Well 7EX-IUA
P-3MA	Submersible Pump	Well 7EX-3MA
P-4MA	Submersible Pump	Well 7EX-4MA
T-1	Tank	Process tank used as surge reservoir for startup and recycle
P-9	Sump Pump	Housekeeping pump
P-1	Process Pump	Pump water from T-1 through UV Ox and into S-3
FV-1	Flow Valve	Shut off to prevent draining T-1
P-1182	Injection Pump	Inject H2O2 into groundwater process
UV-1	UV Oxidation	Primary treatment of groundwater; Calvin Carbon Oxidation Technologies Model 30 - 2
T-3	Tank	Storage of chemical scale inhibitor
P-11	Injection Pump	Inject polyphosphate into groundwater process
PCV-11	Pressure Control Valve	Regulate flow of chemical scale inhibitor
S-3	Air Stripper	Secondary treatment of groundwater; Northeast Environmental Shallow Tray Model 41241
B-3	Process Blower	Induce air flow within air stripper, S-3
CA-1 & 2	Vapor-Phase GAC Adsorbers	Temporary treatment of S-3 and SVE off-gas
AT-6	Analysis Transmitter	VOC detection between temporary GAC adsorbers
P-2	Process Pump	Pump water from S-3 sump to discharge or recycle to T-1
FV-6A	Flow Valve	System recycle
FV-6B	Flow Valve	Discharge to irrigation
FV-6C	Flow Valve	Discharge to sanitary sewer

The UV/Ox reactor will consist of two 30-kilowatt reactors in series manufactured by CCOT. The UV/Ox reactor is intended to reduce the concentrations of VOCs in the process water up to approximately 90 percent. The vendor specifications for the UV/Ox reactor are included in Appendix F. The UV/Ox system also includes a hydrogen peroxide storage and injection system. Hydrogen peroxide system includes a skid-mounted injection system with a metering pump and appurtenant control and safety equipment. The double-contained peroxide storage system includes an approximately 1,000- to 2,000-gallon cross link HDPE tank provided by the UV/Ox vendor. The storage tank may be reduced in size at a later date as the volume of peroxide required to treat the water decreases with decreasing VOC concentrations.

The UV/Ox system will be fitted with recycle and bypass loops. The recycle loop will primarily be used during start-up and system performance testing. Use of the recycle loop will provide added protection against exceedances of effluent discharge limits and more flexible control of the treatment system. The UV/Ox bypass loop may be used while the system is processing water with VOC concentrations in the range appropriate for near complete removal by the air stripper.

A pre-filtration system to remove silt from the extracted groundwater was considered. The CCOT UV/Ox study used unfiltered water, which did not appear to cause problems with the treatability effectiveness. Additionally, the existing UAU air-stripping system treats unfiltered groundwater with satisfactory results. The system is designed, however, to accommodate installation of a multimedia filtration system if excessive sediment is produced which reduces the effectiveness of the treatment system.

The water pre-treatment system will include an injection system to add a polyphosphate chemical scale inhibitor to the partially treated water to minimize calcium carbonate scale build-up on the air stripper internals. The polyphosphate scale inhibitor will be a non-toxic food grade polymer. Preliminary estimates indicate that approximately 5 ppm or 2 gallons per day under normal operating conditions will be required to reduce the scaling potential of the groundwater. The components of the water pre-treatment system include a 100-gallon chemical storage tank or 55-gallon drums, metering pump, pressure control valve, and an in-line static mixer. The injection system will be fitted with a pressure relief valve and piping that will return the chemical to the storage tank if the process line is over pressured or plugged.

The air stripper will be a four-tray Shallow Tray Model 41241, manufactured by North East Environmental Products. The manufacturer's specifications are included in Appendix G. The air stripper system will include a blower capable of providing up to 2,400 cfm with 40 inches W.C. pressure, a 500-gallon sump, and a discharge pump.

The air stripper off-gas will be treated using vapor-phase GAC until concentrations of VOCs in the off-gas decrease to less than 1.49 pounds per day, which is consistent with state and national risk-based standards. The temporary GAC system will consist of two radial flow GAC adsorbers piped in series. The radial flow design allows higher vapor flows with less pressure drop across the bed than typical packed-bed adsorbers. Each adsorber consists of a radial flow element which is housed inside an air-tight cabinet. The element is a steel structure with two concentric screened cylinders. The GAC is placed in the annular space between the screened cylinders. The process vapor enters the adsorber through a port located on top of the cabinet and the inner screen. The process vapor then passes through the GAC where the VOCs are removed. The GAC adsorbers will be Nixtox N-3000, manufactured by Tigg Corporation. Each adsorber contains 1,600 pounds of GAC and is capable of treating up to 3,000 cfm with less than 5 inches W.C. pressure drop across the bed. The manufacturer's literature is provided in Appendix K.

If SVE is re-initiated at Area 7, the extracted soil-vapor from the existing SVE system will be processed through the new GAC system.

Due to the temporary nature of the vapor-phase GAC, no specific relative humidity adjustment equipment will be installed. The air stripper manufacturer indicated that the typical relative humidity of the off-gas is approximately 80 percent. The pressure increase across the air stripper blower will provide an adiabatic temperature increase of approximately 22°F. Assuming an average inlet temperature of 60°F and relative humidity of 80 percent, the outlet conditions will be 82°F and 40 percent, respectively. Additional heated vapor can be provided by use of the positive displacement SVE blowers. The ducting between the air stripper blower and the GAC adsorbers will be adequately insulated to maintain the temperature in the vapor stream.

VOC concentrations in the off-gas will be monitored between the temporary GAC adsorbers to detect VOC breakthrough and initiate a system shutdown so the primary GAC can be serviced.

The vapor will be discharged through a 11-inch-diameter discharge stack approximately 16 feet above grade.

9.2.2 Treatment Plant

The groundwater treatment plant will be located in a space approximately 56 feet by 75 feet in the southeast corner of Area 7. The UV/Ox, air stripper, and peroxide and scale inhibitor injection systems will be housed inside a pre-fabricated metal building. The treatment system motor control center (MCC), and Human/Machine Interface (HMI) will be installed into a control room inside the pre-fabricated metal building. The planned building will be approximately 32 feet by 48 feet, and erected on a concrete foundation. A six-inch high wall will surround the perimeter for peroxide containment. The concrete foundation will be coated with an impermeable epoxy coating to seal the floor.

The equalization tank and GAC adsorbers will be located outside the building on the north side of the treatment plant area. The treatment plant area will be repaved as necessary to provide adequate foundations for the equipment and smooth surfaces for vehicle and foot traffic.

The treatment plant will be surrounded by a block wall for security. The design and color of the block wall and building will be consistent with the decor of Scottsdale Stadium. Access to the plant will be provided through three steel gates, two located on the west wall and one on the south wall.

Due to the space limitations and building placement, UAU well 7EX-2UA will be destroyed. Well 7EX-2UA was installed during the UAU investigation at Area 7 in 1993 as a monitoring well. UAU monitoring at Area 7 will be conducted using well 7EX-1UA. Well 7EX-2UA will be destroyed in accordance with State of Arizona specifications.

9.3 Process Control

The groundwater extraction, SVE and treatment plant, with the exception of the UV/Ox system, will be controlled by a Siemens/TI 545 PLC. A Siemens 435 PLC is an integral part of the UV/Ox system and will control its operation. Control signals, which are required for coordination of the two PLCs, will be hard-wired between them. Both

PLCs will be networked to a PC, which will be used as the operator console and HMI. This console will be the device through which the system is monitored and adjustments are made. The console will support remote monitoring and adjustments to the system. As with the Area 7 SVE system, TiSoft and Wonderware Intouch will be the software used for PLC logic programming and HMI development, respectively. The HMI will support logging of selected data such as flows and pressures from each extraction well, flow rate and pressure on each plant pump and blower, and critical operating parameters of the UV/Ox system, such as UV lamp power and peroxide feed system operation.

Treatment system safeguards include system shutdown in the event of relevant out- of-limit process values (high or low liquid levels, excessive temperature, failure of specific equipment). The remote startup interlocking will require a safety verification (pushbutton) by an onsite operator or observer prior to activation of rotating machinery or UV lamps.

9.4 Functional Description of Control Loops

The control system is graphically presented on the Process and Instrumentation Diagram on figures PI-01, PI-02, and PI-03 in Appendix J.

9.4.1 T-1 Level Control Loop

The liquid level within T-1 will be monitored and transmitted to the PLC. This information will be used to generate an output signal which will control the speed of the pump. The control algorithm will maintain the liquid level at a pre-determined setpoint by adjusting the pump speed to minimize setpoint deviation.

Level switches for detection of excessively high or low levels will initiate a shutdown of the recovery and treatment systems.

9.4.2 S-3 Sump Level Control Loop

The liquid level within the S-3 sump will be monitored and transmitted to the PLC. This information will be used to generate an output signal which will control the speed of the pump. The control algorithm will maintain the liquid level at a pre-determined setpoint by adjusting the pump speed to minimize setpoint deviation.

Level switches for detection of excessively high or low levels will initiate a shutdown of the recovery and treatment systems.

9.4.3 P-3MA and P-4MA Flow Control Loops

The discharge flow rate from pump P-3MA (and P-4MA) will be monitored and transmitted to the PLC. This information will be used to generate an output signal which will control the speed of the pump. The control algorithm will maintain the flow rate at a pre-determined setpoint by adjusting the pump speed to minimize setpoint deviation.

Unacceptable flow rate setpoint deviation will be detected by the PLC and initiate an alarm or shut down the appropriate pump.

9.4.4 B-3 Flow Control Loops

The discharge flow rate from Blower B-3 will be monitored and transmitted to the PLC. This information will be used to generate an output signal which will control the speed of the blower. The control algorithm will maintain flow rate at a pre-determined setpoint by adjusting the blower speed to minimize setpoint deviation. Blower flow rate adjustment is included to allow compensation for stripper head changes as a result of fouling or carbon addition/removal. Flow rate may also be varied over a narrow range as a function of groundwater flow rate.

Unacceptable flow rate setpoint deviation will be detected by the PLC and initiate an alarm or treatment system shutdown.

9.4.5 P-11 and P-1182 Injection Control Loops

The injection rate from pump P-11 (and P-1182) will be determined as a linear function of the groundwater process flow rate. Flow transmitter 7 (FQIT-7) will transmit the flow rate process variable to the PLC. This information will be used to generate an output signal which will control the injection rate of the pump.

9.4.6 AT-6 Analysis Transmitter, VOC Detector

The VOC concentration between the two vapor-phase GAC adsorbers will be continuously monitored and transmitted to the PLC. VOC concentrations exceeding the setpoint will be detected by the PLC and initiate a system shutdown. The setpoint will initially be set at 5 parts per million by volume.

10.0 OPERATION AND MAINTENANCE

The groundwater treatment system will be operated in a manner to effectively remove VOCs from the upper MAU groundwater beneath and downgradient from Area 7. O&M activities will include automatic operation and control, periodic site visits for monitoring, adjustment of the equipment operating parameters, collection of samples, and general preventative maintenance.

10.1 Shakedown

After construction of the Area 7 MAU GWET system, shakedown activities will begin. During shakedown, the equipment and control system will be checked and tested for proper operation. Water will be processed in recycle mode during testing of the UV/Ox and air-stripper systems. Upon confirmation that the UV/Ox and air-stripper systems are functioning properly, the groundwater pumps will be tested. Continuous flow-through will be required during pump testing and calibration due to the limited capacity of the equalization tank. While the system is in continuous flow-through mode, the treated water will be discharged to the COS sanitary sewer. The maximum treatment system throughput will be at flow rates up to 200 gpm until monitoring data indicate that the VOCs in the treated groundwater are within the limitations of the NPDES permit. Samples will be collected frequently when discharge of treated groundwater is planned during system shakedown. Operation of the pumps during shakedown will be intermittent to allow time for adjustment of the equipment and controls. Groundwater will be discharged to the COS sanitary sewer during off-peak hours.

The sanitary sewer connection will likely be at a manway located east of Area 7 in Miller Road. The existing sanitary sewer line at this location is 15 inches in diameter.

System shakedown is anticipated to require 30 days to complete.

10.2 Start-Up

After successful completion of shakedown, system start-up will be initiated and the treatment system will operate in continuous flow-through operating mode. Initially, the groundwater extraction system will be operated at reduced flows starting at approximately 200 gpm to ensure adequate VOC reduction prior to discharge. The process flow rate will be gradually increased until the optimum extraction rates from the three extraction wells are reached. The duration of the system start-up period is projected to be 30 days.

The treated groundwater is anticipated to be of satisfactory quality to discharge to the SRP irrigation network in accordance with the NPDES permit requirements. If abnormal operation or equipment malfunctions occur during start-up, repairs will be made immediately. Upon completion of such repairs, limited discharge to the sanitary sewer may be required while satisfactory treatment system performance is demonstrated. Discharges to the sanitary sewer during start-up will be performed during off-peak hours. Frequent system monitoring will be conducted to expedite the performance demonstration and return the system to normal operation and discharge to SRP.

10.3 Routine Operation and Maintenance

Many critical parameters will be monitored and/or controlled by the PLC network, and regular site visits by a technician will be necessary to maintain efficient GWET. At a minimum, a technician will visit the site weekly to perform routine maintenance on the equipment. If a system alarm occurs or additional work is required at the Site, additional maintenance will be performed on an as-needed basis.

10.3.1 Routine Operation

The GWET system will operate 24 hours per day, 7 days per week except for shutdowns due to routine maintenance.

During normal operation, the treated groundwater will be discharged to SRP. If the system shuts down due to an alarm condition, discharge to SRP will immediately discontinue and residual untreated or partially treated water in the system will be recycled to the influent equalization tank. After an alarm condition is acknowledged, treatment operations will resume in recycle mode until satisfactory conditions are achieved, then the water will be discharged to SRP.

In the event that major repairs are required, limited discharge to the sanitary sewer may be necessary until monitoring data indicate that the treated groundwater VOC quality is within NPDES permit limitations. Flow-through operation of the treatment system and sanitary sewer discharge during performance verification will be limited to 200 gpm during off-peak hours to minimize loadings on the sanitary sewer system.

10.3.2 Routine Maintenance

The following O&M activities will be routinely conducted at the Site:

- Collect groundwater and vapor samples for chemical analyses
- Inspect gages, valves, and instrumentation; maintain as necessary
- Recalibrate appropriate control equipment as necessary, in accordance with the manufacturers' instructions
- Record locally indicated operating parameters
- Inspect all equipment including pumps, blowers, and tanks; maintain as necessary
- Inspect general condition of the extraction system and treatment plant
- Remove any rubbish or foreign material from the well head vaults and treatment plant
- Refill the scale inhibitor feed tank
- Refill the peroxide feed tank; peroxide handling will be performed by a qualified chemical distributor
- Service the GAC; spent GAC will be serviced by a qualified contractor

11.0 TREATMENT SYSTEM MONITORING

A monitoring program will be implemented during the MAU groundwater remedial action to track the progress and effectiveness of VOC mass reduction in the MAU and treatment of the groundwater. The monitoring program includes collection of routine system operating data, groundwater quality data, and vapor emission data. The data will be collected and maintained in accordance with the "Salt River Project North Indian Bend Wash Sampling and Analysis Plan and Quality Assurance Project Plan" (SAP and QAPP; June 1991) with addenda included in Appendix L of this report.

11.1 Shakedown Monitoring

Treated groundwater will be monitored for VOCs on a daily basis while flow-through events are conducted to verify that the water discharged to the sanitary sewer is within COS limitations. Air stripper off-gas will be monitored for VOCs during flow-through events, as necessary to verify proper system operation. VOC monitoring will be conducted from the individual groundwater extraction wells on a weekly basis during continuous flow-through events.

11.2 Start-Up Monitoring

For the first two weeks, treatment plant influent and effluent VOC monitoring will be conducted on a daily basis. Influent and effluent monitoring will be conducted weekly until the completion of start-up. Additional process monitoring may be performed as necessary to verify proper operation of specific system components. Individual groundwater wells, air stripper off-gas, and temporary GAC system discharge will be monitored for VOCs on a weekly basis during start-up.

11.3 Routine Monitoring

Treatment plant monitoring will be performed in accordance with the NPDES permit requirements. The proposed monitoring schedule includes monthly plant influent and effluent sampling for VOCs. If routine monitoring indicates that the treatment plant effluent exceeds permit limitations, system adjustments will be performed as necessary and more frequent VOC monitoring will be conducted to verify proper operation and demonstrate that the system is performing within NPDES limitations. General minerals will be monitored in the treatment plant influent and effluent on a quarterly basis. The air stripper off-gas and GAC system will be monitored for VOCs on a monthly basis using a PID. Vapor samples will be collected on a quarterly basis from the discharge stack and submitted to a state-certified laboratory for VOC analysis.

11.3.1 Operating Parameters

The following operating parameters will be monitored by a technician on site visits during operation of the treatment system.

- Individual groundwater extraction well flow rates
- Equalization tank liquid level
- Treatment plant process flow rate and pressure
- UV/Ox system lamp power
- Lamp sleeve wiper operation
- Peroxide storage tank level
- Peroxide injection rate
- Scale inhibitor storage tank level
- Scale inhibitor injection rate
- Air stripper air flow rate and pressure
- Liquid level in air stripper sump
- Recycle flow rate, as necessary
- Flow rate to COS sanitary sewer
- Flow rate to SRP irrigation network

11.3.2 Data Logging

The control system will support routine logging of treatment plant operating parameters. At a minimum, the following operating parameters will be logged by the computer system

- FT-3MA, flow rate from well 7EX-3MA
- FT-4MA, flow rate from well 7EX-4MA
- FT-1UA, flow rate from well 7EX-1UA
- FT-B3, flow rate from air stripper blower
- FT-6, system process flow rate
- EI-3MA, power usage of pump in well 7EX-3MA

- EI-4MA, power usage of pump in well 7EX-4MA
- EI-1UA, power usage of pump in 7EX-1UA

11.3.3 Remote Access

Remote access to the local PC and HMI will be accomplished using a telephone modem. The system will allow a remote party to view current operating parameters and status and download logged data for future use.

11.4 Area 7 MAU Response Action Performance

As discussed in Section 6.1.3, the modeling approach was intended to estimate upper MAU capture from wells 7EX-3MA and 7EX-4MA in a general way. Actual performance of the proposed GWET system will be monitored using the existing upper MAU monitoring network. Water levels and VOC concentrations will be monitored periodically in accordance with the OU-I monitoring program. That data will be evaluated to assess the performance of the Area 7 MAU GWET system. Performance of the Area 7 MAU GWET system will be evaluated with respect to stated objectives on a 6-month basis in accordance with the existing MAU monitoring program.

11.5 Laboratory Analyses

Groundwater samples for VOC analyses will be analyzed by EPA Method 8010 in accordance with the NPDES permit. Vapor samples will be collected in 6-liter Summa canisters and analyzed by EPA Method T014.

Groundwater treatment system influent and effluent sampling procedures and analyses will be conducted in accordance with the SAP and QAPP with addenda included in Appendix L of this report.

11.6 Reporting

Upon completion of start-up, an installation report will be prepared. The installation report will include a summary of the system design, installation, control systems, start-up monitoring data, and O&M procedures. The installation report will be submitted to EPA within 90 days after successful completion of system start-up.

Data and response action performance evaluation reports will be prepared on a semi-annual basis. The reports will include a description of the extraction and treatment system, summary of O&M procedures, and tabulation and discussion of the O&M data. The semi-annual data evaluation will be based on the calendar year and will be submitted to EPA within 90 days of the end of each operating period.

11.7 Health and Safety

A Health and Safety Plan has been prepared for use during implementation of the Area 7 MAU response action. All activities conducted at the Site associated with construction, start-up, operation, and monitoring will be in accordance with applicable Occupational Safety and Health Administration (OSHA) regulations, Title 29 Code of Federal Regulations (CFR) 1910.120 and other applicable federal, state, and local laws, regulations, and statutes. The Health and Safety Plan is provided in Appendix M.

12.0 ESTIMATED SCHEDULE

Figure 10 presents a general schedule for implementation of the Area 7 MAU response action. In summary, field construction activities are planned to begin in June 1997 and be completed by the end of August 1997. System shakedown is planned to be conducted during September 1997 with system start-up completed by the end of October 1997. Routine operation is planned to begin in November 1997. EPA will be notified prior to commencement of the following field activities: field construction and plant installation, system start-up, and system routine operation.

TABLES

Table 1

Analysis Results for Groundwater Samples Collected From Wells 7EX-3MA and 7EX-4MA During Well Development and Aquifer-Tests

Well ID		Groundwater Extracted (gallons)	Sample Date	Trichloroethene (TCE)
7EX-3MA	Well Development	4,500	1/9/96	6.60
	Aquifer Test	13,080	1/12/96	7.40
		20,350	1/12/96	6.00
		34,160	1/12/96	8.10
		54,600	1/12/96	7.40
		75,150	1/12/96	2.40
		96,060	1/12/96	7.50
		115,900	1/12/96	6.00
		136,120	1/12/96	7.90
7EX-4MA	Well Development*	1,500	11/6/96	2.60
	Aquifer Test	14,215	12/11/96	6.40
	Effluent From GAC Adsorber		12/11/96	0.0048
			12/11/96	0.17
			12/11/96	0.43
			12/11/96	0.48
			12/11/96	0.60

Notes: Samples tested by EPA Method 601 for Halogenated Organic Compounds.
Concentrations reported in ppm.

*PCE was detected in this sample at a concentration of 0.016 ppm.

QA/QC: DRS

Table 2

Analysis Results for Soil Samples Collected From Well 7EX-3MA

Sample Depth (feet bgs)	Sample Date	Organic Compounds EPA Method 8010 Trichloroethene (TCE)	Aromatic Compounds EPA Method 8020
147.0	12/19/95	<0.10	ND
200.5	12/20/95	0.44	ND
230.0	12/20/95	0.19	ND
250.0	12/20/95	0.40	ND
270.5	12/20/95	0.21	ND
290.0	12/20/95	<0.10	ND
310.5	12/21/95	<0.10	ND
330.0	12/21/95	<0.10	ND
355.0	12/21/95	0.18	ND

Notes: All concentrations reported in milligrams per kilogram (mg/kg).
Reporting only compounds detected above laboratory detection limits.
<0.10 = laboratory detection limit for TCE.
ND = no compounds detected above laboratory detection limit.

QA/QC: DRS

Table 3

Analysis Results for SimulProbe Groundwater Samples Collected From Wells 7EX-3MA and 7EX-4MA

Well ID	Depth (feet bgs)	Sample Date	Halogenated Organic Compounds EPA Method 601 Trichloroethene (TCE)	Aromatic Organic Compounds EPA Method 602
7EX-3MA	147.0	12/19/95	1.60	ND
	147.0*	12/19/95	1.50	ND
	230.0	12/20/95	2.00	ND
	250.0	12/20/95	2.50	ND
	290.0	12/20/95	0.430	ND
	350.0	12/21/95	0.560	ND
7EX-4MA	220**	10/26/95	13.00	NA
	253	10/26/95	0.17	NA
	370	10/27/95	0.0015	NA

Notes: All concentrations reported in ppm.
Reporting only compounds detected above laboratory detection limits.
7EX-4MA analyzed for TCE, PCE, and TCA only.
ND = no compounds detected above laboratory detection limit.
NA = not analyzed.

* Duplicate sample
** PCE detected in this sample at a concentration of 0.025 ppm

QA/QC: DRS

Table 4

Physical Test Results for Soil Samples Collected From Well 7EX-3MA

Sample Depth (ft. bgs)	Sample Date	Effective Vertical Water Permeability (millidarcy)	Effective Vertical Hydraulic Conductivity (cm/s)	Specific Gravity (g/cm³)	Bulk Density (g/cm³)	Effective Porosity	Atterberg Limits			Grain Size Classification (median Wentworth Scale	USCS Identification
							PI	PL	LL		
40		0.164	1.61 E-07	2.54	1.45	42.00	23	24	47	0.025	CL with sand
180		1.02	1.01 E-06	2.61	1.40	45.7	28	27	55	0.019	CH with sand
220		1.18	1.16 E-06	2.64	1.47	43.7	19	2	40	0.035	CL sandy
310		1.02	1.00 E-06	2.57	1.36	46.4	16	22	38	0.032	CL sandy

Notes: g/cm³ = grams per cubic centimeter
PI = Plasticity Index
PL = Plastic Limit
LL = Liquid Limit

QA/QC: DRS

Table 6

General Chemistry Analysis for Groundwater Samples Collected From Well 7EX-4MA

Sample ID	Analytical Parameter	Analysis Method	Result	Units
D-7EX-B	Biochemical Oxygen Demand	405.1	<1	ppm
	Nitrogen, Ammonia	350.2	<0.3	ppm
	Nitrogen, Kjeldahl	351.3	<0.1	ppm
	Nitrogen, Nitrate	353.3	9.8	ppm
	O-Phosphate	365.3	<0.1	ppm
	Turbidity	180.1	29.0	NTU
	Conductivity	120.1	1544	µs/cm
	Calcium	200.7	75	ppm
	Copper	200.7	<0.020	ppm
	Iron	200.7	1.1	ppm
	Magnesium	200.7	47	ppm
	Manganese	200.7	0.26	ppm
	Potassium	200.7	5.9	ppm
	Sodium	200.7	240	ppm
	Zinc	200.7	0.58	ppm
	Alkalinity	2320B	228	ppm
	Chemical Oxygen Demand	410.4	21	ppm
	Chloride	SM4500CLB	291	ppm
	pH	150.1	7.63	s.u.
	Sulfate	300.0	190	ppm
	Total Dissolved Solids	160.1	750	ppm
	Suspended Solids	160.2	10	ppm
	Hardness	200.7	380	ppm
D-7EX-C	Total Organic Carbon	415.2	13	ppm

Notes: <: designates laboratory detection limit

Table 6

Summary of MAU Aquifer Test Results for Area 7

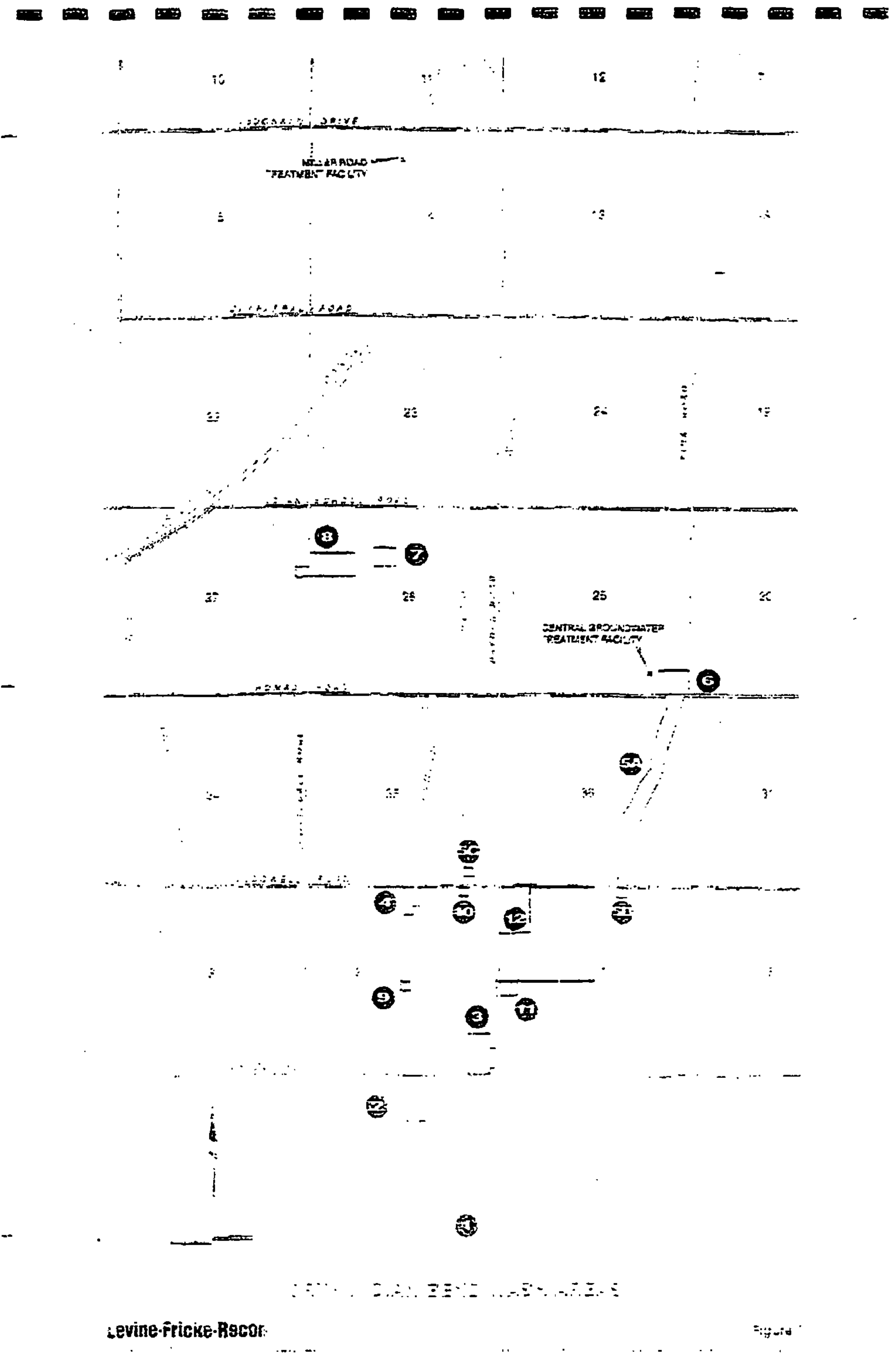
Test Well	Observation Well	Radius (R) (feet)	Screen Interval (feet bgs)	Analysis Method	Transmissity (T)		Storativity (S)	Hydraulic Conductivity (K) (feet/day)
					(ft^2/min)	(ft^2/day)		
7EX-3MA	—	0.25	180-350	Theis (1935)	0.30	427	0.0332	2.2
	CH2MHILL	350	160-185	Theis (1935)	1.45	2,088	0.0029	11.0
	D2MA	330	195-248	Theis (1935)	1.67	2,406	0.0032	12.7
	W1-MA	1700	240-290	Theis (1935)	1.19	1,706	0.0002	9.0
	W1-MA	1250	250-290	Theis (1935)	1.01	1,460	0.0004	7.7
	W1-MA	1700	240-290	Cooper (1946)	1.34	1,932	0.0001	10.2
	W1-MA	1250	250-290	Cooper (1946)	1.09	1,574	0.0002	8.3
7EX-4MA	—	0.25	190-300	Theis (1935)	0.81	1,160	0.0265	6.1
	W2-MA	471	250-290	Theis (1935)	0.87	1,247	0.0000	6.6
Average Values					**1.08**	**1,556**	**0.01**	**8.2**

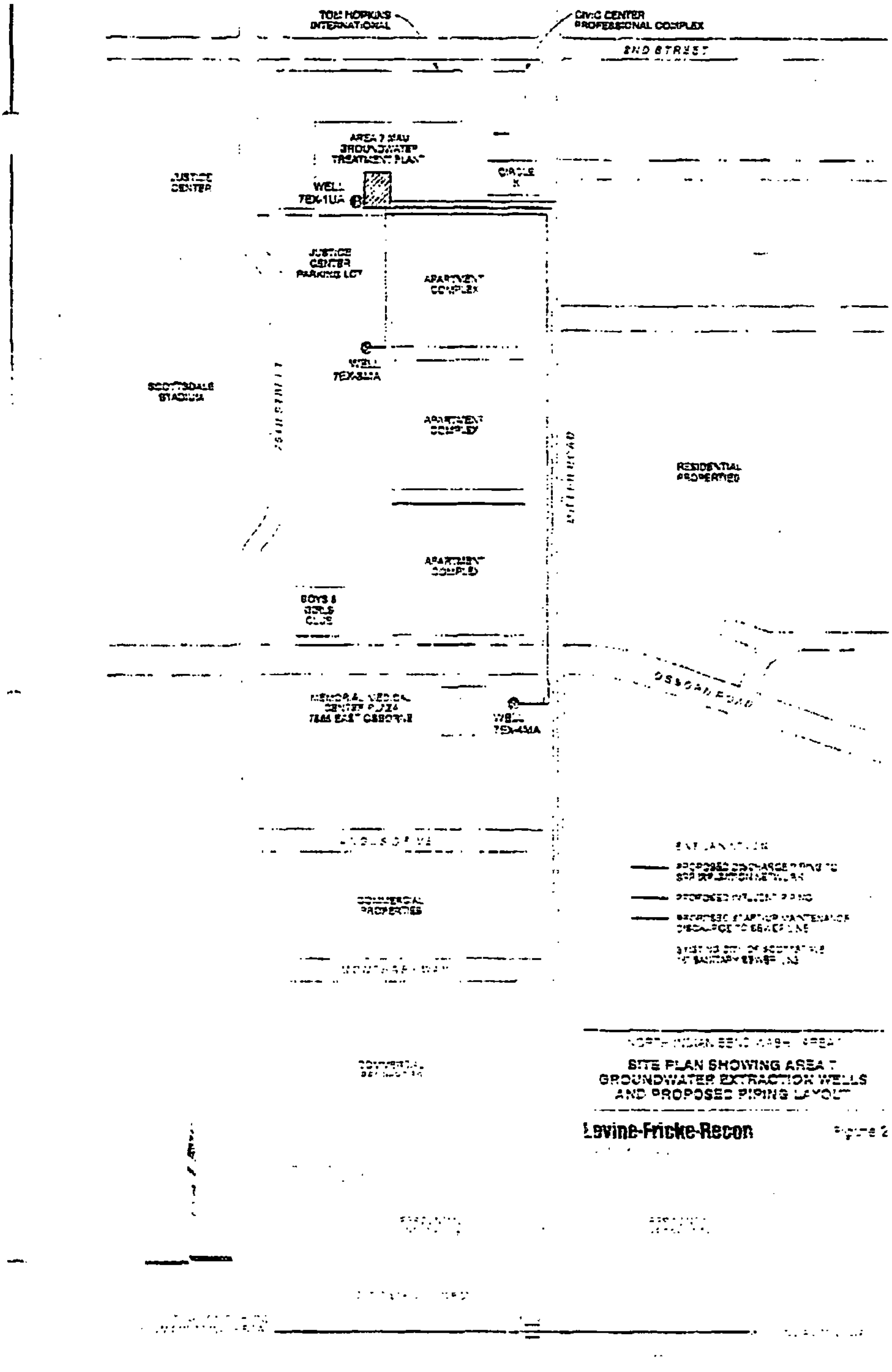
Notes: Radius = radius from pumping well
ft = feet
min = minute
K = assumed 190-feet thick aquifer wall

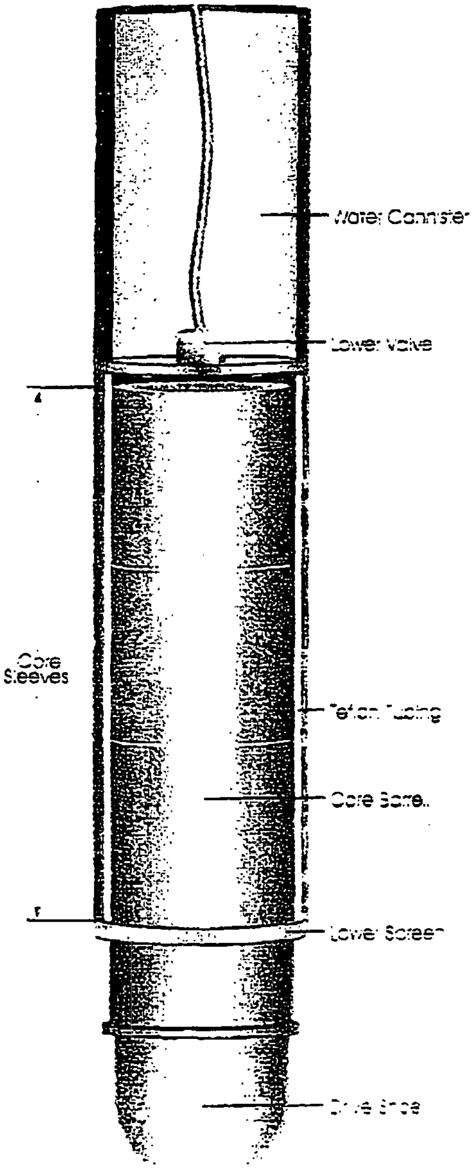
Theis, C.J., 1935. The relationship between the lowering of the piezometric surface and the duration of discharge of a well using groundwater storage, Am. Geophys. Union Trans., vol. 16, pp. 519-524.

Cooper, H.H. and C.E. Jacobs, 1946. A generalized graphical method for evaluating formations constants and summarizing well field history, Am. Geophys. Union Trans., vol. 27, pp. 526-534.

FIGURES


10
12
MILLER ROAD TREATMENT FACILITY
25
CENTRAL GROUNDWATER TREATMENT FACILITY
8
7
6
9
3
12
Levine-Fricke-Recon
Figure

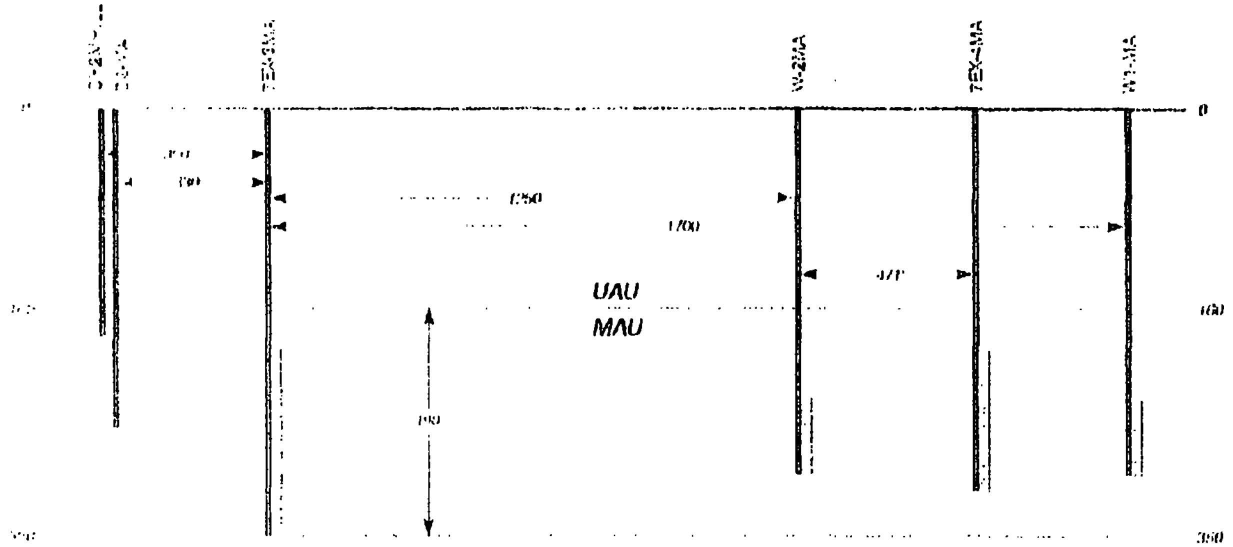

TOM HOPKINS INTERNATIONAL
CIVIC CENTER PROFESSIONAL COMPLEX
2ND STREET
AREA 7 GROUNDWATER TREATMENT PLANT
JUSTICE CENTER
WELL 7EX-1UA
CIRCLE K
JUSTICE CENTER PARKING LOT
APARTMENT COMPLEX
WELL 7EX-3UA
SCOTTSDALE STADIUM
75TH STREET
APARTMENT COMPLEX
MILLER ROAD
RESIDENTIAL PROPERTIES
APARTMENT COMPLEX
BOYS & GIRLS CLUB
OSBORN ROAD
MEMORIAL MEDICAL CENTER PLAZA 7585 EAST OSBORNE
WELL 7EX-4UA
COMMERCIAL PROPERTIES
EXPLANATION
PROPOSED DISCHARGE PIPING TO SRP IRRIGATION NETWORK
PROPOSED INFLUENT PIPING
PROPOSED STARTUP/MAINTENANCE DISCHARGE TO SEWER LINE
EXISTING CITY OF SCOTTSDALE SANITARY SEWER LINE
COMMERCIAL
NORTH INDIAN BEND WASH AREA 7
SITE PLAN SHOWING AREA 7 GROUNDWATER EXTRACTION WELLS AND PROPOSED PIPING LAYOUT
Levine-Fricke-Recon
Figure 2



SIMULPROBE DETAIL

Levine-Fricke-Recon

Figure 3



WELL	SCREENED INTERVAL
CH2MHILL (7-209)	160' - 185'
IC2 MA	195' - 240'
7EX 3MA	180' - 350'
W 2MA	240' - 290'
7EX 4MA	180' - 300'
W-1MA	240' - 290'

$K_z / K_h = 0.001$

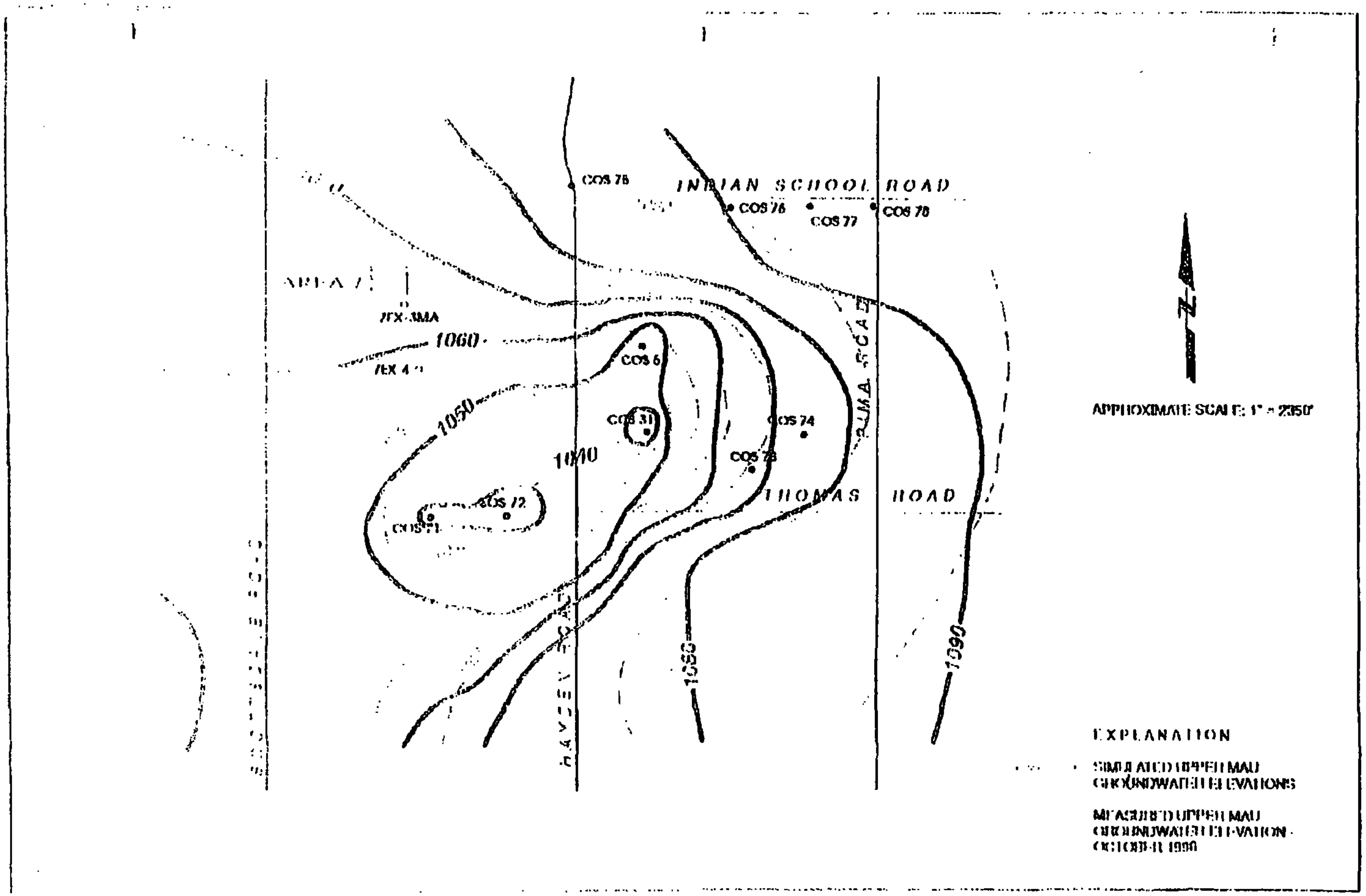
PARTIAL PENETRATION
THIS MODEL (CONFINED)
SATURATED INTERVAL 190'

CONCEPTUAL MODEL UPPER MAU AQUIFER TEST

NIBW - AREA 7

Figure 4

Levine-Fricke-Recon
Project No. 3583

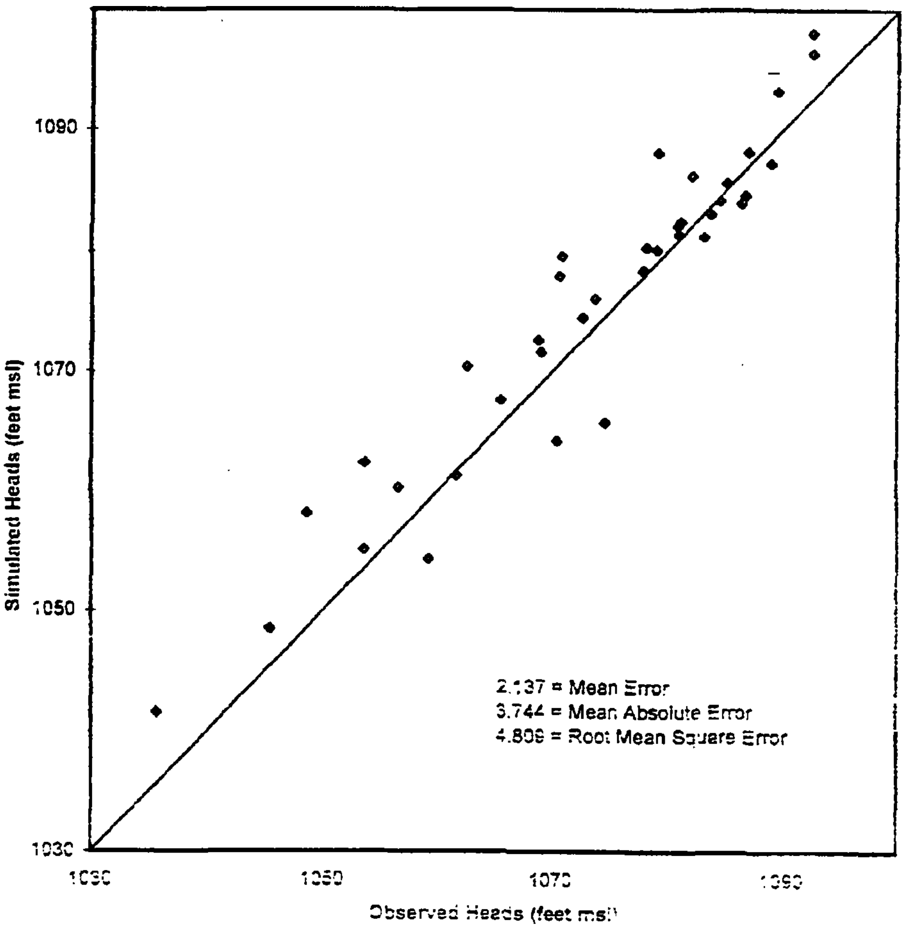


CONTOURS OF OBSERVED AND SIMULATED GROUNDWATER ELEVATIONS
FOR UPPER MAU, OCTOBER 1996

[illegible]

NIBW - AREA 7

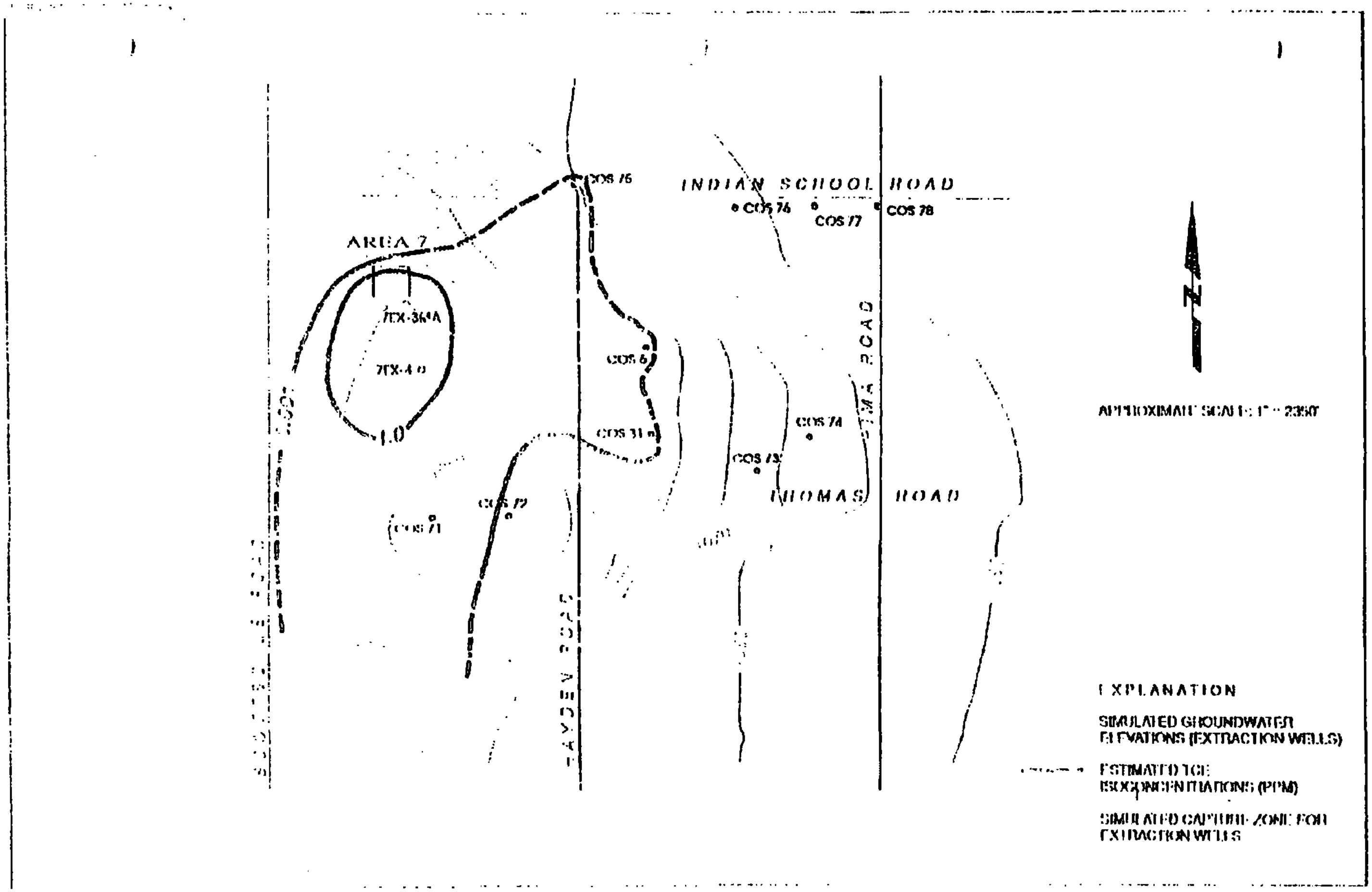
Figure 5



CALIBRATION RESIDUALS FOR SIMULATED GROUNDWATER ELEVATIONS
FOR THE UPPER MAU OCTOBER 1996

Levine·Fricke·Recon

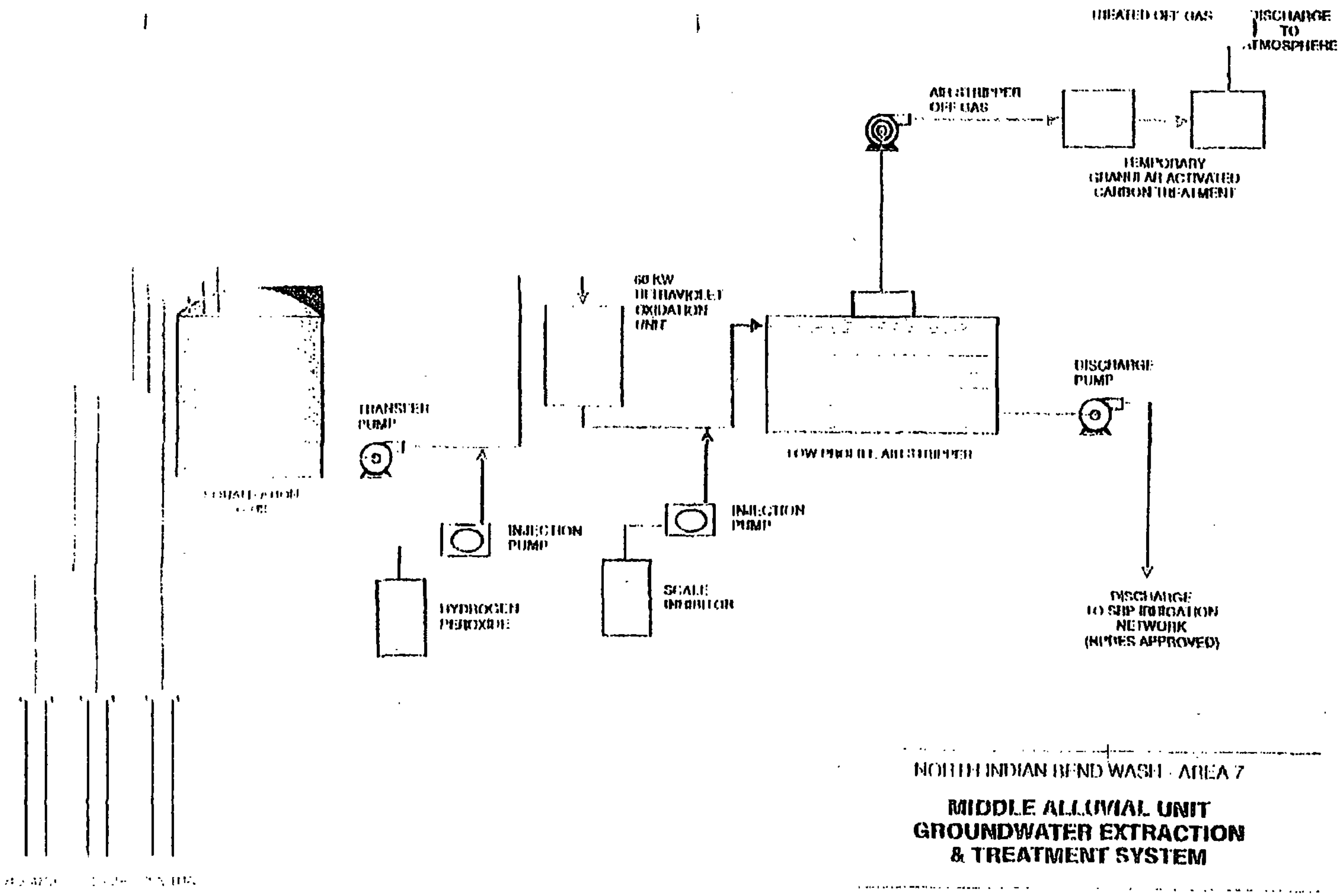
Figure



SIMULATED GROUNDWATER ELEVATIONS AND GROUNDWATER CAPTURE ZONES FOR GROUNDWATER WELLS 7EX-3MA AND 7EX-4MA

NIBW - AREA 7

Figure 7

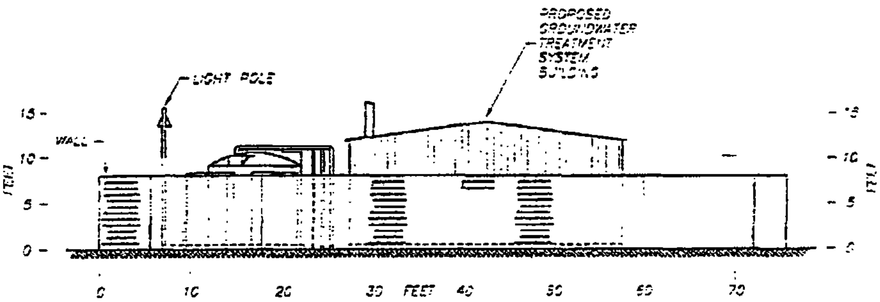


NORTH INDIAN BEND WASH - AREA 7

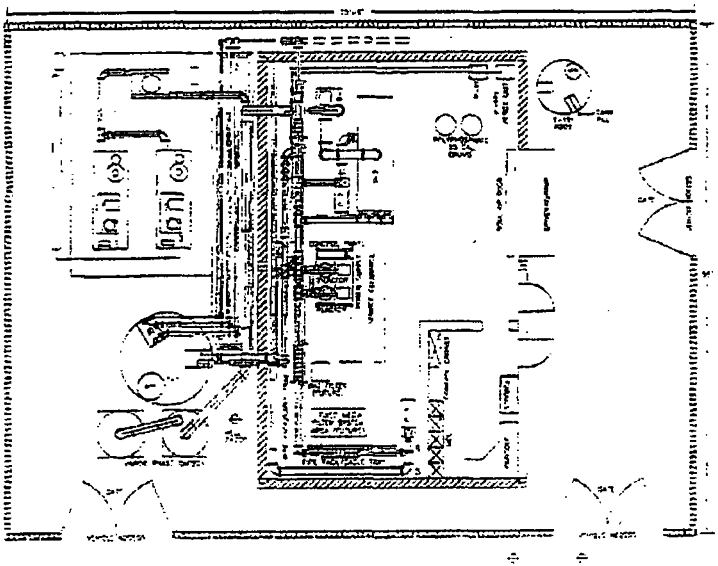
MIDDLE ALLUVIAL UNIT GROUNDWATER EXTRACTION & TREATMENT SYSTEM

Levine-Fricke-Recon *Figure 8*

Project No. 1583



ELEVATION

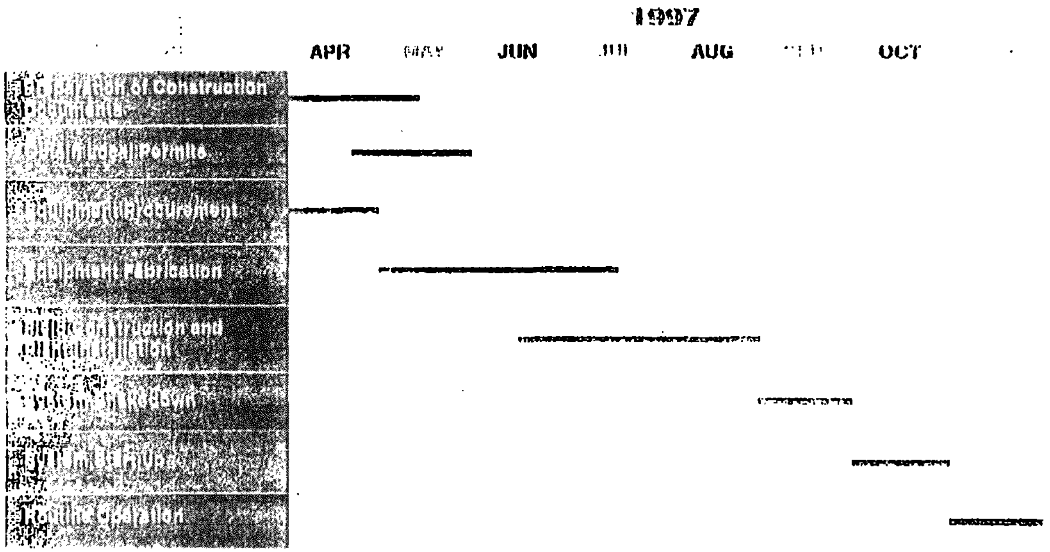


PLAN

Conceptual Plan and Elevation
Proposed NIBW Area 7
Treatment System

Levine·Fricke·Recon

Figure 8



ESTIMATED SCHEDULE
NIBW AREA 7 MAU RESPONSE ACTION

Levine·Fricke·Recon

NIBW - AREA 7

Figure 10

APPENDICES

Appendix A

APPENDIX A

DATA FROM SVE AND UAU GROUNDWATER SYSTEMS

VOC Concentrations
Soil-Vapor Extraction Well (7-SVE-1A1)
North Indian Bend Wash - Area 7
LF 1583.97-007

Location	Date Sampled	1,1 DCE	cis-1,2 DCE	Chloro-form	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	TCE	PCE
1A1	27-Jul-94	--	5.0	1.4	--	--	--	--	360	8.2
1A1	04-Aug-94	--	11.0	--	--	--	--	--	240	2.6
1A1	11-Aug-94	--	7.8	--	--	--	--	--	160	2.8
1A1 duplicate	11-Aug-94	--	7.4	--	--	--	--	--	140	2.5
1A1	18-Aug-94	--	5.2	--	--	--	--	--	140	3.1
1A1	29-Sep-94	--	1.9	--	--	0.93	--	0.33	120	1.7
1A1	29-Oct-94	--	1.5	--	--	--	--	--	83	1.4
1A1 (A)	07-Dec-94	--	1.5	--	--	--	--	--	120	1.3
1A1 (B) replicate	07-Dec-94	--	1.3	--	--	--	--	--	100	1.2
1A1	05-Jan-95	--	1.7	--	--	--	--	--	90	1.6
1A1	09-Feb-95	--	0.86	--	--	--	--	--	44	1.2
1A1	14-Mar-95	--	0.65	--	--	--	--	--	35	0.74
1A1	04-Apr-95	--	0.63	--	--	--	--	--	36	0.82
1A1	05-May-95	--	0.86	--	--	--	--	--	43	0.60
SVE system was shutdown due to maintenance activities during June 1995 and July 1995										
1A1	18-Aug-95	--	0.46	--	--	--	--	--	85	1.1
1A1 duplicate	18-Aug-95	--	0.50	--	--	--	--	--	87	1.2
1A1	31-Aug-95	--	1.1	--	--	--	--	--	56	0.69
1A1	13-Sep-95	--	0.35	0.035	--	--	--	--	9.5	0.28
1A1 duplicate	13-Sep-95	--	0.35	0.041	--	--	--	--	10	0.30
1A1	12-Oct-95	--	0.44	--	--	--	--	--	29	0.57
1A1	16-Jan-96	--	0.12	0.019	--	--	--	--	4.6	0.20
1A1	29-Mar-96	--	0.22	--	--	--	--	--	22	0.39
1A1	09-Jul-96	--	0.23	--	--	--	--	--	18	0.28
1A1 replicate	09-Jul-96	--	0.18	--	--	--	--	--	14	0.24
1A1	01-Oct-96	--	0.24	--	--	--	--	--	16	0.26
1A1 replicate	01-Oct-96	--	0.23	--	--	--	--	--	15	0.23

-- Sample was reported below laboratory detection limits.
Concentrations expressed in parts per million by volume.
Replicate indicates two samples collected and analyzed for field QA/QC.
Duplicate indicates duplicate analysis on a particular sample for lab QA/QC.
( ) data presented represents replicate sample results for samples collected by EPA.

VOC Concentrations

Soil-Vapor Extract Well (7-SVE-1B1)
North Indian Bend Wash - Area 7
LF 1583.97-007

Location	Date Sampled	1,1 DCE	cis-1,2 DCE	Chloro-form	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	TCE	PCE
1B1 (A)	27-Jul-94	--	--	--	--	--	--	--	1,600	29.0
1B1 (B) replicate	27-Jul-94	--	--	--	--	--	--	--	1,600	30.0
1B1	04-Aug-94	--	6.0	--	--	--	--	--	950	8.3
1B1	11-Aug-94	--	2.7	--	--	--	--	--	660	8.9
1B1	18-Aug-94	--	--	--	--	--	--	--	610	11.0
1B1	29-Sep-94	--	0.90	--	--	2.9	--	1.8	410	3.8
1B1	29-Oct-94	--	--	--	--	--	--	--	250	2.6
1B1	07-Dec-94	--	--	--	--	--	--	--	240	2.5
1B1	05-Jan-95	--	--	--	--	--	--	--	140	1.4
1B1	09-Feb-95	--	--	--	--	--	--	--	67	1.0
1B1	14-Mar-95	--	--	--	--	--	--	--	55	0.61
1B1 duplicate	14-Mar-95	--	--	--	--	--	--	--	48	0.58
1B1	04-Apr-95	--	--	0.059	--	--	--	--	36	0.45
1B1 duplicate	04-Apr-95	--	--	0.088	--	--	--	--	35	0.51
1B1	05-May-95	--	--	0.059	--	--	--	--	37	0.47
SVE system was shutdown due to maintenance activities during June 1995 and July 1995										
1B1	18-Aug-95	--	--	--	--	--	--	--	91	0.60
1B1 (A)	31-Aug-95	--	--	--	--	--	--	--	47	0.48
1B1 (B) replicate	31-Aug-95	--	--	--	--	--	--	--	55	0.80
1B1 (A)	13-Sep-95	--	--	--	--	--	--	--	33	0.37
1B1 (B) replicate	13-Sep-95	--	--	--	--	--	--	--	35	0.41
1B1	12-Oct-95	--	--	0.10	--	--	--	--	29	0.42
1B1(A)	15-Jan-96	--	--	0.15	--	--	--	--	20	0.23
1B1 (B) replicate	15-Jan-96	--	--	0.11	--	--	--	--	20	0.24
1B1	29-Mar-96	--	--	0.14	--	--	--	--	15	0.18
1B1	09-Jul-96	--	--	0.11	--	--	--	--	11	0.15
1B1	01-Oct-96	--	--	0.093	--	--	--	--	10	0.13

-- Sample was reported below laboratory detection limits.
Concentrations expressed in parts per million by volume.
Replicate indicates two samples collected and analyzed for field QA/QC.
Duplicate indicates duplicate analysis on a particular sample for lab QA/QC.
( ) data presented represents replicate sample results for samples collected by EPA.

VOC Concentrations

Soil-Vapor Extract! Well (7-SVE-1B2)
North Indian Benu Wash - Area 7
LF 1583.97-007

Location	Date Sampled	1,1 DCE	cis-1,2 DCE	Chloro-form	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	TCE	PCE
1B2	27-Jul-94	--	14.0	--	--	--	--	--	960 (750)	11.0
1B2	04-Aug-94	--	--	--	--	--	--	--	260	1.9
1B2	11-Aug-94	--	2.0	--	--	--	--	--	210	--
1B2	18-Aug-94	--	1.6	--	--	--	--	--	170	3.0
1B2	29-Sep-94	--	0.66	--	--	2.1	--	0.68	150	1.4
1B2	29-Oct-94	--	0.31	--	--	--	--	--	89	0.83
1B2 duplicate	29-Oct-94	--	0.37	--	--	--	--	--	88	0.98
1B2	07-Dec-94	--	1.2	--	--	--	--	--	150	1.4
1B2 (A)	05-Jan-95	--	0.31	--	--	--	--	--	62	0.59
1B2 (A) duplicate	05-Jan-95	--	0.19	--	--	--	--	--	60	0.57
1B2 (B) replicate	05-Jan-95	--	0.33	--	--	--	--	--	65	0.67
1B2	09-Feb-95	--	--	--	--	--	--	--	31	0.43
1B2 (A)	14-Mar-95	--	--	--	--	--	--	--	25	0.26
1B2 (B) replicate	14-Mar-95	--	--	--	--	--	--	--	22	0.21
1B2 (A)	04-Apr-95	--	--	--	--	--	--	--	20	0.20
1B2 (B) replicate	04-Apr-95	--	--	--	--	--	--	--	19	0.20
1B2	05-May-95	--	0.27	0.15	--	--	--	--	25	0.50
SVE system was shutdown due to maintenance activities during June 1995 and July 1995										
1B2	18-Aug-95	--	--	--	--	--	--	--	36	0.26
1B2	31-Aug-95	--	0.32	--	--	--	--	--	33	0.21
1B2	13-Sep-95	--	0.86	--	--	--	--	--	38	0.21
1B2	12-Oct-95	--	0.85	0.14	--	--	--	--	43	0.27
1B2	15-Jan-96	--	1.2	0.18	--	--	--	--	41	0.14
1B2	29-Mar-96	--	0.77	0.16	--	--	--	--	26	0.12
1B2	09-Jul-96	--	0.79	0.11	--	--	--	--	26	0.12
1B2	01-Oct-96	--	0.74	0.091	--	--	--	--	19	0.093

-- Sample was reported below laboratory detection limits.

Concentrations expressed in parts per million by volume.

Replicate indicates two samples collected and analyzed for field QA/QC.

Duplicate indicates duplicate analysis on a particular sample for lab QA/QC.

( ) data presented represents replicate sample results for samples collected by EPA.

VOC Concentrations

Soil-Vapor Ext pn Well (7-SVE-2A1)

North Indian .and Wash - Area 7

LF 1583.97-007

Location	Date Sampled	1,1 DCE	cis-1,2 DCE	Chloro-form	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	TCE	PCE
2A1	27-Jul-94	--	--	--	--	--	--	--	21	0.53
2A1 duplicate	27-Jul-94	--	--	--	--	--	--	--	21	0.55
2A1 (A)	04-Aug-94	--	0.056	--	--	--	--	--	12	0.20
2A1 (B) replicate	04-Aug-94	--	0.056	--	--	--	--	--	13	0.22
2A1	11-Aug-94	--	0.054	--	--	--	--	--	13	0.47
2A1	18-Aug-94	--	0.061	--	--	--	--	--	8.9	0.36
2A1	29-Sep-94	0.0039	0.050	0.0050	0.0039	0.0050	--	--	3.0	0.11
2A1	29-Oct-94	--	0.047	--	--	--	--	--	1.6	0.07
2A1	07-Dec-94	--	0.046	--	--	--	--	--	1.7	0.08
2A1	05-Jan-95	--	0.042	--	--	--	--	--	1.1	0.059
2A1	09-Feb-95	--	0.025	0.002	0.0010	0.0025	--	0.0014	0.24	0.028
2A1	14-Mar-95	--	0.019	0.001	--	--	--	--	0.21	0.017
2A1	04-Apr-95	--	0.015	0.001	0.0020	0.0040	--	0.0020	0.18	0.014
2A1	05-May-95	--	0.016	0.002	0.0011	0.0016	--	--	0.14	0.010
2A1 duplicate	05-May-95	--	0.016	0.002	0.0011	0.0014	--	--	0.14	0.0092
SVE system was shutdown due to maintenance activities during June 1995 and July 1995										
2A1	18-Aug-95	--	0.036	--	--	--	--	--	1.2	0.052
2A1	31-Aug-95	--	0.016	0.0028	0.0079	0.0035	--	0.0016	0.31	0.016
2A1	13-Sep-95	--	0.015	0.0038	--	0.0010	--	--	0.17	0.010
2A1	12-Oct-95	--	0.010	0.0051	--	0.0020	--	0.0010	0.067	0.0084
2A1	15-Jan-96	--	0.012	--	--	--	--	--	0.073	0.0065
2A1 (A)	29-Mar-96	--	0.0017	0.0012	--	--	--	--	0.038	0.0034
2A1 (A) duplicate	29-Mar-96	--	0.0019	0.0013	--	--	--	--	0.040	0.0035
2A1 (B) replicate	29-Mar-96	--	--	--	--	--	--	--	0.0058	--
2A1	09-Jul-96	--	--	0.0017	0.0028	--	--	--	0.048	0.0067
2A1	01-Oct-96	--	--	--	--	--	--	--	0.053	0.0086

-- Sample was reported below laboratory detection limits.

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( ) data presented represents replicate sample results for samples collected by EPA.

VOC Concentrations

Soil-Vapor Ext   pn Well (7-SVE-2B1)

North Indian ƀend Wash - Area 7

LF 1583.97-007

Location	Date Sampled	1,1 DCE	cis-1,2 DCE	Chloro-form	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	TCE	PCE
2B1	27-Jul-94	--	--	--	--	--	--	--	320	5.6
2B1	04-Aug-94	1.4	1.5	--	--	--	--	--	280	2.4
2B1	11-Aug-94	--	0.51	--	--	--	--	--	180	2.3
2B1	18-Aug-94	--	--	--	--	--	--	--	160	2.2
2B1 (A)	29-Sep-94	0.28	0.20	--	--	1.8	0.33	1.27	120	0.91
2B1 (B) replicate	29-Sep-94	0.55	0.36	0.21	--	1.3	0.3	1.08	200	0.90
2B1 (A)	28-Oct-94	--	--	--	--	--	--	--	87	0.66
2B1 (B) replicate	29-Oct-94	--	--	--	--	--	--	--	84	0.68
2B1	07-Dec-94	--	--	--	--	--	--	--	92	0.87
2B1	05-Jan-95	--	--	--	--	--	--	--	53	0.42
2B1 (A)	09-Feb-95	--	--	--	--	--	--	--	27	0.35
2B1 (B) replicate	09-Feb-95	--	--	--	--	--	--	--	26	0.36
2B1	14-Mar-95	--	0.11	--	--	--	--	--	23	0.22
2B1	04-Apr-95	--	--	--	--	--	--	--	17	0.20
2B1	05-May-95	--	--	0.081	--	--	--	--	16	0.16
SVE system was shutdown due to maintenance activities during June 1995 and July 1995										
2B1	18-Aug-95	--	--	--	--	--	--	--	28	0.29
2B1	31-Aug-95	--	--	--	--	--	--	--	22	0.19
2B1	13-Sep-95	--	--	0.090	--	--	--	--	15	0.16
2B1	12-Oct-95	--	0.089	0.068	--	--	--	--	16	0.20
2B1	15-Jan-96	--	0.086	0.058	--	--	--	--	12	0.15
2B1	29-Mar-96	--	0.077	0.069	--	--	--	--	8.8	0.12
2B1 duplicate	29-Mar-96	--	0.078	0.075	--	--	--	--	9.0	0.10
2B1	09-Jul-96	--	0.047	0.072	--	--	--	--	5.5	0.093
2B1 duplicate	09-Jul-96	--	0.047	0.068	--	--	--	--	5.6	0.090
2B1	01-Oct-96	--	0.043	0.079	0.013	--	--	--	5.3	0.10

-- Sample was reported below laboratory detection limits.

Concentrations expressed in parts per million by volume.

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Duplicate indicates duplicate analysis on a particular sample for lab QA/QC.

( ) data presented represents replicate sample results for samples collected by EPA.

VOC Concentrations

Soil-Vapor Ext pn Well (7-SVE-2B2)

North Indian end Wash - Area 7

LF 1683.97-007

Location	Date Sampled	1,1 DCE	cis-1,2 DCE	Chloro-form	Benzene	Toluene	Ethyl-Benzene	Total Xylenes	TCE	PCE
2B2	27-Jul-94	3.4	4.8	--	--	--	--	--	520 (623)	9.5
2B2	04-Aug-94	3.1	4.2	--	--	--	--	--	510	5.1
2B2 (A)	11-Aug-94	--	1.6	--	--	--	--	--	380	4.2
2B2 (B) replicate	11-Aug-94	2.0	2.0	--	--	--	--	--	340	4.2
2B2	18-Aug-94	--	--	--	--	--	--	--	390	4.4
2B2	29-Sep-94	0.78	1.0	--	--	7.1	--	1.2	260	1.8
2B2	29-Oct-94	--	--	--	--	--	--	--	180	1.2
2B2	07-Dec-94	--	--	--	--	--	--	--	160	1.2
2B2	05-Jan-95	--	--	--	--	--	--	--	120	1.1
2B2	09-Feb-95	--	--	--	--	--	--	--	62	1.1
2B2	14-Mar-95	1.3	--	--	--	--	--	--	44	0.83
2B2	04-Apr-95	1.5	--	--	--	--	--	--	37	0.90
2B2 (A)	05-May-95	1.4	--	--	--	--	--	--	38	0.93
2B2 (B) replicate	05-May-95	1.5	--	--	--	--	--	--	44	0.94
SVE system was shutdown due to maintenance activities during June 1995 and July 1995.										
2B2 (A)	18-Aug-95	1.1	0.16	--	--	--	--	--	40	0.90
2B2 (B) replicate	18-Aug-95	1.2	--	--	--	--	--	--	42	0.94
2B2	31-Aug-95	1.7	--	--	--	--	--	--	55	1.2
2B2	13-Sep-95	1.9	--	--	--	--	--	--	33	0.85
2B2(A)	12-Oct-95	1.2	--	0.11	--	--	--	--	34	0.91
2B2(B) replicate	12-Oct-95	1.1	--	0.080	--	--	--	--	32	0.78
2B2	15-Jan-96	0.50	--	0.12	--	--	--	--	35	0.35
2B2	29-Mar-96	0.21	--	0.11	--	--	--	--	20	0.28
2B2	09-Jul-96	0.12	--	0.12	--	--	--	--	16	0.22
2B2	01-Oct-96	--	--	0.10	--	--	--	--	11	0.15

-- Sample was reported below laboratory detection limits.

Concentrations expressed in parts per million by volume.

Replicate indicates two samples collected and analyzed for field QA/QC.

Duplicate indicates duplicate analysis on a particular sample for lab QA/QC.

( ) data presented represents replicate sample results for samples collected by EPA.

Soil-Vapor Extraction System
North Indian Bend Wa Area 7
Last Update Throug. /1/96

		TCE MASS REMOVED FROM SVE WELLS (POUNDS)						TOTAL TCE MASS REMOVED (POUNDS)	CUMULATIVE TCE MASS REMOVED (POUNDS)
Sample Date	Wee	1A1	1B1	1B2	2A1	2B1	2B2		
7/27/94	1	24	90	56	1	17	27	215	215
8/4/94	2	94	320	169	5	76	124	788	1,003
8/11/94	3	68	194	70	5	67	111	515	1,518
8/18/94	4	29	87	33	2	29	52	232	1,750
9/29/94	9	194	517	188	7	182	337	1,425	3,175
10/28/94	13	91	218	91	2	91	151	644	3,819
12/7/94	18	64	149	79	1	59	124	476	4,295
1/5/95	24	84	157	99	1	64	118	523	4,818
2/9/95	29	124	147	77	1	62	136	547	5,365
3/15/95	34	71	81	43	0.3	37	76	308	5,673
4/10/95	38	34	20	13	0.2	9	21	97	5,770
5/5/95	42	82	44	27	0.3	22	48	222	5,992
SVE system was idle due to maintenance activities during June 1995 and July 1995									
8/18/95*	57	15	0	0	0.1	0	0	15	6,007
9/1/95	59	45	31	16	0.5	12	20	124	6,131
9/13/95	61	12	24	18	0.1	12	25	91	6,222
10/12/95	65	2	11	14	0.0	6	11	44	6,266
1/15/96	79	19	24	43	0.1	15	34	135	6,401
3/29/96	90	6	12	22	0.01	8	22	69	6,470
7/9/96	105	11	6	6	0	4	7	35	6,505
10/1/96	117	4	3	7	0	2	3	19	6,524
	Total	1,072	2,134	1,073	27	772	1,446		

* System was restarted after completion of maintenance

Exhibit A
Page 97 of 495
Attachment 3

Summary of Historical TCE Concentrations

Soil-Vapor N[illegible]pring Wells
North Indian Bend Wash - Area 7
LF 1583.97-007

SVM Well	1992 (Average)	July-94 (prestart-up)	Feb-95	Oct-95	Mar-96	Oct-96
7-209-8	433	300	2.3	1.9	0.44	1.7(2.1)((2.1))
7-209-20	1,056	750	0.88	1.7	0.054	0.20
7-209-38	824	940	94 ((98))	89	28	100((77))
7-209-125	1,501 [970]	1,500 (2,400)((1,900))	3.9	2.6 [2.4]	11 [8.6]	4.0
7-209-185	928	2,100	13	36	15	29
SVM 7A-9	168	25	0.31	0.4	0.19	0.83
SVM 7A-27	225	98	0.057	0.3	0.20	0.099(0.13)
SVM 7A-38	267	81	2.7 (2.6)	0.4	0.63	6.4
SVM 7A-95	565	390	2.1	1.6 ((1.6))	0.03	12
SVM 7A-125	992	900	6.8	9.40 ((9.17))[91.7]	0.29	40
SVM 7B-9	33	28	0.35	1.5	0.29	0.63
SVM 7B-27	101	70	ND	0.6	0.35 ((0.36))	0.14
SVM 7B-38	74	6.3	29	12	13	0.35
SVM 7B-95	570	560	75 (82)	36 (34)	1.0	0.47
SVM 7B-126	1,056 [390]	1,100	6.8	130 ((130)) [19.8]	21 (21)[19.8]	4.2((3.4))
SVM 7C-10	7.7	3.2	0.3	0.4	0.12	0.20
SVM 7C-27	15	7.8	2.2	2.0	1.4	0.94
SVM 7C-38	41	3.4	11	11	11 (15)	7.5
SVM 7C-95	159 [540]	99	34	18	9.9	6.0
SVM 7C-130	281	380	140	79	26	30

Notes: All concentrations in parts per million by volume.
1992 concentrations based on the mean of three sampling rounds.
July 1994 data represents the prestart-up SVM sampling event.
February 1995 data represents first semi-annual SVM sampling event.
October 1995 data represents the second semi-annual SVM sampling event.
March 1996 data represents the third semi-annual SVM sampling event.
October 1996 data represents the fourth semi-annual SVM sampling event.
( )Data presented represent the value of LF replicate samples. (( ))Data presented represent the value of laboratory duplicate samples
[ ]Data presented represent the value of replicate samples collected by EPA.

TABLE A-[illegible]

VOC Con[illegible]trations

UAU Groundwa[illegible]ell (7EX-1UA)

North Indian Bend Wash - Area 7

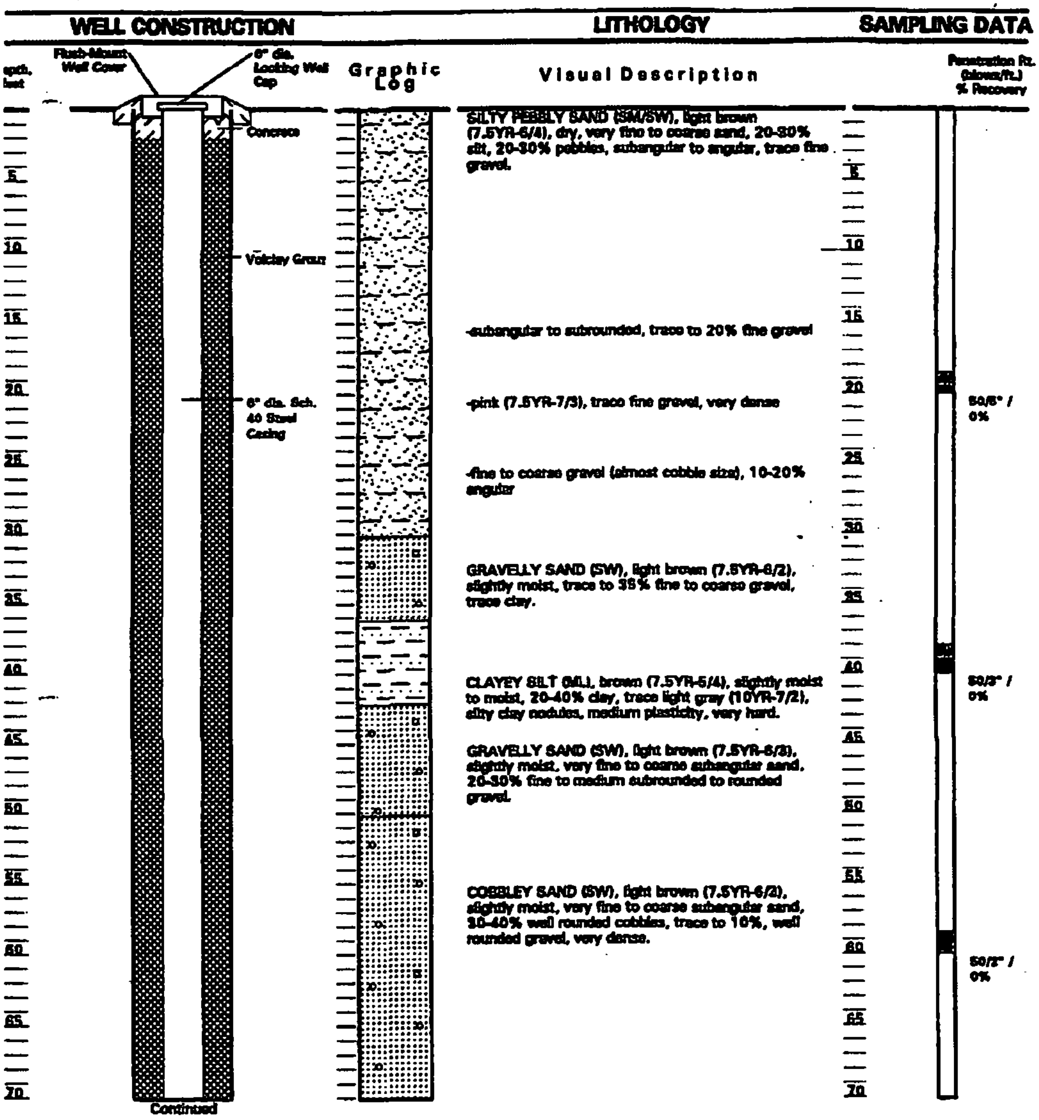
1583.96-009

Date Sampled	1,1 DCE	1,1,2 - Trichloroethane	cis- 1,2 DCE	Chloro- form	Benzene	Toluene	Ethyl- Benzene	Total Xylenes	TCE	PCE
10-Aug-94	--	--	--	--	--	--	--	--	15	--
1-Sep-94	--	--	--	--	--	--	--	--	9.8 (10)	--
29-Sep-94	--	--	--	--	--	--	--	--	8.7 (9.7)	--
28-Oct-94	0.0031	0.0044	--	0.0090	--	--	--	--	3.4	--
6-Dec-94	--	0.0039	0.058	0.010	--	--	--	--	0.70	--
5-Jan-95	0.0020	0.0030	0.032	0.0070	--	--	--	--	7.7	0.051
7-Apr-95	0.0010	0.0010	0.011	0.0040	--	--	--	--	3.8	0.033
5-May-95	--	--	--	--	--	--	--	--	2.7	--
6-Jul-95	--	--	--	--	0.071	--	--	--	2.5	--
31-Aug-95	--	--	--	--	0.076	--	--	--	2.3	--
8-Nov-95	--	--	--	--	0.028	--	--	0.030	1.9	--
20-Dec-95	--	--	--	--	0.0070	--	0.0008	0.0020	1.5	--
7-Feb-96	--	--	--	0.0070	--	--	--	--	1.4	0.011
27-Jun-96	--	--	--	--	--	--	--	--	0.91	0.010
1-Oct-96	--	--	--	--	--	--	--	--	0.55	0.013

Appendix B

APPENDIX B

LITHOLOGIC LOGS AND WELL CONSTRUCTION DETAILS



SILTY PEBBLY SAND (SM/SW), light brown (7.5YR-6/4), dry, very fine to coarse sand, 20-30% silt, 20-30% pebbles, subangular to angular, trace fine gravel.

-subangular to subrounded, trace to 20% fine gravel

-pink (7.5YR-7/3), trace fine gravel, very dense

-fine to coarse gravel (almost cobble size), 10-20% angular

GRAVELLY SAND (SW), light brown (7.5YR-6/2), slightly moist, trace to 35% fine to coarse gravel, trace clay.

CLAYEY SILT (ML), brown (7.5YR-5/4), slightly moist to moist, 20-40% clay, trace light gray (10YR-7/2), silty clay nodules, medium plasticity, very hard.

GRAVELLY SAND (SW), light brown (7.5YR-6/3), slightly moist, very fine to coarse subangular sand, 20-30% fine to medium subrounded to rounded gravel.

COBBLEY SAND (SW), light brown (7.5YR-6/2), slightly moist, very fine to coarse subangular sand, 30-40% well rounded cobbles, trace to 10%, well rounded gravel, very dense.

50/6" / 0%

50/3" / 0%

50/2" / 0%

EXPLANATION

▤	Clay	■	Interval Sampled
▨	Silt	■	Sample Retained
⁘	Sand		
⁘	Gravel		

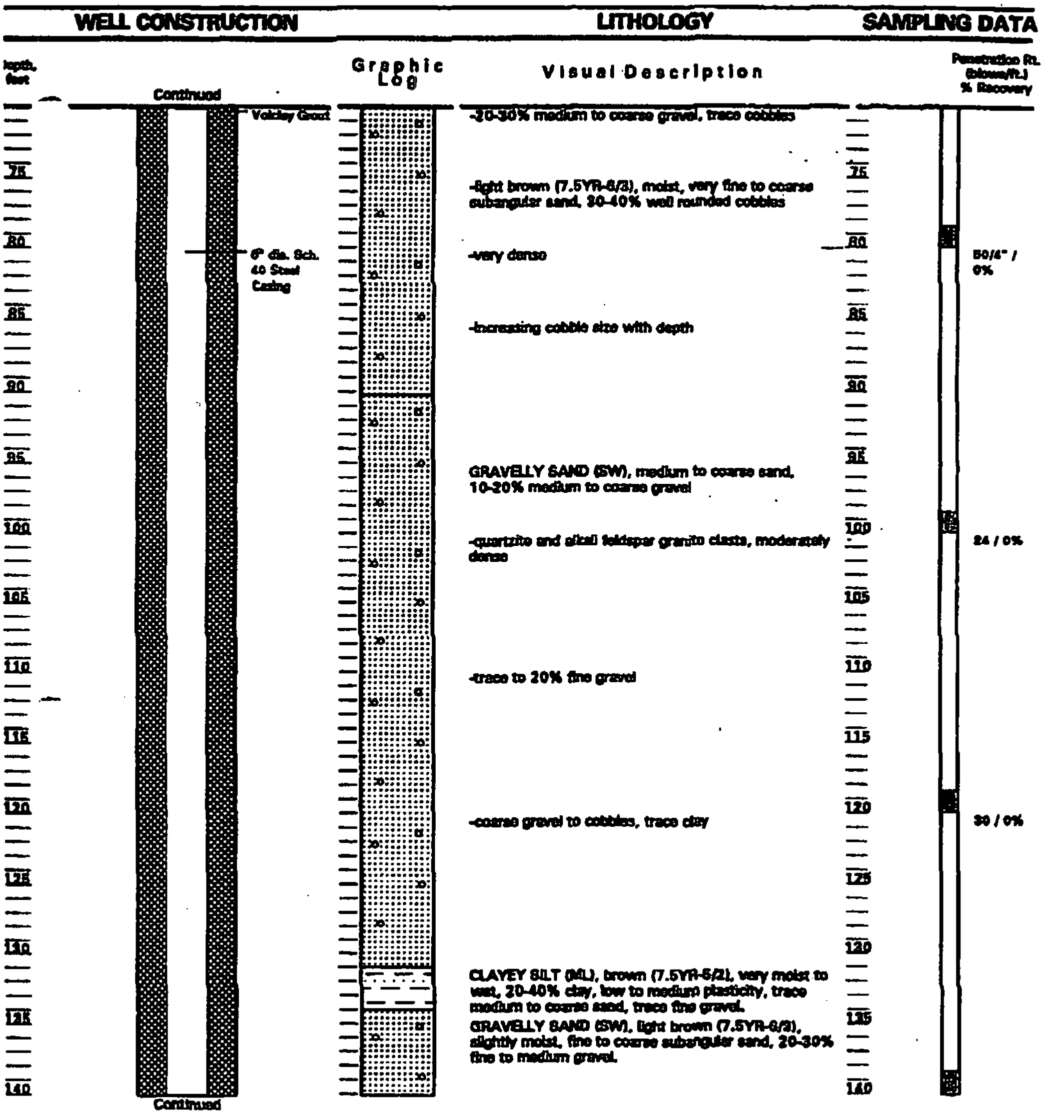
Date well drilled: 12/18/95 - 12/21/95
L•F Geologist/Engineer: J.A. Boughter
Approved by: Richard A. Vogl #26396

WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-3MA

Project No. 1583
Siemens-Scottsdale
030796DOG/scj

LEVINE • FRICKE
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

Page 1 of 6



-20-30% medium to coarse gravel, trace cobbles

-light brown (7.5YR-6/3), moist, very fine to coarse subangular sand, 30-40% well rounded cobbles

-very dense

-increasing cobble size with depth

GRAVELLY SAND (SW), medium to coarse sand, 10-20% medium to coarse gravel

-quartzite and alkali feldspar granite clasts, moderately dense

-trace to 20% fine gravel

-coarse gravel to cobbles, trace clay

CLAYEY SILT (ML), brown (7.5YR-5/2), very moist to wet, 20-40% clay, low to medium plasticity, trace medium to coarse sand, trace fine gravel.

GRAVELLY SAND (SW), light brown (7.5YR-6/3), slightly moist, fine to coarse subangular sand, 20-30% fine to medium gravel.

EXPLANATION

Clay
Silt
Sand
Gravel
Interval Sampled
Sample Retained

Date well drilled: 12/18/95 - 12/21/95
L•F Geologist/Engineer: J.A. Boughter
Approved by: #26396

WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-3MA (CONTINUED)

Project No. 1583
Siemens-Scottsdale

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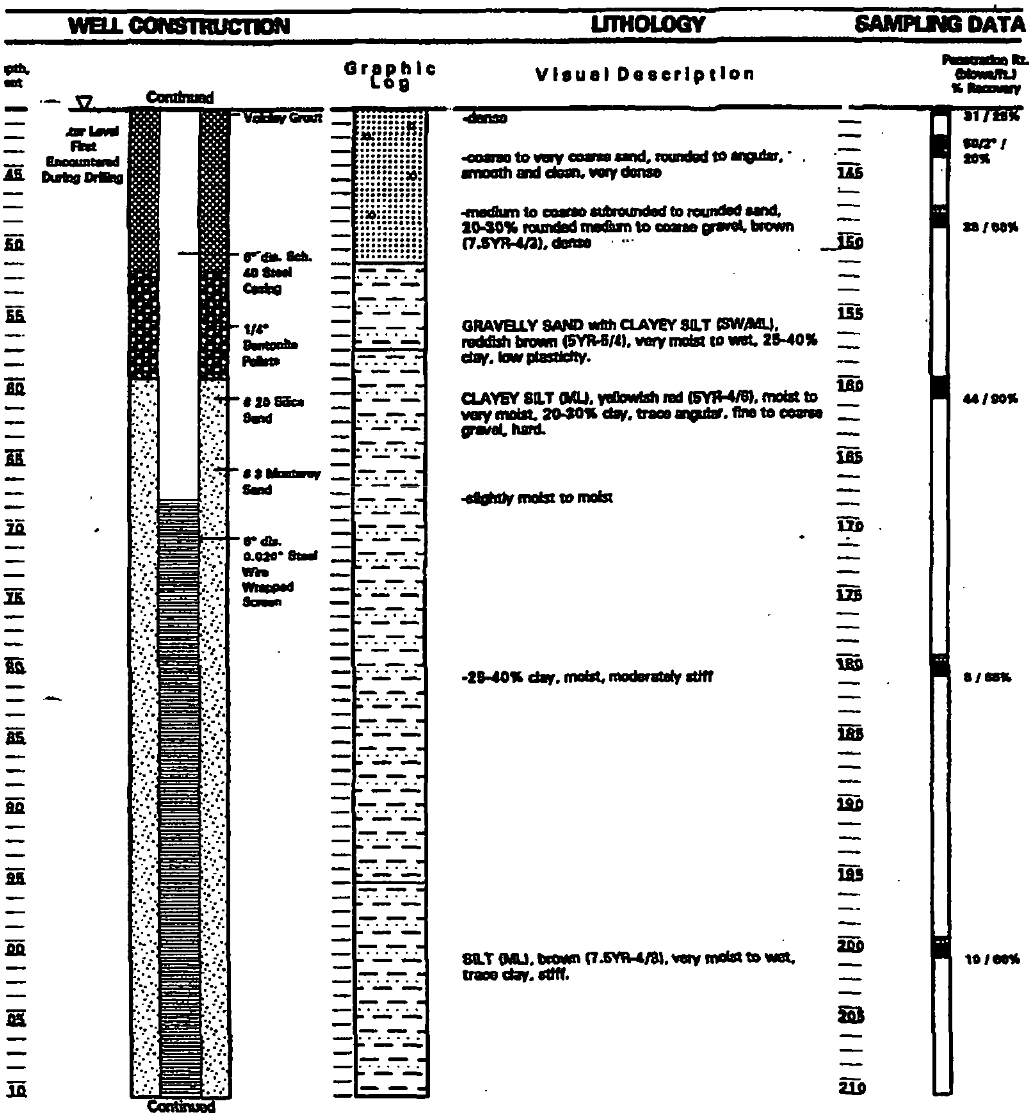

-dense

-coarse to very coarse sand, rounded to angular, smooth and clean, very dense

-medium to coarse subrounded to rounded sand, 20-30% rounded medium to coarse gravel, brown (7.5YR-4/2), dense

GRAVELLY SAND with CLAYEY SILT (SW/ML), reddish brown (5YR-5/4), very moist to wet, 25-40% clay, low plasticity.

CLAYEY SILT (ML), yellowish red (5YR-4/6), moist to very moist, 20-30% clay, trace angular, fine to coarse gravel, hard.

-slightly moist to moist

-25-40% clay, moist, moderately stiff

SILT (ML), brown (7.5YR-4/3), very moist to wet, trace clay, stiff.

EXPLANATION

☐ Clay

▤ Silt

▨ Sand

▨ Gravel

■ Interval Sampled

■ Sample Retained

)ate well drilled: 12/18/95 - 12/21/95

.F Geologist/Engineer: J.A. Boughter

\pproved by: Richard A. Vogel #26396

WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-3MA (CONTINUED)

Project No. 1583
Siemens-Scottsdale

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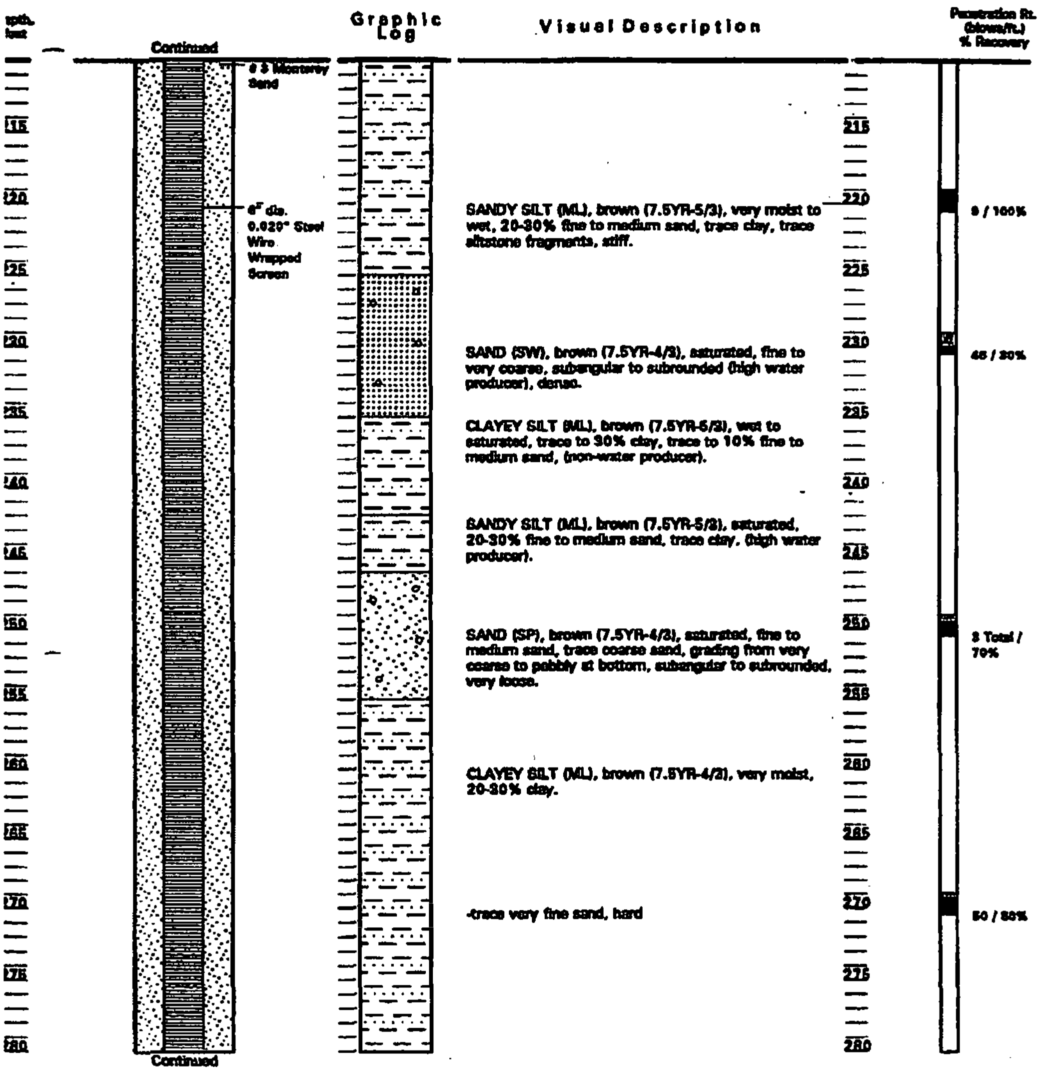
WELL CONSTRUCTION	LITHOLOGY	SAMPLING DATA



SANDY SILT (ML), brown (7.5YR-5/3), very moist to wet, 20-30% fine to medium sand, trace clay, trace siltstone fragments, stiff.

SAND (SW), brown (7.5YR-4/3), saturated, fine to very coarse, subangular to subrounded (high water producer), dense.

CLAYEY SILT (ML), brown (7.5YR-5/3), wet to saturated, trace to 30% clay, trace to 10% fine to medium sand, (non-water producer).

SANDY SILT (ML), brown (7.5YR-5/3), saturated, 20-30% fine to medium sand, trace clay, (high water producer).

SAND (SP), brown (7.5YR-4/3), saturated, fine to medium sand, trace coarse sand, grading from very coarse to pebbly at bottom, subangular to subrounded, very loose.

CLAYEY SILT (ML), brown (7.5YR-4/2), very moist, 20-30% clay.

-trace very fine sand, hard

EXPLANATION

- ▤ Clay
- ▤ Silt
- ⛶ Sand
- ⛶ Gravel
- ▨ Interval Sampled
- ■ Sample Retained

Date well drilled: 12/18/95 - 12/21/95
L• F Geologist/Engineer: J.A. Boughter
Approved by: #26396

WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-3MA (CONTINUED)

Project No. 1583
Siemens-Scottsdale

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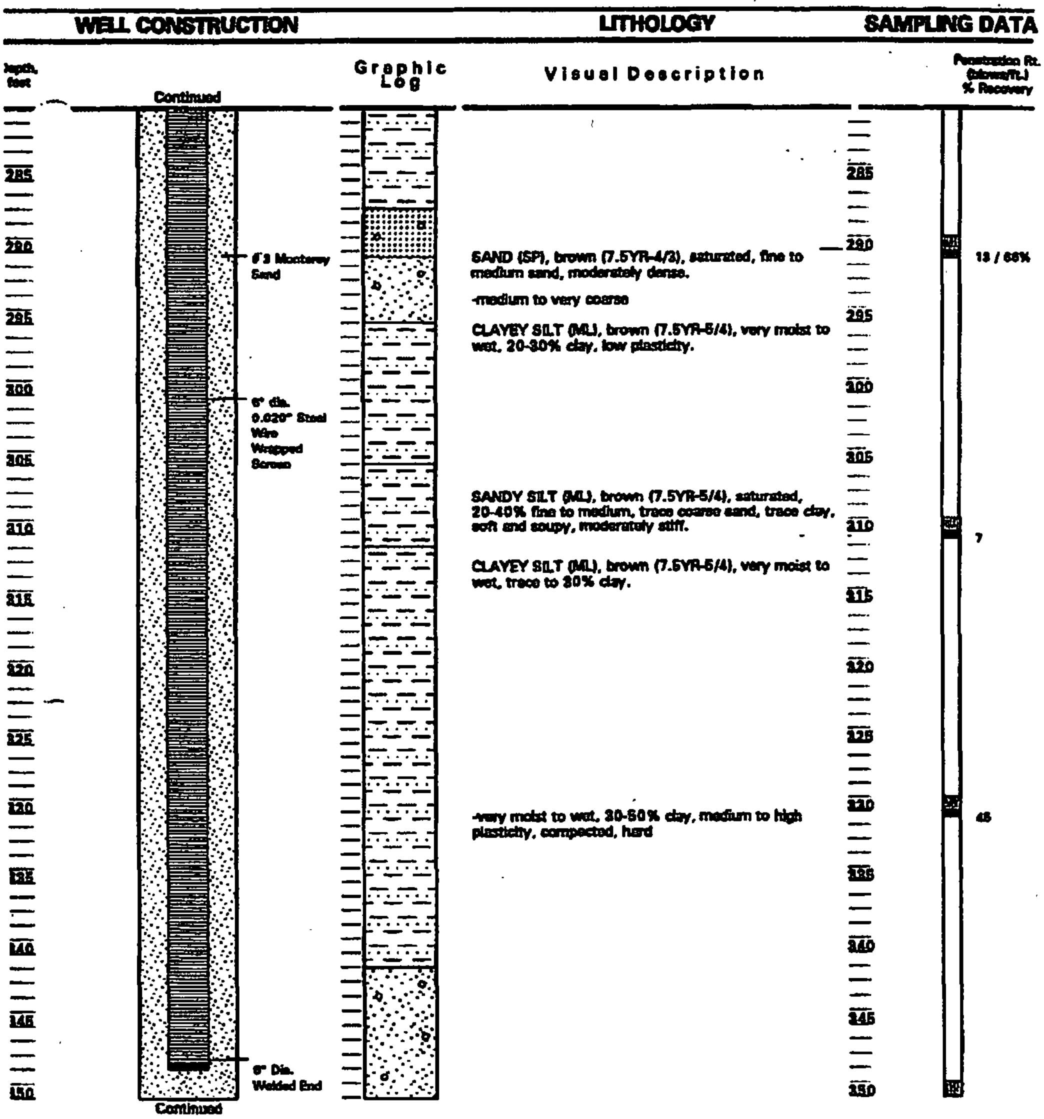


SAND (SP), brown (7.5YR-4/3), saturated, fine to medium sand, moderately dense.

-medium to very coarse

CLAYEY SILT (ML), brown (7.5YR-5/4), very moist to wet, 20-30% clay, low plasticity.

SANDY SILT (ML), brown (7.5YR-5/4), saturated, 20-40% fine to medium, trace coarse sand, trace clay, soft and soupy, moderately stiff.

CLAYEY SILT (ML), brown (7.5YR-5/4), very moist to wet, trace to 30% clay.

-very moist to wet, 30-50% clay, medium to high plasticity, compacted, hard

EXPLANATION

▤ Clay
▦ Silt
░ Sand
○ Gravel

▨ - Interval Sampled
■ - Sample Retained

Date well drilled: 12/18/95 - 12/21/95

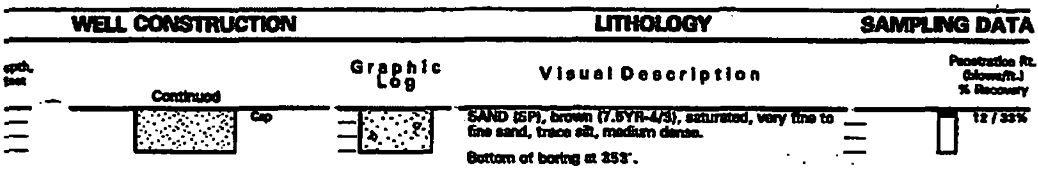
L•F Geologist/Engineer; J.A. Boughter

Approved by: #26396

WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-3MA (CONTINUED)

Project No. 1583
Siemens-Scottsdale

LEVINE • FRICKE
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS



WELL CONSTRUCTION			LITHOLOGY	SAMPLING DATA
epth, feet	Continued	Graphic Log	Visual Description	Penetration Rt. (blows/ft.) % Recovery
	Cap		SAND (SP), brown (7.5YR-4/3), saturated, very fine to fine sand, trace silt, medium dense. Bottom of boring at 253'.	12 / 33%

EXPLANATION

- ▤ Clay
- ▦ Silt
- ⛆ Sand
- ⚬ Gravel
- ▯ Interval Sampled
- ▮ Sample Retained

Date well drilled: 12/18/95 - 12/21/95

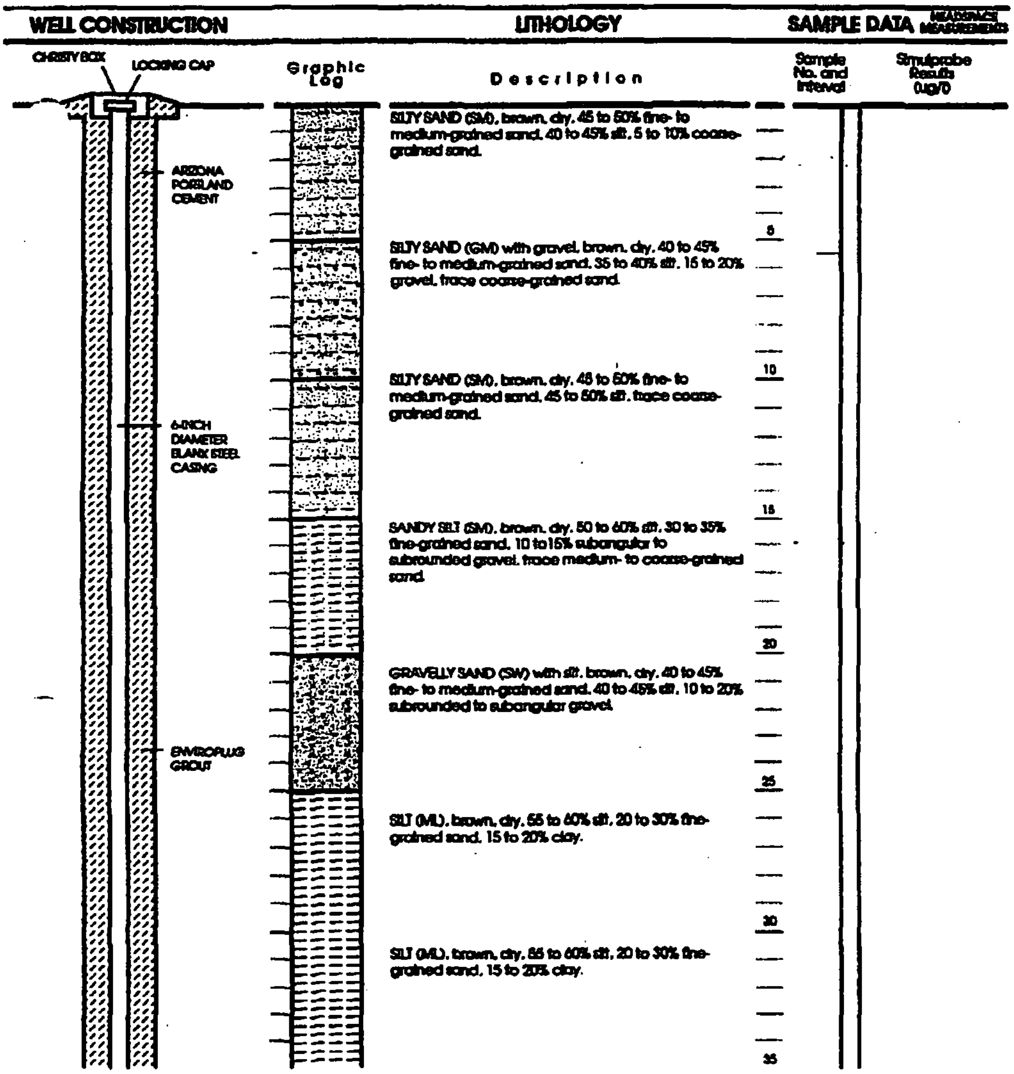
L•F Geologist/Engineer: J.A. Boughter

Approved by: #26396

WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-3MA (CONTINUED)

Project No. 1583
Siemens-Scottsdale

LEVINE • FRICKE
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS



SILTY SAND (SM), brown, dry, 45 to 50% fine- to medium-grained sand, 40 to 45% silt, 5 to 10% coarse-grained sand.

SILTY SAND (GM) with gravel, brown, dry, 40 to 45% fine- to medium-grained sand, 35 to 40% silt, 15 to 20% gravel, trace coarse-grained sand.

SILTY SAND (SM), brown, dry, 48 to 50% fine- to medium-grained sand, 45 to 50% silt, trace coarse-grained sand.

SANDY SILT (SM), brown, dry, 50 to 60% silt, 30 to 35% fine-grained sand, 10 to15% subangular to subrounded gravel, trace medium- to coarse-grained sand.

GRAVELLY SAND (SW) with silt, brown, dry, 40 to 45% fine- to medium-grained sand, 40 to 45% silt, 10 to 20% subrounded to subangular gravel.

SILT (ML), brown, dry, 55 to 60% silt, 20 to 30% fine-grained sand, 15 to 20% clay.

SILT (ML), brown, dry, 55 to 60% silt, 20 to 30% fine-grained sand, 15 to 20% clay.

proved by:

WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 1 of 11)*

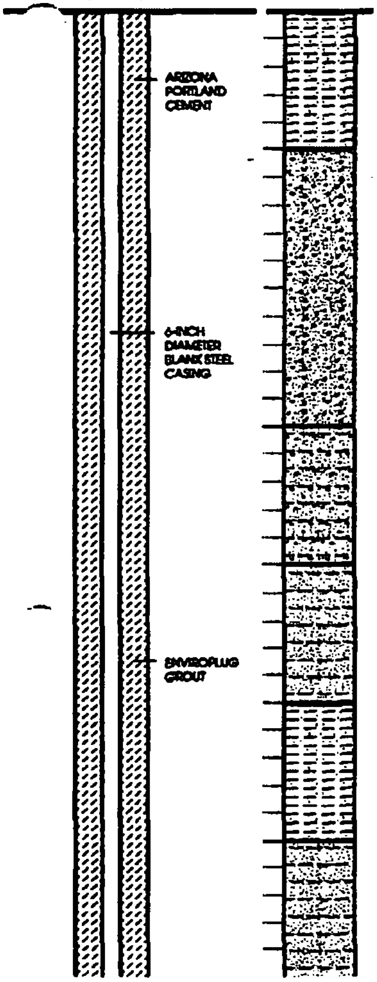
vine-Fricke-Recon

NIBW Area 7

ect No. 1583

(1583.97-009) 7EX4MA1.CDR 033197JSC:REF

WELL CONSTRUCTION **LITHOLOGY** **SAMPLE DATA** HEADSPACE MEASUREMENTS



Description		Sample No. and Interval	Simulprobe Results (ug/l)
SANDY SILT (SM). brown. dry. 60 to 55% silt. 30 to 35% fine-grained sand. 10 to15% gravel. trace amount of medium- to coarse-grained sand.			
GRAVELLY SAND (SW). brown. dry. 50 to 60% fine- to medium-grained sand. 20 to 30% silt. 20 to 25% subrounded gravel.	40		
GRAVELLY SAND (SW). brown. dry. 60 to 66% fine- to medium-grained sand. 20 to 30% subrounded gravel. 15 to 20% silt.	45		
SILTY SAND (SM) with gravel. brown. dry. 45 to 50% fine- to medium-grained sand. 35 to 40% silt. 10 to 15% subrounded gravel.	50		
SILTY SAND (SM). brown. dry. 50 to 55% fine- to medium-grained sand. 40 to 45% silt. 5 to 10% subrounded gravel.	55		
SANDY SILT (SM). brown. dry. 40 to 45% silt. 40 to 45% fine-grained sand. 10 to 15% clay. trace amount of medium-grained sand.	60		
SILTY SAND (SM). brown. dry. 45 to 55% fine- to medium-grained sand. 35 to 40% silt. 15 to 20% coarse-grained sand. 5 to 10% subrounded gravel.	65		
	70		

proved by

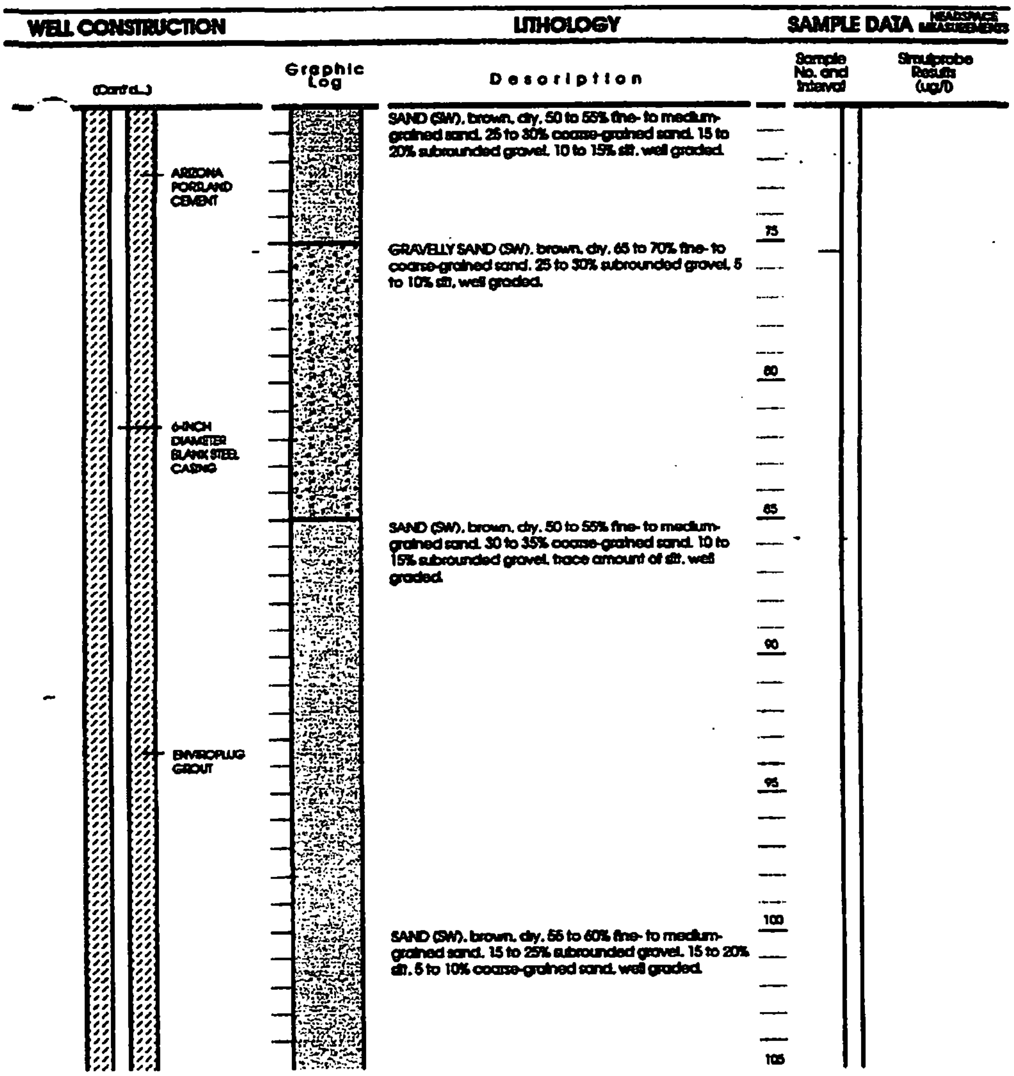
WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 2 of 11)*

vine-Fricke-Recon

NIBW Area 7

ect No. 1583

(1583.97-009) 7EX4MA2.CDR 033197JSC:REF



SAND (SW), brown, dry, 50 to 55% fine- to medium-grained sand, 25 to 30% coarse-grained sand, 15 to 20% subrounded gravel, 10 to 15% silt, well graded.

GRAVELLY SAND (SW), brown, dry, 65 to 70% fine- to coarse-grained sand, 25 to 30% subrounded gravel, 5 to 10% silt, well graded.

SAND (SW), brown, dry, 50 to 55% fine- to medium-grained sand, 30 to 35% coarse-grained sand, 10 to 15% subrounded gravel, trace amount of silt, well graded.

SAND (SW), brown, dry, 55 to 60% fine- to medium-grained sand, 15 to 25% subrounded gravel, 15 to 20% silt, 5 to 10% coarse-grained sand, well graded.

Drawn by:

WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 3 of 11)*

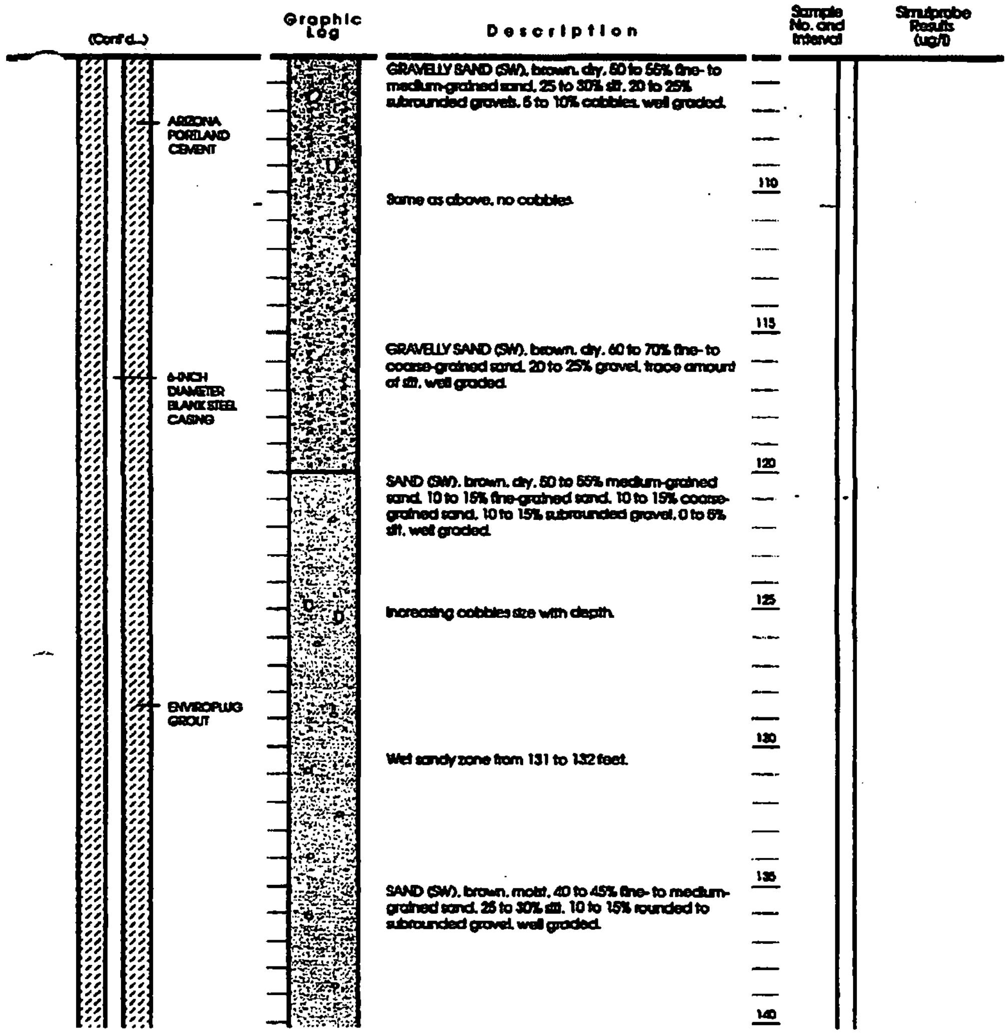
NIBW Area 7

vine-Fricke-Recon

ect No. 1583

(1583.97-009) 7EX4MA3.CDR 033197JSC:REF

WELL CONSTRUCTION | **LITHOLOGY** | **SAMPLE DATA** HEADSPACE MEASUREMENTS



GRAVELLY SAND (SW), brown, dry, 50 to 55% fine- to medium-grained sand, 25 to 30% silt, 20 to 25% subrounded gravels, 5 to 10% cobbles, well graded.

Same as above, no cobbles.

GRAVELLY SAND (SW), brown, dry, 60 to 70% fine- to coarse-grained sand, 20 to 25% gravel, trace amount of silt, well graded.

SAND (SW), brown, dry, 50 to 55% medium-grained sand, 10 to 15% fine-grained sand, 10 to 15% coarse-grained sand, 10 to 15% subrounded gravel, 0 to 5% silt, well graded.

Increasing cobbles size with depth.

Wet sandy zone from 131 to 132 feet.

SAND (SW), brown, moist, 40 to 45% fine- to medium-grained sand, 25 to 30% silt, 10 to 15% rounded to subrounded gravel, well graded.

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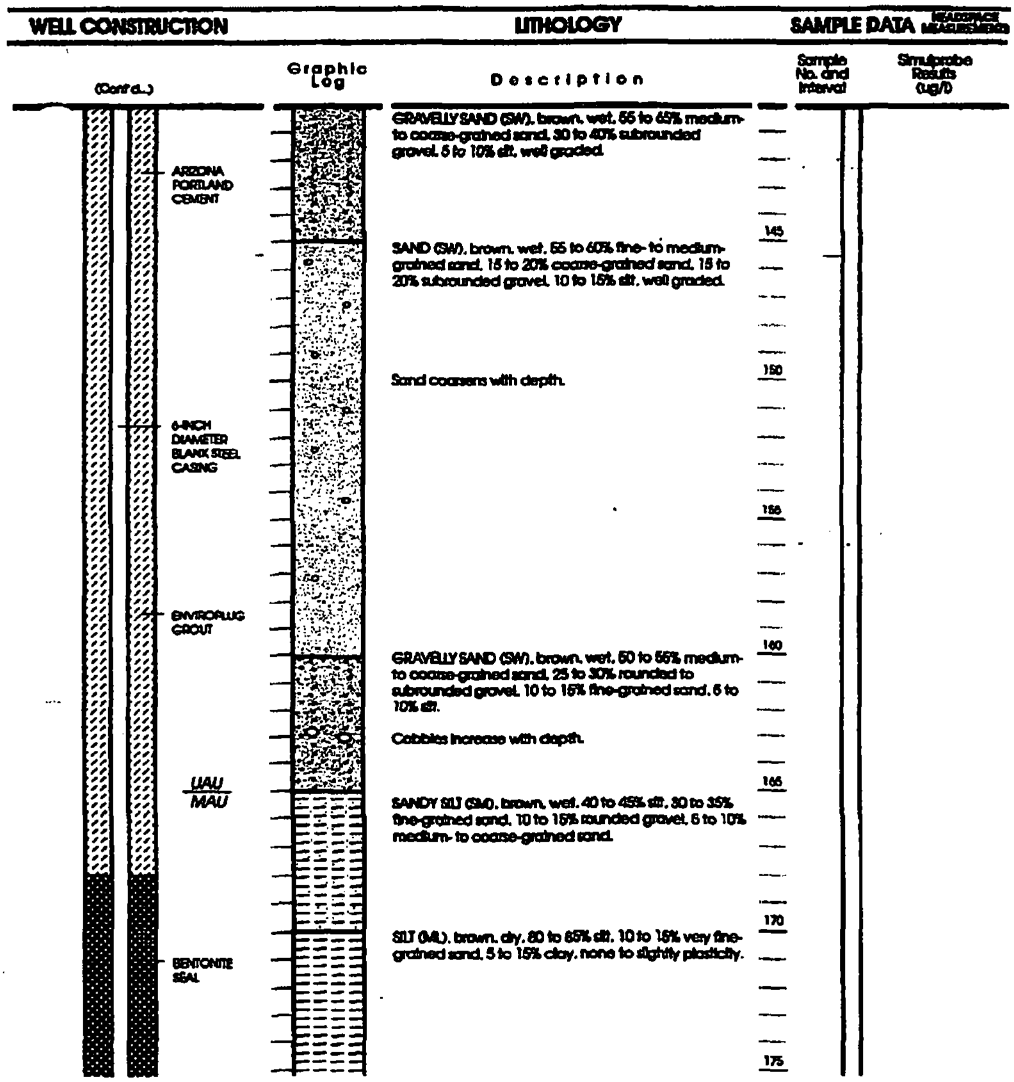
WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 4 of 11)*

vine-Fricke-Recon

NIBW Area 7

ct No. 1583

(1583.97-009) 7EX4MA4.CDR 033197JSC:REF



GRAVELLY SAND (SW), brown, wet, 55 to 65% medium- to coarse-grained sand, 30 to 40% subrounded gravel, 5 to 10% silt, well graded.

SAND (SW), brown, wet, 55 to 60% fine- to medium-grained sand, 15 to 20% coarse-grained sand, 15 to 20% subrounded gravel, 10 to 15% silt, well graded.

Sand coarsens with depth.

GRAVELLY SAND (SW), brown, wet, 50 to 55% medium- to coarse-grained sand, 25 to 30% rounded to subrounded gravel, 10 to 15% fine-grained sand, 5 to 10% silt.

Cobbles increase with depth.

SANDY SILT (SM), brown, wet, 40 to 45% silt, 30 to 35% fine-grained sand, 10 to 15% rounded gravel, 5 to 10% medium- to coarse-grained sand.

SILT (ML), brown, dry, 80 to 85% silt, 10 to 15% very fine-grained sand, 5 to 15% clay, none to slightly plasticity.

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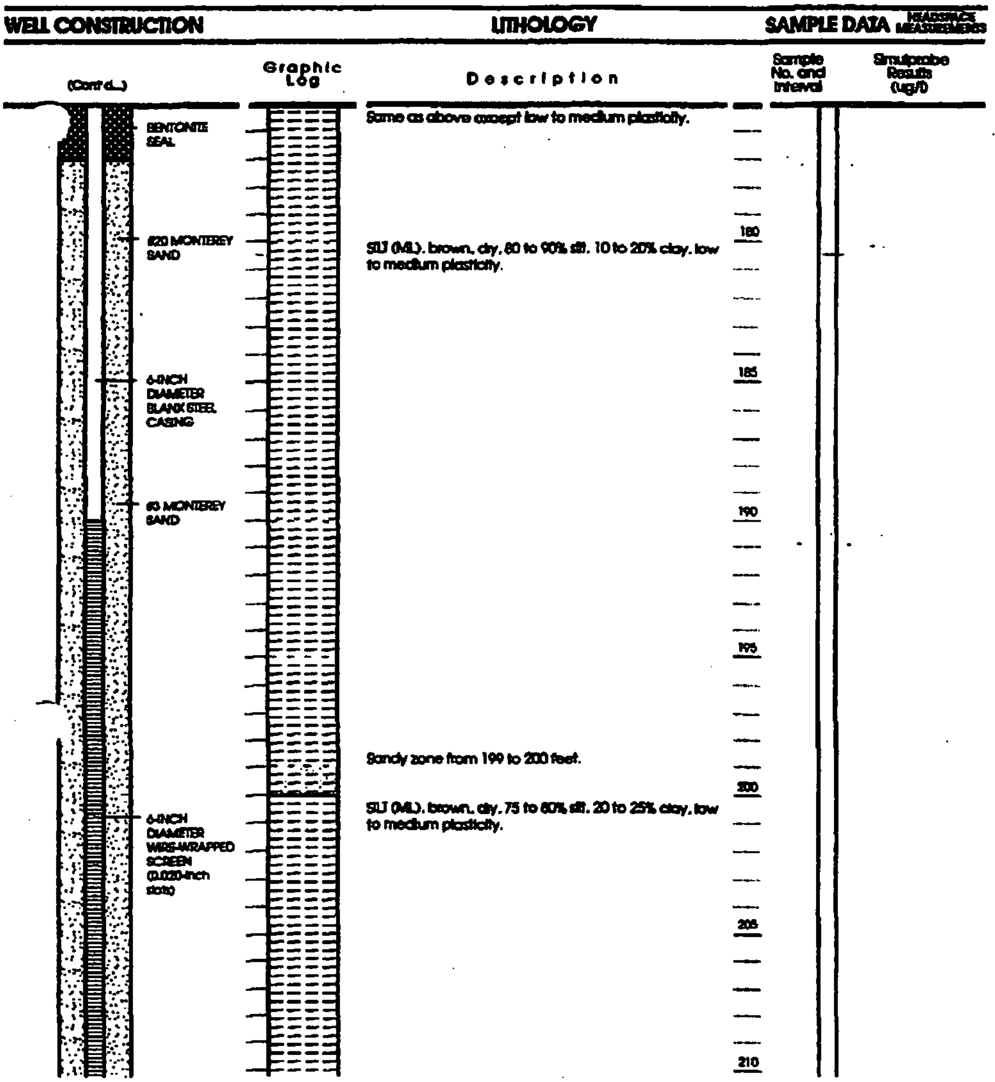
WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 5 of 11)*

NIBW Area 7

vine·Fricke·Recon

ect No. 1583

(1583.97-009) 7EX4MA5.CDR 033197.BSC:REF



Same as above except low to medium plasticity.

SILT (ML). brown, dry, 80 to 90% silt. 10 to 20% clay. low to medium plasticity.

Sandy zone from 199 to 200 feet.

SILT (ML). brown, dry, 75 to 80% silt. 20 to 25% clay. low to medium plasticity.

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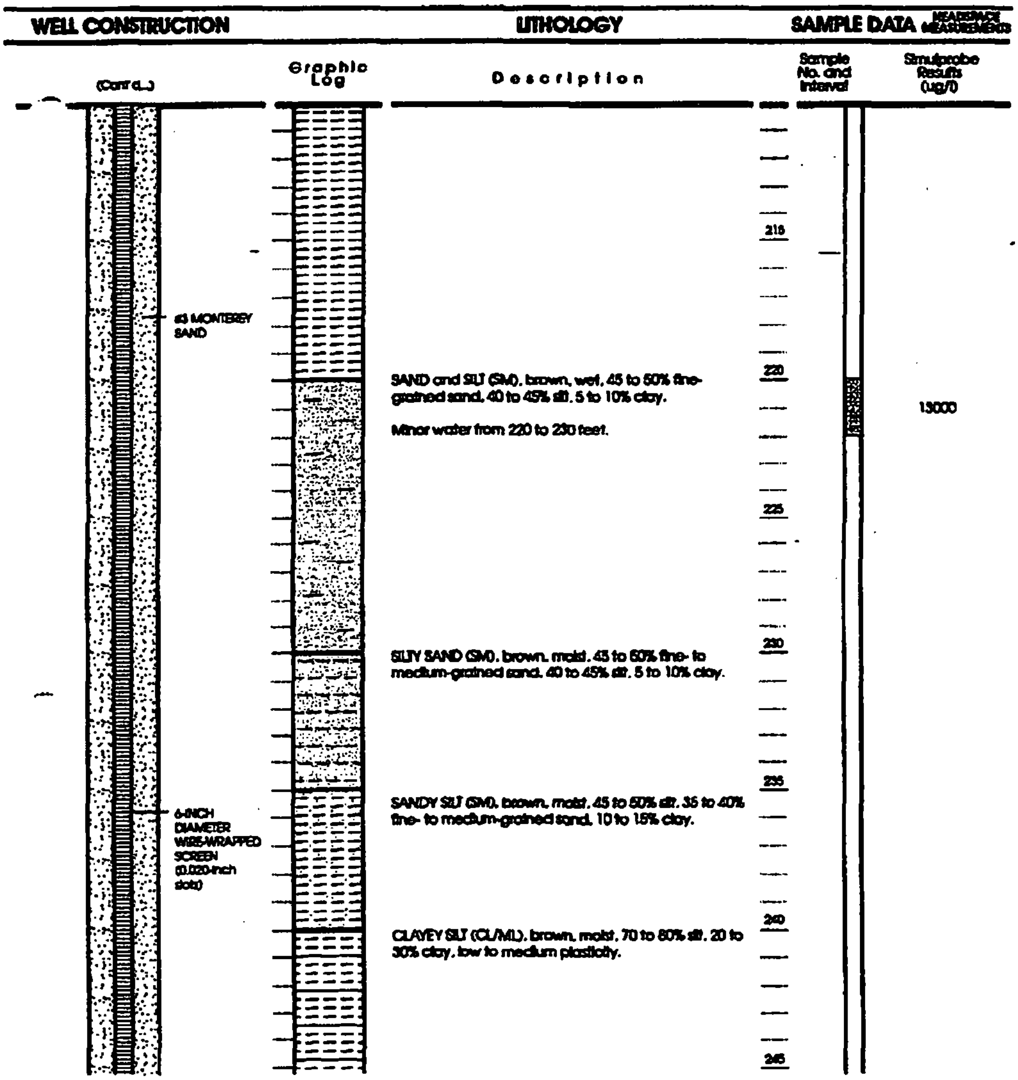
WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 6 of 11)*

NIBW Area 7

ne-Fricke-Recon
No. 1583

(1583.97-009) 7EX4MA6.CDR 033197JSC:REF



SAND and SILT (SM), brown, wet, 45 to 50% fine-grained sand, 40 to 45% silt, 5 to 10% clay.

Minor water from 220 to 230 feet.

SILTY SAND (SM), brown, moist, 45 to 50% fine- to medium-grained sand, 40 to 45% silt, 5 to 10% clay.

SANDY SILT (SM), brown, moist, 45 to 50% silt, 35 to 40% fine- to medium-grained sand, 10 to 15% clay.

CLAYEY SILT (CL/ML), brown, moist, 70 to 80% silt, 20 to 30% clay, low to medium plasticity.

by:

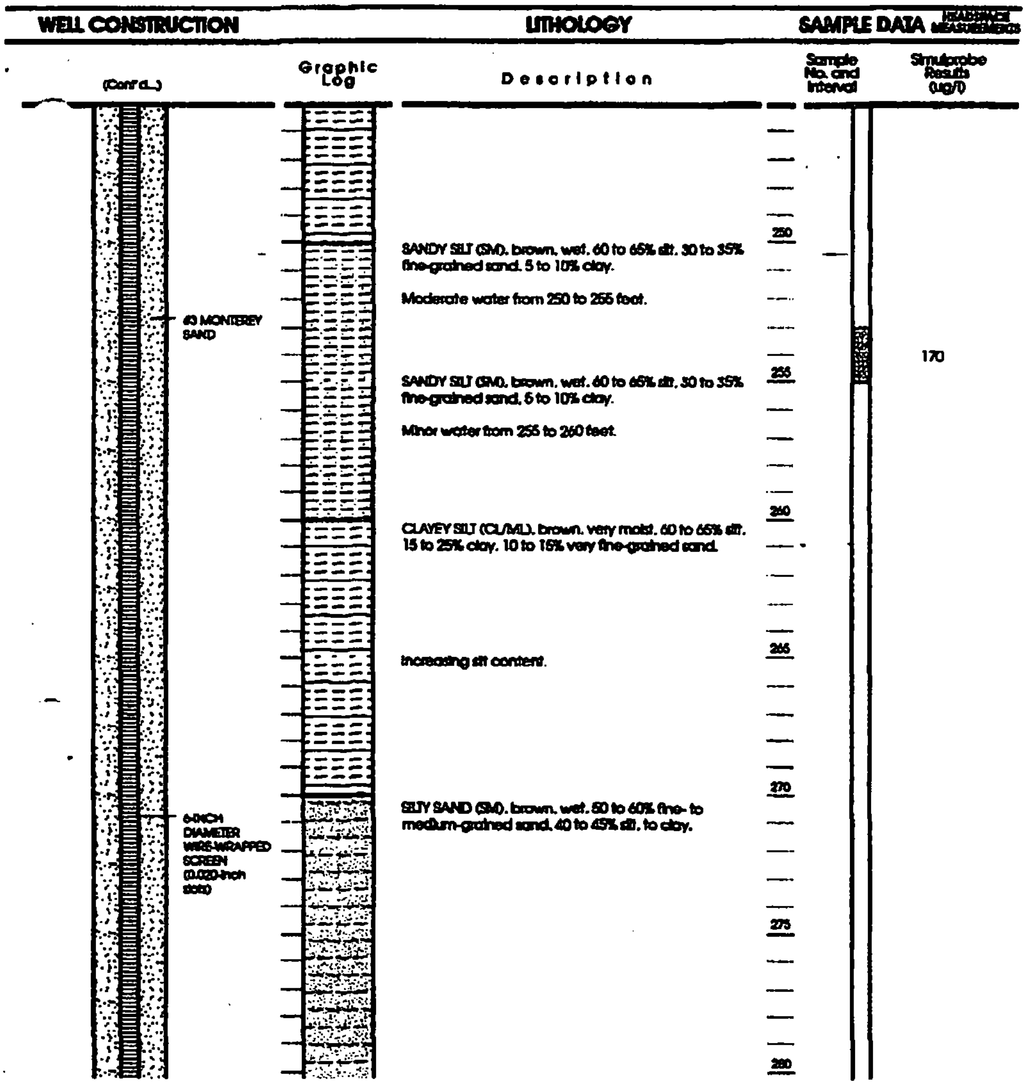
WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 7 of 11)*

vine-Fricke-Recon

NIBW Area 7

ject No. 1583

(1583.97-009) 7EX4MA7.CDR 033197JSC:REF



SANDY SILT (SM), brown, wet, 60 to 65% silt, 30 to 35% fine-grained sand, 5 to 10% clay.

Moderate water from 250 to 255 feet.

SANDY SILT (SM), brown, wet, 60 to 65% silt, 30 to 35% fine-grained sand, 5 to 10% clay.

Minor water from 255 to 260 feet.

CLAYEY SILT (CL/ML), brown, very moist, 60 to 65% silt, 15 to 25% clay, 10 to 15% very fine-grained sand.

Increasing silt content.

SILTY SAND (SM), brown, wet, 50 to 60% fine- to medium-grained sand, 40 to 45% silt, to clay.

pro- -d by:

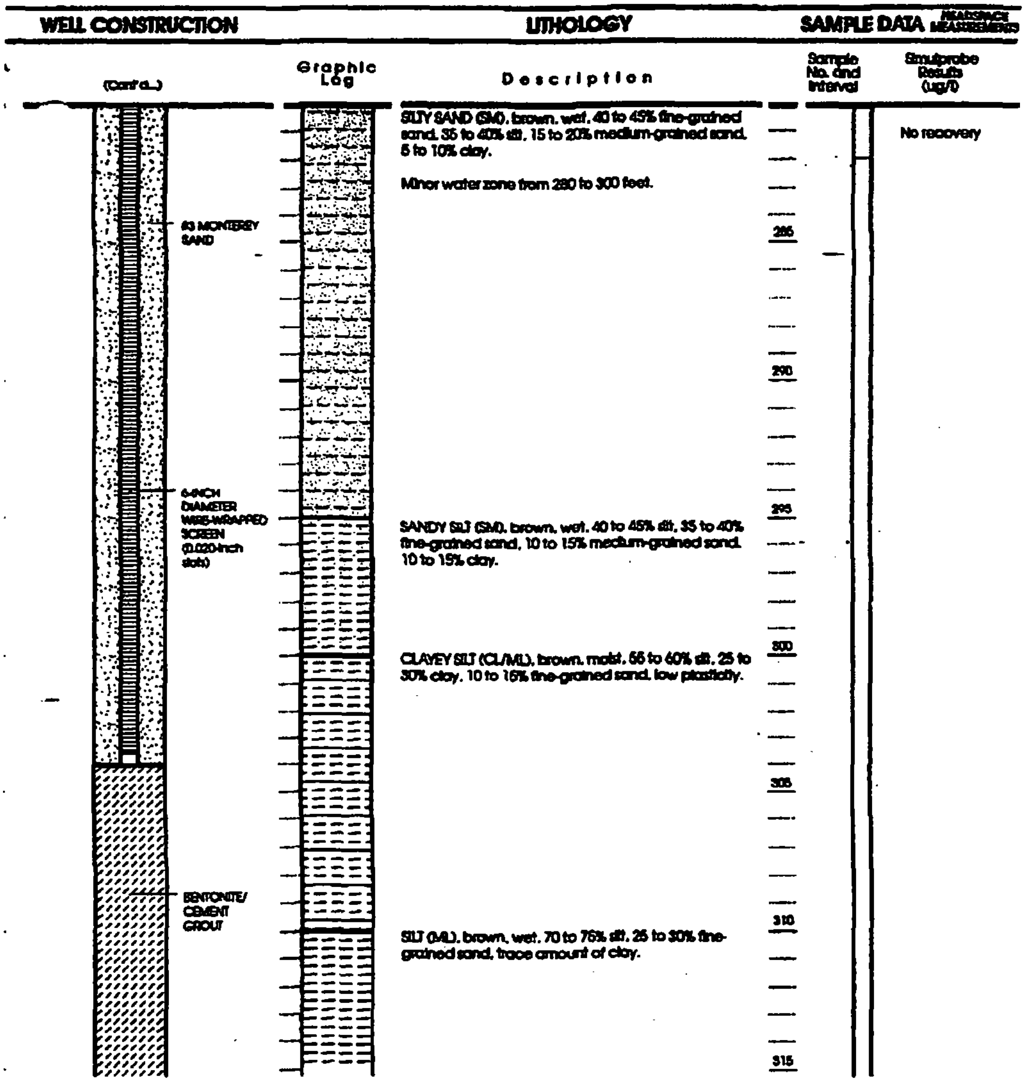
WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 8 of 11)*

wine-Fricke-Recon

NIBW Area 7

ject No. 1583

(1583.97-009) 7EX4MAB.CDR 033197JSC:REF



SILTY SAND (SM), brown, wet, 40 to 45% fine-grained sand, 35 to 40% silt, 15 to 20% medium-grained sand, 5 to 10% clay.

Minor water zone from 280 to 300 feet.

SANDY SILT (SM), brown, wet, 40 to 45% silt, 35 to 40% fine-grained sand, 10 to 15% medium-grained sand, 10 to 15% clay.

CLAYEY SILT (CL/ML), brown, moist, 55 to 60% silt, 25 to 30% clay, 10 to 15% fine-grained sand, low plasticity.

SILT (ML), brown, wet, 70 to 75% silt, 25 to 30% fine-grained sand, trace amount of clay.

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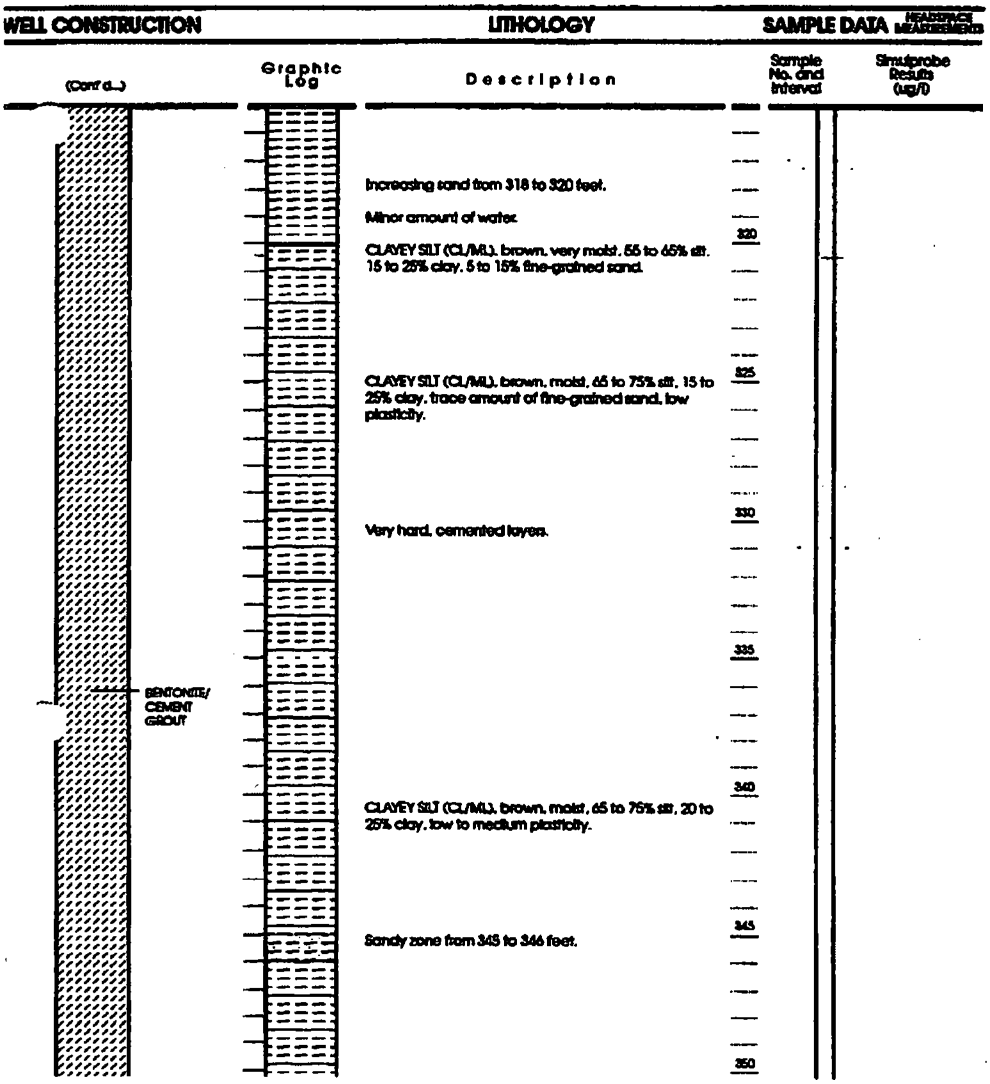
WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 9 of 11)*

wine-Fricke-Recon

NIBW Area 7

ject No. 1583

(1583.97-009) 7EX4MA9.CDR 033197JSC:REF



Increasing sand from 318 to 320 feet.

Minor amount of water.

CLAYEY SILT (CL/ML), brown, very moist, 55 to 65% silt, 15 to 25% clay, 5 to 15% fine-grained sand.

CLAYEY SILT (CL/ML), brown, moist, 65 to 75% silt, 15 to 25% clay, trace amount of fine-grained sand, low plasticity.

Very hard, cemented layers.

CLAYEY SILT (CL/ML), brown, moist, 65 to 75% silt, 20 to 25% clay, low to medium plasticity.

Sandy zone from 345 to 346 feet.

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WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 10 of 11)*

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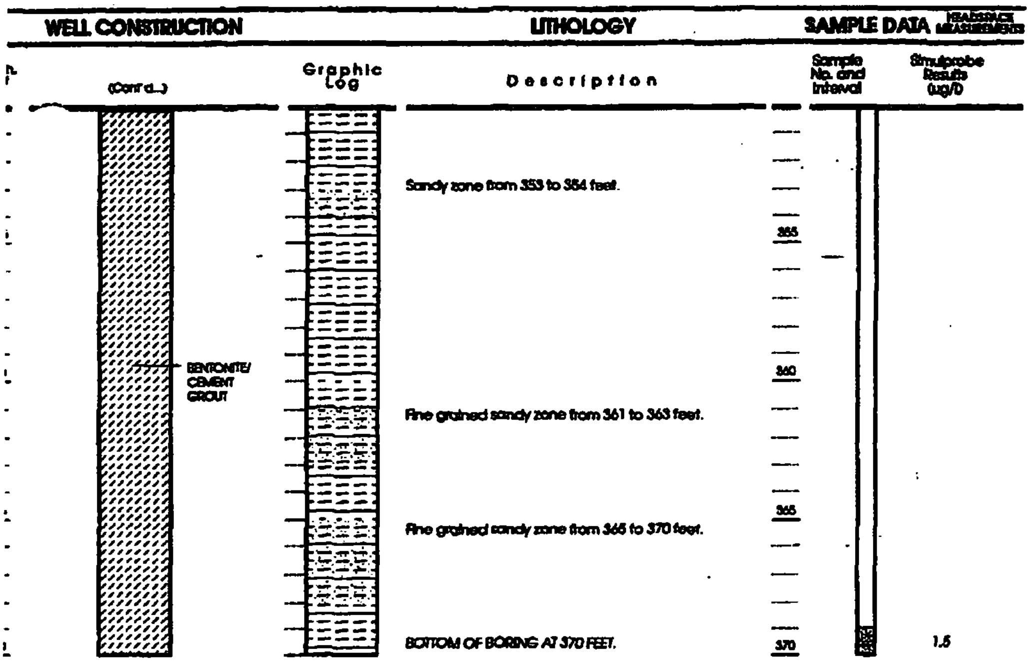
NIBW Area 7

No. 1583

(1583.97-009) 7EX4MA10.CDR 033197JSC:REF



Well Permit No.:
Well elevation: 1250.77 feet MSL
Date well drilled: October 25 to 31, 1996
Drilling company: Layne Environmental Services
Sampling Method: Simulprobe
Hammer weight: 300 lbs.
LF Geologist: Robert Forsberg

EXPLANATION
☰ Clay
☷ Silt
▒ Sand
▓ Gravel

pproved by:

WELL CONSTRUCTION AND LITHOLOGY FOR WELL 7EX-4MA *(page 11 of 11)*

NIBW Area 7

evine·Fricke·Recon

oject No. 1583

(1583.97-009) 7EX4MA11.CDR 033197JSC:REF

Appendix C

APPENDIX C

LABORATORY REPORTS AND GRAIN-SIZE DISTRIBUTION

TRANSWEST
GEOCHEM
ADHS Lab #AZM133

December 22, 1995
TRANSWEST #4951219A

Mr. Ian Goltz
Levine-Fricke
1920 Main Street Suite 750
Irvine, California 92714

Subject: **Laboratory Analytical Report**
Levine-Fricke Project: EXIMA
Siemens-Scottsdale

Dear Mr. Goltz:

Provided with this letter is the laboratory analytical report for analyses recently performed on the referenced project. *TRANSWEST* chemists provided analyses of:

- 9 soil sample(s) according to EPA Method 8010 for halogenated hydrocarbons using gas chromatography with electrolytic conductivity detection;
- 9 soil sample(s) according to EPA Method 8020 for aromatic hydrocarbons using gas chromatography with photoionization detection;
- 5 water sample(s) according to EPA Method 601 for halogenated hydrocarbons using gas chromatography with electron capture detection;
- 5 water sample(s) according to EPA Method 602 for aromatic hydrocarbons using gas chromatography with photoionization detection.

The following report includes the analytical results and quality assurance information for the project. The subject samples will be disposed of thirty days from the last sample collection date unless other arrangements are made. *TRANSWEST* is pleased to have provided analytical services to Levine-Fricke on this project. If we may be of further assistance, please do not hesitate to call.

Sincerely,

TRANSWEST
GEOCHEM

P[illegible]k J. Coughlin
Laboratory Manager
T:\95cvr\lab\951219ACVR.4LF

7950 E. Acoma Drive • Suite 103 • Scottsdale, Arizona 85260 • Phone (602) 443-0508 • Fax (602) 443-0422

TRANSWEST
GEOCHEM

LABORATORY ANALYTICAL REPORT
VOLATILE HALOGENATED HYDROCARBONS
VOLATILE AROMATIC HYDROCARBONS
EPA Method 8010/8020

Client:	Levine-Fricke, Inc.	**Transwest#:**	4951219A
Client Project :	1583.96	**Report Date:**	22Dec95
Matrix:	Soil		

CLIENT SAMPLE	**SB7EXIMA-147**	**SB7EXIMA-200.5**	**SB7EXIMA-230**
Date Sampled:	12/19/95	12/20/95	12/20/95
Date Extracted:	12/19/95	12/20/95	12/20/95
Date Analyzed:	12/19/95	12/20/95	12/20/95
Dilution Factor:	1	1	1
	Units in milligrams per kilogram (mg/kg)		
Benzene	<0.10	<0.10	<0.10
Ethyl Benzene	<0.10	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10	<0.10
Toluene	<0.10	<0.10	<0.10
Trichloroethene	<0.10	0.44	0.19
Xylenes	<0.30	<0.30	<0.30

TRANSWEST GEOCHEM

LABORATORY ANALYTICAL REPORT
VOLATILE HALOGENATED HYDROCARBONS
VOLATILE AROMATIC HYDROCARBONS
EPA Method 8010/8020

Client:	**Levine-Fricke, Inc.**	**Transwest#:**	**4951219A**
Client Project :	**1583.96**	**Report Date:**	**22Dec95**
Matrix:	**Soil**		

CLIENT SAMPLE	**SB7EXIMA-250**	**SB7EXIMA-270.5**	**SB7EXIMA-290**
Date Sampled:	12/20/95	12/20/95	12/20/95
Date Extracted:	12/20/95	12/20/95	12/21/95
Date Analyzed:	12/20/95	12/20/95	12/21/95
Dilution Factor:	1	1	1
	Units in milligrams per kilogram (mg/kg)		
Benzene	<0.10	<0.10	<0.10
Ethyl Benzene	<0.10	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10	<0.10
Toluene	<0.10	<0.10	<0.10
Trichloroethene	0.40	0.21	<0.10
Xylenes	<0.30	<0.30	<0.30

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TRANSWEST GEOCHEM

LABORATORY ANALYTICAL REPORT
VOLATILE HALOGENATED HYDROCARBONS
VOLATILE AROMATIC HYDROCARBONS
EPA Method 8010/8020

Client:	Levine-Fricke, Inc.	**Transwest#:**	4951219A
Client Project :	1583.96	**Report Date:**	22Dec95
Matrix:	Soil		

CLIENT SAMPLE	SB7EXIMA-310.5	SB7EXIMA-330	SB7EXIMA-355
Date Sampled:	12/21/95	12/21/95	12/21/95
Date Extracted:	12/21/95	12/21/95	12/21/95
Date Analyzed:	12/21/95	12/21/95	12/21/95
Dilution Factor:	1	1	1
	Units in milligrams per kilogram (mg/kg)		
Benzene	<0.10	<0.10	<0.10
Ethyl Benzene	<0.10	<0.10	<0.10
Tetrachloroethene	<0.10	<0.10	<0.10
Toluene	<0.10	<0.10	<0.10
Trichloroethene	<0.10	<0.10	0.18
Xylenes	<0.30	<0.30	<0.30

TRANSWEST GEOCHEM

LABORATORY ANALYTICAL REPORT
VOLATILE HALOGENATED HYDROCARBONS
VOLATILE AROMATIC HYDROCARBONS
EPA Method 601/602

Client:	**Levine-Fricke, Inc.**	**Transwest#:**	**4951219A**
Client Project :	**1583.96**	**Report Date:**	**22Dec95**
Matrix:	**Water**		

CLIENT SAMPLE	**12957EXIMA-147**	**12957EXIMA-147 Duplicate**	**12957EXIMA-230**
Date Sampled:	12/19/95	12/19/95	12/20/95
Date Analyzed:	12/19/95	12/19/95	12/20/95
Dilution Factor:	100	100	100
	Units in micrograms per Liter (ug/L)		
Benzene	<50	<50	<50
Ethyl Benzene	<50	<50	<50
Tetrachloroethene	<50	<50	<50
Toluene	<50	<50	<50
Trichloroethene	1600	1500	2000
Xylenes	<150	<150	<150

TRANSWEST GEOCHEM

LABORATORY ANALYTICAL REPORT
VOLATILE HALOGENATED HYDROCARBONS
VOLATILE AROMATIC HYDROCARBONS
EPA Method 601/602

Client:	Levine-Fricke, Inc.	**Transwest#:**	4951219A
Client Project :	1583.96	**Report Date:**	22Dec95
Matrix:	Water		

CLIENT SAMPLE	**12957EXIMA-250**	**12957EXIMA-290**	**12957EXIMA-350**
Date Sampled:	12/20/95	12/20/95	12/21/95
Date Analyzed:	12/20/95	12/21/95	12/21/95
Dilution Factor:	100	100	50
	Units in micrograms per Liter (ug/L)		
Benzene	<50	<50	<25
Ethyl Benzene	<50	<50	<25
Tetrachloroethene	<50	<50	<25
Toluene	<50	<50	<25
Trichloroethene	2500	430	560
Xylenes	<150	<150	<75

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TRANSWEST GEOCHEM

QUALITY ASSURANCE REPORT
VOLATILE HALOGENATED HYDROCARBONS
VOLATILE AROMATIC HYDROCARBONS
EPA Method 8010/8020
EPA Method 601/602

Client:	Levine-Fricke, Inc.	Transwest#:	4951219A
Client Project :	1583.96	Report Date:	22Dec95
Matrix:	Soil & Water		

SELECTED KEY COMPOUNDS

	BENZENE	ETHYL-BENZENE	XYLENES	TCE	PCE
	Units in milligrams per kilogram (mg/kg)				
December 19, 1995					
DUPLICATE ANALYSIS					
Control:SB 7 ' -147	*<0.10*	*<0.10*	*<0.30*	*<0.10*	*<0.10*
Control Duplicate	*<0.10*	*<0.10*	*<0.30*	*<0.10*	*<0.10*
% Relative Difference	—	—	—	—	—
Control:1295 7 ' -147	*<0.50*	*<0.50*	*<01.5*	*1600*	*<0.50*
Control Duplicate	*<0.50*	*<0.50*	*<01.5*	*1500*	*<0.50*
% Relative Difference	—	—	—	*6.5%*	—
MATRIX SPIKE ANALYSIS					
Matrix Spike	*79%*	—	*85%*	*106%*	*89%*
CALIBRATION CHECK					
Calibration Standard	*104%*	*95%*	*97%*	*111%*	*111%*
December 20, 1995					
DUPLICATE ANALYSIS					
Control:SB 7 ' -200.5	*<0.10*	*<0.10*	*<0.30*	*0.44*	*<0.10*
Control Duplicate	*<0.10*	*<0.10*	*<0.30*	*0.38*	*<0.10*
% Relative Difference	—	—	—	*15%*	—
Control:1295 7 ' -250	*<0.50*	*<0.50*	*<01.5*	*2500*	*<0.50*
Control Duplicate	*<0.50*	*<0.50*	*<01.5*	*2500*	*<0.50*
% Relative Difference	—	—	—	—	—
MATRIX SPIKE ANALYSIS					
Matrix Spike	*91%*	—	*101%*	*130%*	*128%*
CALIBRATION CHECK					
Calibration Standard	*131%**	*121%**	*130%**	*92%*	*87%*

*Curve check values exceed QAQC controls. The values show an increase in instrument sensitivity that affects any values above the detection level. As there were no detected values in any of the samples, the samples reported are not affected.

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**TRANSWEST
GEOCHEM**

QUALITY ASSURANCE REPORT
VOLATILE HALOGENATED HYDROCARBONS
VOLATILE AROMATIC HYDROCARBONS
EPA Method 8010/8020
EPA Method 601/602

Client:	Levine-Fricke, Inc.	**Transwest#:**	4951219A
Client Project :	1583.98	**Report Date:**	22Dec95
Matrix:	Soil & Water		

SELECTED KEY COMPOUNDS

Units in milligrams per kilogram (mg/kg)

	BENZENE	ETHYL-BENZENE	XYLENES	TCE	PCE
December 21, 1995					
DUPLICATE ANALYSIS					
Control:SB 7 ' -310.5	<0.10	<0.10	<0.30	<0.10	<0.10
Control Duplicate	<0.10	<0.10	<0.30	<0.10	<0.10
% Relative Difference	—	—	—	—	—
MATRIX SPIKE ANALYSIS					
Matrix Spike	96%	—	93%	78%	86%
CALIBRATION CHECK					
Calibration Standard	98%	104%	99%	107%	106%

Project #: 1583.96

Field Logbook No.

Date: 12-19-95

Serial No.: № N- 322

Project Name: Siemens Scottsdale

Project Location: 75th St. & Osborn, Scottsdale, AZ

Sampler (Signature):

Samplers: DAK, JAB, NBO

SAMPLES						ANALYSES								
SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE	EPA 601 *	EPA 624	EPA 602 **	8010	8020		HOLD	RUSH	REMARKS
12957EXIMA-197	12/19	11:05		3	H2O	X		X						
68TEXIMA-147		↓		~~DCL~~ 1	SOIL				X	X				
81TEXIMA-1165		↓		1	SOIL							X		NOTICE - SAMPLE ON HOLD

RELINQUISHED BY: (Signature) Jay a. Bourgeois	DATE 12/19/95	TIME 1745	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature) John Jay Dubetz Transwest Geochem	DATE 12-19-95	TIME 1745
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS: SAMPLES EXTRACTED AND ANALYZED ON-SITE SUNNY, TEMP 50° → 65°F		

Sample Collector:

LEVINE-FRICKE
1920 Main Street, Suite 750
Irvine, California 92714
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory:

** 602 = BTEX (≈8020)
* 601 = TARGET COMPOUNDS TCE/PCE (≈8010)

Shipping Copy (White) Lab Copy (Green) File Copy (Yellow) Field Copy (Pink)

(3) Samples on this page

FORM NO. 86/COC/ARF

Project No.: 1583.76
Field Logbook No :
Date: 12/21/95
Serial No.: № N- 124

Project Name: Siemens- Scottsdale
Project Location: 15th & Osborn Scottsdale, AZ

Sampler (Signature) :

Samplers: DAK, JAB

SAMPLES | ANALYSES

SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE	EPA 601 (*)	EPA 624	EPA 602 (**)	8010 (*)	8020 (**)		HOLD	RUSH	REMARKS
SB76XIMA-310.5	12/21	10:30		1	SOIL				X	X				Results to Ian Goltz
SB76XIMA-330	↓	11:30		1	SOIL				X	X				
[illegible]XIMA-320		5:00		3	H2O	X		X						
SB76XIMA-340		5:45		1	SOIL				X	X				

	DATE	TIME		DATE	TIME
RELINQUISHED BY: (Signature)	12/21/95	5:55	RECEIVED BY: (Signature)		
RELINQUISHED BY: (Signature)			RECEIVED BY: (Signature)		
RELINQUISHED BY: (Signature)			RECEIVED BY: (Signature) John Gary Dubesky / Transglobal Geochem	12-21-95	1755
METHOD OF SHIPMENT:			LAB COMMENTS: SAMPLES EXTRACTED AND ANALYZED ON-SITE		

Sample Collector:

LEVINE-FRICKE
1920 Main Street, Suite 750
Irvine, California 92714
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory:
(*) 601 AND 8010 ANALYSIS FOR TARGET COMPOUNDS TCE & PCE;
(**) 602 AND 8020 ANALYSIS FOR BTEX.

Shipping Copy (White) Lab Copy (Green) File Copy (Yellow) Field Copy (Pink) (4) samples on this C-o-C FORM NO. 86/COC/ARF

Project 1583.96	**Field Logbook N**	**Date:** 12/20/95	**Serial No.:** № N- L 23
Project Name: Siemens-Scottsdale	**Project Location:** 75th & Osborn SCOTTSDALE, AZ		

Sampler (Signature):

Samplers: DAK, JAB

SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE	EPA 601 (*)	EPA 624	EPA 602 (**)	8010 (*)	8020 (**)		HOLD	RUSH	REMARKS
SBTEXIMA-210.5	12/20	10:58		1	SOIL				X	X				Results to Ian Goltz
SBTEXIMA-230		1:25		1	SOIL				X	X				
12957BXIMA-230		↓		3	H2O	X		X						
↓ 250		3:10		3	H2O	X		X						
SBTEXIMA-250		↓		1	SOIL				X	X				
SBTEXIMA-220.5		3:50		1	SOIL				X	X				
12/20 ~~SBTEX~~12957EXIMA-220		6:00		3	H2O	X		X						
SBTEXIMA-290		↓		1	SOIL				X	X				

RELINQUISHED BY: (Signature)	DATE 12/20/95	TIME 1830	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature) John Jay Dubesky @ [redacted] TRANSWEST GEOCHEM	DATE 12-20-95	TIME 1830
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:

LEVINE-FRICKE
1920 Main Street, Suite 750
Irvine, California 92714
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory:
SAMPLES EXTRACTED AND ANALYZED ON-SITE.
(*) 601 and 8010 ANALYSIS FOR TARGET COMPOUNDS TCE + PCE
(**) 602 and 8020 ANALYSIS FOR BTEX COMPOUNDS.

Shipping Copy (White) Lab Copy (Green) File Copy (Yellow) Field Copy (Pink) (8) Samples on this page. FORM NO. 86/COC/ARF

TRANSWEST
GEOCHEM
ADHS Lab #AZM133

January 23, 1996
TRANSWEST #1960110B

Mr. Brad Cross
Levine-Fricke
8260 E. Raintree Dr. Suite #108
Scottsdale, Arizona 85260

Subject: **Laboratory Analytical Report**
Levine-Fricke Project: 1583.96-009
NIBW Area 7/MAU

Dear Mr. Cross:

Provided with this letter is the laboratory analytical report for analyses recently performed on the referenced project. *TRANSWEST* chemists provided analyses of:

- o 3 water sample(s) according to EPA Method 601 for halogenated hydrocarbons using gas chromatography with electrolytic conductivity detection;
- o 1 sample(s) were subcontracted to McKenzie Laboratories for requested analysis not performed by this laboratory at this time. The report of analysis results will be provided by McKenzie Laboratories.

The following report includes the analytical results and quality assurance information for the project. The subject samples will be disposed of thirty days from the last sample collection date unless other arrangements are made. *TRANSWEST* is pleased to have provided analytical services to Levine-Fricke on this project. If we may be of further assistance, please do not hesitate to call.

Sincerely,

TRANSWEST
GEOCHEM

Gary E Shipley

Gary E. Shipley
Laboratory Manager

T:\96cvrltr\lab#\0110BCVR.1LF

7950 E. Acoma Drive • Suite 103 • Scottsdale, Arizona 85260 • Phone (602) 443-0508 • Fax (602) 443-0422

TRANSWEST
GEOCHEM

LABORATORY ANALYTICAL REPORT
VOLATILE HALOGENATED HYDROCARBONS
EPA Method 601

Client:	Levine-Fricke	**Transwest#:**	1960110B
Client Project :	1583.96-009	**Report Date:**	23Jan96
Matrix:	Water	**Page:**	1 of 2

CLIENT SAMPLE:	**WS-1**	**Effluent-1**	**Effluent-2**
Date Sampled:	1/9/96	1/9/96	1/10/96
Date Analyzed:	1/19/96	1/19/96	1/19/96
Dilution Factor:	1,000	5	5
	Units in micrograms per Liter (ug/L)		
Bromomethane	<500	<2.5	<2.5
Carbon Tetrachloride	<500	<2.5	<2.5
Chlorobenzene	<500	<2.5	<2.5
Chloroform	<500	<2.5	<2.5
Chloromethane	<500	<2.5	<2.5
1,2 Dichlorobenzene	<500	<2.5	<2.5
1,3 Dichlorobenzene	<500	<2.5	<2.5
1,4 Dichlorobenzene	<500	<2.5	<2.5
1,1-Dichloroethane	<500	<2.5	<2.5
1,2-Dichloroethane	<500	<2.5	<2.5
1,1-Dichloroethene	<500	<2.5	<2.5
1,2-Dichloropropane	<500	<2.5	<2.5
cis-1,3-Dichloropropene	<500	<2.5	<2.5
trans-1,3-Dichloropropene	<500	<2.5	<2.5
Methylene Chloride	<500	<2.5	<2.5
1,1,2,2-Tetrachloroethane	<500	<2.5	<2.5
Tetrachloroethene	<500	<2.5	<2.5
1,1,1-Trichloroethane	<500	<2.5	<2.5
1,1,2-Trichloroethane	<500	<2.5	<2.5
Trichloroethene	6,600	8.2	4.9
Trichlorofluoromethane	<500	<2.5	<2.5
Vinyl Chloride	<500	<2.5	<2.5
Surrogate % Recovery	103%	98%	97%

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**TRANSWEST
GEOCHEM**

QUALITY ASSURANCE ANALYSES
VOLATILE HALOGENATED HYDROCARBONS
EPA Method 601

Client:	Levine-Fricke	Transwest#:	1960110B
Client Project :	1583.96-009	Report Date:	23Jan96
Matrix:	Water	Page:	2 of 2

SELECTED KEY COMPOUNDS

Units in micrograms per Liter (ug/L)

	MeCL2	1,1,1-TCA	TCE	PCE	Surrogate % Recovery
January 19, 1996					
DUPLICATE ANALYSIS					
Control (Effluent-1)	*<0.50*	*<0.50*	*8.2*	*<0.50*	*98%*
Control Duplicate	*<0.50*	*<0.50*	*5.5*	*<0.50*	*102%*
% Relative Difference	—	—	*39%*	—	*4.0%*
MATRIX SPIKE ANALYSIS					
Matrix Spike (% Recovery)	*101%*	*99%*	*99%*	*102%*	—
QC CHECK					
QC Check Standard	*113%*	*106%*	*103%*	*115%*	—
CALIBRATION CHECK					
Calibration Standard	*97%*	*93%*	*95%*	*99%*	—

Node1\96RPT\Lab\0110BW10.1LF

ADHS License # AZM133 Fax: (602) 443-0422 McKenzie TRANSWEST PROJECT # [illegible]

CLIENT: Levine - Fricke

ADDRESS: 1920 Main Street, Suite 750, Irvine, CA 92714

PHONE: 714-955-1390 FAX: 714-955-0683

PROJECT NAME: NIBW Area 7/Mall PROJECT MANAGER: Ned Overs

DATE: 1-11-96 PAGE 1 of 1

CLIENT PROJECT #: 1583.96-009

LOCATION: Scottsdale, Az.

COLLECTOR:

Sample ID	Date	Time	Sample Matrix	Container Type				Total Number of Containers	Lab ID	BLS-192/8010	BLS-193/8020	418.1	BLS-191/8015(gas)	BLS-191/8015(diesel)	BLS-191/8015 g & d	601	602	8095 Paint Filter	1010 Flash Point	6010 (Metals)	*General Minerals			FIELD NOTES:
				Brass Tubes	Glass Jar	40 ML VOA	Other																	
WS-1	1/9/96	22:45	H_2O				2	2												X	X			*Analyses to include: Carbonate, Bicarbonate, Hydroxide, Alkalinity, ~~Chloride, & Sulfate,~~ Conductivity, Hardness, pH, total dissolved solids, turbidity.

Turnaround: ☐ < 24-hr. RUSH ☐ 24-72 hr. PRIORITY ☒ Standard ☐ Other:

Report Requirements: ☐ Verbal ☐ Preliminary ☐ Final ☐ Other:

RELINQUISHED BY	RELINQUISHED BY	RELINQUISHED BY
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
(Printed Name) (Date) Transwest Geochem	(Printed Name) (Date)	(Printed Name) (Date)
(Company)	(Company)	(Company)
RECEIVED BY	RECEIVED BY	RECEIVED BY LABORATORY
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) (Date)
(Company)	(Company)	TRANSWEST GEOCHEM, INC.

LABORATORY NOTES:
Fax Preliminary Report to Levine - Fricke
Send Final Report to Levine - Fricke.
Send copy of Final Report to Transwest Geochem

Send Invoice to Transwest Geochem
Thankyou!

SAMPLE RECEIPT

CHAIN OF CUSTODY SEALS		ON-SITE	
REC'D GOOD CONDITION/COLD		IN-HOUSE	

DISTRIBUTION: WHITE, CANARY - TRANSWEST GEOCHEM, INC. • PINK - ORIGINATOR

Exhibit A
Page 135 of 495
Attachment 3

TRANSWEST
GEOCHEM
ADHS Lab #AZM133

January 24, 1996
TRANSWEST #1960112A

Mr. Brad Cross
Levine-Fricke
8260 E. Raintree Dr. Suite #108
Scottsdale, Arizona 85260

Subject: **Laboratory Analytical Report**
Levine-Fricke Project: 1583.96
Siemens

Dear Mr. Cross:

Provided with this letter is the laboratory analytical report for analyses recently performed on the referenced project. *TRANSWEST* chemists provided analyses of:

- 10 water sample(s) according to EPA Method 601 for halogenated hydrocarbons using gas chromatography with electrolytic conductivity detection.

The following report includes the analytical results and quality assurance information for the project. The subject samples will be disposed of thirty days from the last sample collection date unless other arrangements are made. *TRANSWEST* is pleased to have provided analytical services to Levine-Fricke on this project. If we may be of further assistance, please do not hesitate to call.

Sincerely,

TRANSWEST
GEOCHEM

Gary E. Shipley
Laboratory Manager

T:\96cvrltr\lab#R0112ACVR.1LF

7950 E. Acoma Drive • Suite 103 • Scottsdale, Arizona 85260 • Phone (602) 443-0508 • Fax (602) 443-0422

TRANSWEST
GEOCHEM

LABORATORY ANALYTICAL REPORT
VOLATILE HALOGENATED HYDROCARBONS
EPA Method 601

Client:	Levine-Fricke	**Transwest#:**	1960112A
Client Project:	1583.96	**Report Date:**	24Jan96
Matrix:	Water	**Page:**	1 of 3

CLIENT SAMPLE:	**Influent-3**	**Effluent-3**	**PT-20350**	**PT-13080**	**PT-34160**
Date Sampled:	1/11/96	1/11/96	1/12/96	1/12/96	1/12/96
Date Analyzed:	1/23/96	1/23/96	1/23/96	1/23/96	1/23/96
Dilution Factor:	1,000	1	1,000	1,000	1,667
			Units in micrograms per Liter (ug/L)		
Bromomethane	<500	<0.50	<500	<500	<833
Carbon Tetrachloride	<500	<0.50	<500	<500	<833
Chlorobenzene	<500	<0.50	<500	<500	<833
Chloroform	<500	<0.50	<500	<500	<833
Chloromethane	<500	<0.50	<500	<500	<833
1,2 Dichlorobenzene	<500	<0.50	<500	<500	<833
1,3 Dichlorobenzene	<500	<0.50	<500	<500	<833
1,4 Dichlorobenzene	<500	<0.50	<500	<500	<833
1,1-Dichloroethane	<500	<0.50	<500	<500	<833
1,2-Dichloroethane	<500	<0.50	<500	<500	<833
1,1-Dichloroethene	<500	<0.50	<500	<500	<833
1,2-Dichloropropane	<500	<0.50	<500	<500	<833
cis-1,3-Dichloropropene	<500	<0.50	<500	<500	<833
trans-1,3-Dichloropropene	<500	<0.50	<500	<500	<833
Methylene Chloride	<500	<0.50	<500	<500	<833
1,1,2,2-Tetrachloroethane	<500	<0.50	<500	<500	<833
Tetrachloroethene	<500	<0.50	<500	<500	<833
1,1,1-Trichloroethane	<500	<0.50	<500	<500	<833
1,1,2-Trichloroethane	<500	<0.50	<500	<500	<833
Trichloroethene	5,500	10	6,000	7,400	8,100
Trichlorofluoromethane	<500	<0.50	<500	<500	<833
Vinyl Chloride	<500	<0.50	<500	<500	<833
Surrogate % Recovery	99%	90%	99%	108%	106%

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TRANSWEST GEOCHEM

LABORATORY ANALYTICAL REPORT
VOLATILE HALOGENATED HYDROCARBONS
EPA Method 601

Client:	Levine-Fricke	**Transwest#:**	1960112A
Client Project :	1583.96	**Report Date:**	24Jan96
Matrix:	Water	**Page:**	2 of 3

CLIENT SAMPLE:	PT-54600	PT-75150	PT-96060	PT-115900	PT-136120
Date Sampled:	1/12/96	1/12/96	1/12/96	1/12/96	1/12/96
Date Analyzed:	1/23/96	1/23/96	1/23/96	1/23/96	1/23/96
Dilution Factor:	1,000	1,000	1,000	500	1,667
			Units in micrograms per Liter (ug/L)		
Bromomethane	<500	<500	<500	<250	<833
Carbon Tetrachloride	<500	<500	<500	<250	<833
Chlorobenzene	<500	<500	<500	<250	<833
Chloroform	<500	<500	<500	<250	<833
Chloromethane	<500	<500	<500	<250	<833
1,2 Dichlorobenzene	<500	<500	<500	<250	<833
1,3 Dichlorobenzene	<500	<500	<500	<250	<833
1,4 Dichlorobenzene	<500	<500	<500	<250	<833
1,1-Dichloroethane	<500	<500	<500	<250	<833
1,2-Dichloroethane	<500	<500	<500	<250	<833
1,1-Dichloroethene	<500	<500	<500	<250	<833
1,2-Dichloropropane	<500	<500	<500	<250	<833
cis-1,3-Dichloropropene	<500	<500	<500	<250	<833
trans-1,3-Dichloropropene	<500	<500	<500	<250	<833
Methylene Chloride	<500	<500	<500	<250	<833
1,1,2,2-Tetrachloroethane	<500	<500	<500	<250	<833
Tetrachloroethene	<500	<500	<500	<250	<833
1,1,1-Trichloroethane	<500	<500	<500	<250	<833
1,1,2-Trichloroethane	<500	<500	<500	<250	<833
Trichloroethene	7,400	2,400	7,500	6,000	7,900
Trichlorofluoromethane	<500	<500	<500	<250	<833
Vinyl Chloride	<500	<500	<500	<250	<833
Surrogate % Recovery	110%	106%	106%	115%	104%

Node1\96RPT\Lab\0112AW10.1LF

TRANSWEST GEOCHEM

QUALITY ASSURANCE ANALYSES
VOLATILE HALOGENATED HYDROCARBONS
EPA Method 601

Client:	Levine-Fricke	Transwest#:	1960112A
Client Project :	1583.96	Report Date:	24Jan96
Matrix:	Water	Page:	3 of 3

SELECTED KEY COMPOUNDS

	MeCL2	1,1,1-TCA	TCE	PCE	Surrogate % Recovery
	Units in micrograms per Liter (ug/L)				
January 23, 1996					
DUPLICATE ANALYSIS					
Control (PT-75150)	<500	<500	2,400	<500	106%
Control Duplicate	<500	<500	2,500	<500	98%
% Relative Difference	—	—	4.1%	—	7.8%
MATRIX SPIKE ANALYSIS					
Matrix Spike (% Recovery)	111%	107%	110%	111%	—
CALIBRATION CHECK					
Calibration Standard	108%	101%	109%	110%	—

Node1\96RPT\Lab\0112AW10.1LF

13940633v6

Exhibit A
Page **140** of **495**
Attachment 3

Project No.: 1583 96
Field Logbook No.: i
Date: 1-11-96
Serial No.: № 0498
Project Name: SIEMENS
Project Location: SCOTTSDALE, AZ
Sampler (Signature): D. J. Foster
Samplers: DJF

SAMPLES						ANALYSES								
SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CONTAINERS	SAMPLE TYPE	EPA 601	EPA 624	8010	GEN MINERALS			HOLD	RUSH	REMARKS
INFLUENT-3	1-11-96	0400		2xVOA	H_2O			X						GEN MINERALS TO INCLUDE:
														CARBONATE, BICARBONATE, HYDROXIDE,
EFFLUENT-3	1-11-96	0350		2xVOA	H_2O			X						ALKALINITY, CONDUCTIVITY, HARDNESS
PT-20350	1-12-96	0001		2xVOA	↓			X						pH, TOTAL DISSOLVED SOLIDS,
PT-13000 *	↓	0200		↓				X						TURBIDITY, CHLORIDE, & SULFATE
PT-34160		0400						X						
PT-54600		0600						X						FAX RESULTS TO JIM LUTTON
PT-75130		0800						X						@ 916 786 03660
PT-96000		1000						X						
PT-115800		1200						X	**					
PT-136120		1400		2xVOA 2xLITER				X	X					* FLOW METER RE-SET @
														27,615 gal.
														**Cancelled per Ned Overs 1-18-96

RELINQUISHED BY: (Signature) D. J. Foster	DATE 1-11-96	TIME 0700 AM	RECEIVED BY: (Signature) Greg Sunnall	DATE 1/12/96	TIME 1645
RELINQUISHED BY: (Signature) Ned B	DATE 1-12-96	TIME 1610	RECEIVED BY: (Signature)	DATE	TIME
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:
LEVINE-FRICKE
3001 Douglas Boulevard, Suite 320
Roseville, California 95661
(916) 786-0320

Analytical Laboratory:

Shipping Copy (White) Lab Copy (Green) File Copy (Yellow) Field Copy (Pink) FORM NO. 86/COC/ARF

City of Scottsdale Contract No. 1998-006-COS-A2

S Laboratories, Inc.

ical Services

8100 Secura Way • Santa Fe Springs • CA 90670
Phone (310) 907-3607 • Fax (310) 907-3610

1583.96 - 007

bruary 29, 1996

ı Goltz
vine-Fricke
20 Main Street, Suite 750
ine, CA 92714

: Project No: 1583.96
PTS File: 26025

ar Mr. Goltz:

closed are final data for analyses conducted on the samples submitted from your Siemens-Scottsdale project. l analyses were performed by applicable ASTM, EPA or API methodology. Samples will be retained for days before disposal unless prior arrangements are made.

e appreciate the opportunity to be of service and trust these data will prove beneficial in the development this project. Please feel free to call myself or Fred Adame, Supervisor, should you have any questions or quire additional information.

ıcerely,

S Laboratories, Inc.

rry Kunkel
strict Manager

K:lg

ıclosures

PTS Laboratories, Inc.

CLIENT: LEVINE-FRICKE

FILE NO: 26025
DATE: FEBRUARY 1998
PROJ. NAME: SIEMENS-SCOTTSDALE
PROJ. NO: 1583.98

PHYSICAL PROPERTIES DATA

(METHODOLOGY: ASTM D2216, API RP40, EPA 9100)

									CONDUCTED AT 25.0 PSI CONFINING STRESS			
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENT. (1)	SPECIFIC GRAVITY	DENSITY		EFFECTIVE POROSITY, % Vb	PORE FLUID SATURATION, % Pv		NATIVE STATE EFFECTIVE PERMEABILITY TO AIR (millidarcy)	NATIVE STATE EFFECTIVE AIR CONDUCTIVITY (cm/s)	NATIVE STATE EFFECTIVE PERMEABILITY TO WATER (millidarcy)	NATIVE STATE EFFECTIVE WATER CONDUCTIVITY (cm/s)
				BULK (g/cc)	GRAIN (g/cc)		WATER (2)	CONTAMINANT (3)				
SBTEX-IMA-40	N/A	V	2.54	1.45		42.0					0.164	1.61E-07
SBTEX-IMA-180	N/A	V	2.61	1.40		45.7					1.02	1.01E-06
SBTEX-IMA-220	N/A	V	2.64	1.47		43.7					1.18	1.16E-06
SBTEX-IMA-310	N/A	V	2.57	1.36		46.4					1.02	1.00E-06

(1) SAMPLE ORIENTATION: (2) 0.9988 gm/cc USED TO CALCULATE WATER SATURATION Vb = BULK VOLUME, cc

CLIENT: LEVINE-FRICKE

FILE NO: 26025
DATE: FEBRUARY 1998
PROJ. NO: 1583.98

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D4464)

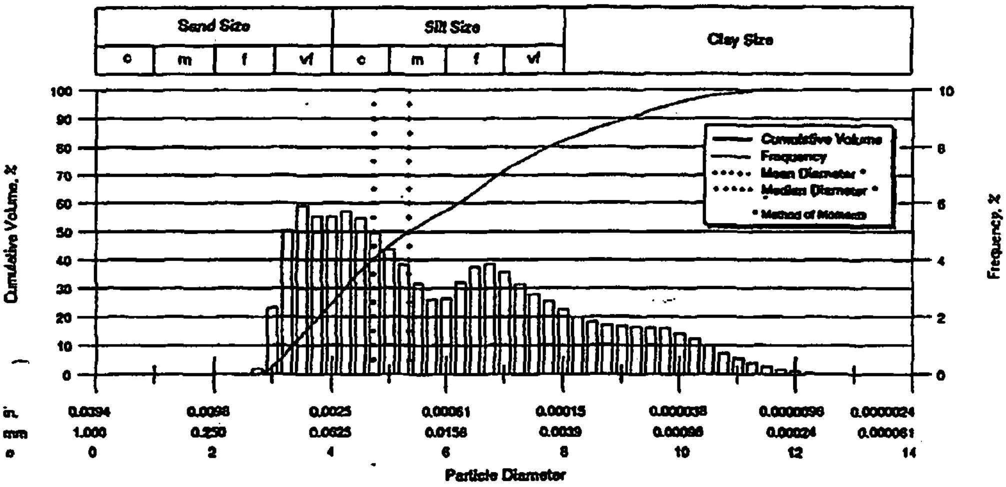
Sample ID	Median Grain Size, mm	Particle Size Distribution, % grain volume									Classification				
		Gravel	Sand Fraction							Silt & Clay	Liquid Limit	Plastic Limit	Plasticity Index	Moisture Content	USCS ID
		Fine	V. Coarse	Coarse	Medium	Fine	V. Fine	Silt	Clay						
SBTEX-IMA-40	0.025	0.00	0.00	0.00	0.00	2.50	22.00	57.71	17.79	75.50	47	24	23	19.7	CL w/sand
SBTEX-IMA-180	0.019	0.00	0.00	0.00	0.00	4.19	12.71	60.94	22.16	83.10	55	27	28	31.3	CH w/sand
SBTEX-IMA-220	0.035	0.00	0.00	3.39	9.41	10.32	12.83	49.52	14.53	64.05	40	2	19	29.1	CL sandy
SBTEX-IMA-310	0.032	0.00	0.00	3.42	9.58	4.73	12.44	55.61	14.22	69.83	38	22	16	48.1	CL sandy

'S Laboratories, Inc.

File No: 26025
Date: February 1996
Project Name: Siemens-Scottsdale
Sample ID: SBTEX-IMA-40

Client: Levine-Fricke

Particle Size by Laser Light Scattering
(ASTM D4464)



Particle Size Distribution						
		Diameter			Volume, %	
	[U.S. Sieve]	[in]	[mm]	[phi]	[Inc.]	[Cum.]
Coarse Sand	20	0.0331	0.84	0.25	0.00	0.00
	25	0.0280	0.71	0.50	0.00	0.00
	30	0.0232	0.59	0.75	0.00	0.00
	35	0.0197	0.50	1.00	0.00	0.00
Medium Sand	40	0.0165	0.42	1.25	0.00	0.00
	45	0.0138	0.35	1.50	0.00	0.00
	50	0.0118	0.30	1.75	0.00	0.00
	60	0.0098	0.25	2.00	0.00	0.00
Fine Sand	70	0.0083	0.210	2.25	0.00	0.00
	80	0.0070	0.177	2.50	0.00	0.00
	100	0.0059	0.149	2.75	0.20	0.20
	120	0.0049	0.125	3.00	2.30	2.50
Very Fine Sand	140	0.0041	0.105	3.25	5.05	7.55
	170	0.0035	0.088	3.50	5.91	13.46
	200	0.0029	0.074	3.75	5.53	18.99
	230	0.0025	0.063	4.00	5.51	24.50
Silt	270	0.0021	0.053	4.25	5.71	30.21
	325	0.0017	0.044	4.50	5.48	35.69
	400	0.0015	0.037	4.75	4.94	40.63
	450	0.0012	0.031	5.00	4.36	44.99
	500	0.0010	0.025	5.32	4.80	49.79
	635	0.0008	0.020	5.64	3.70	53.49
		0.00061	0.0156	6.00	3.70	57.19
		0.00031	0.0078	7.00	14.37	71.56
		0.00015	0.0039	8.00	10.65	82.21
Clay		0.000079	0.0020	9.00	7.13	89.34
		0.000039	0.00098	10.0	6.18	95.52
		0.000019	0.00049	11.0	3.44	98.96
		0.0000094	0.00024	12.0	0.94	99.90
		0.0000047	0.00012	13.0	0.10	100.00
		0.0000039	0.00010	13.3	0.00	100.00

Sorting Statistics				
Parameter	[Moment]	[Trask]	[Inman]	[Folk]
Mean, in	0.0015	0.0008	0.0006	0.0007
Mean, mm	0.0379	0.0190	0.0165	0.0189
Mean, phi	4.7232	5.6487	5.9198	5.7252
Median, in	0.0010	0.0010	0.0010	0.0010
Median, mm	0.0248	0.0245	0.0248	0.0248
Median, phi	5.3358	5.3360	5.3360	5.3360
Std Deviation, in	0.0015	0.0154	0.0079	0.0086
Std Deviation, mm	0.0373	0.3936	0.2021	0.2211
Std Deviation, phi	4.7443	1.3451	2.3066	2.1773
Skewness	0.9520	1.0276	0.5122	0.3014
Kurtosis	-0.1450	0.2829	0.4650	0.8512
Mode, mm	0.1059			
95% Confidence	0.0305			
Limits, mm	0.0452			
Variance, mm2	0.0014			
Coef. of Variance, %	96.56			

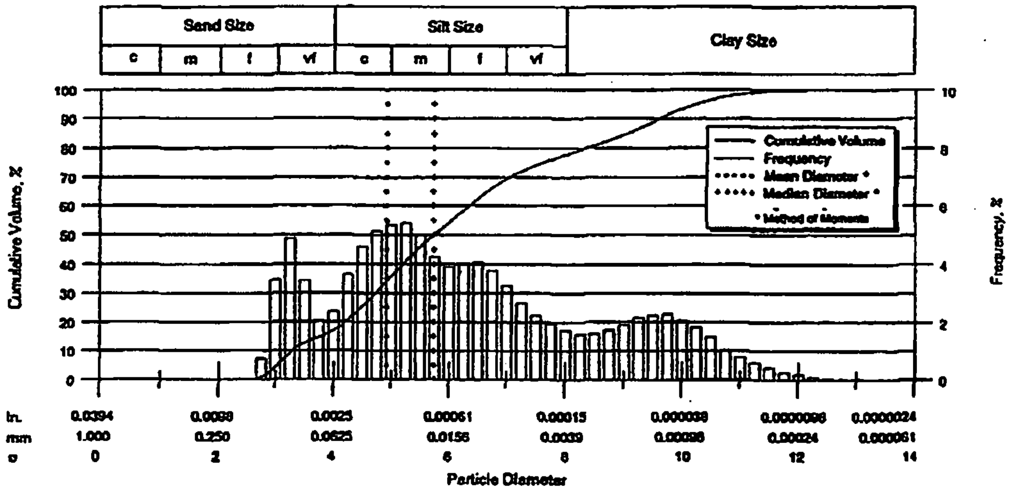
Percentiles [volume, %]	Particle Diameter		
	[in]	[mm]	[phi]
5	0.0044	0.1136	3.1383
10	0.0038	0.0979	3.3523
16	0.0032	0.0817	3.6132
25	0.0024	0.0616	4.0218
50	0.0010	0.0248	5.3360
75	0.0003	0.0065	7.2758
84	0.0001	0.0033	8.2284
90	0.0001	0.0018	9.1034
95	0.0000	0.0010	9.8968

TS Laboratories, Inc.

File No: 26025
Date: February 1996
Project Name: Siemens-Scottsdale
Sample ID: SBTEX-IMA-180

Client: Levine-Fricke

Particle Size by Laser Light Scattering
(ASTM D4464)



Particle Size Distribution						
		Diameter			Volume, %	
	[U.S. Sieve]	[in]	[mm]	[phi]	[Inc.]	[Cum.]
Coarse Sand	20	0.0331	0.84	0.25	0.00	0.00
	25	0.0280	0.71	0.50	0.00	0.00
	30	0.0232	0.59	0.75	0.00	0.00
	35	0.0197	0.50	1.00	0.00	0.00
Medium Sand	40	0.0165	0.42	1.25	0.00	0.00
	45	0.0138	0.35	1.50	0.00	0.00
	50	0.0118	0.30	1.75	0.00	0.00
	60	0.0098	0.25	2.00	0.00	0.00
Fine Sand	70	0.0083	0.210	2.25	0.00	0.00
	80	0.0070	0.177	2.50	0.00	0.00
	100	0.0059	0.149	2.75	0.73	0.73
	120	0.0049	0.125	3.00	3.46	4.19
Very Fine Sand	140	0.0041	0.105	3.25	4.87	9.06
	170	0.0035	0.088	3.50	3.45	12.51
	200	0.0029	0.074	3.75	2.03	14.54
	230	0.0025	0.063	4.00	2.36	16.90
Silt	270	0.0021	0.053	4.25	3.63	20.53
	325	0.0017	0.044	4.50	4.65	25.18
	400	0.0015	0.037	4.75	5.08	30.26
	450	0.0012	0.031	5.00	5.33	35.59
	500	0.0010	0.025	5.32	6.89	42.48
	635	0.0008	0.020	5.64	6.00	48.48
		0.00061	0.0156	6.00	5.72	54.20
		0.00031	0.0078	7.00	15.14	69.34
		0.00015	0.0039	8.00	8.50	77.84
Clay		0.000079	0.0020	9.00	6.80	84.64
		0.000039	0.00098	10.0	8.66	93.30
		0.000019	0.00049	11.0	5.16	98.46
		0.0000094	0.00024	12.0	1.39	99.85
		0.0000047	0.00012	13.0	0.15	100.00
		0.0000039	0.00010	13.3	0.00	100.00

Sorting Statistics				
Parameter	[Moment]	[Trask]	[Inman]	[Folk]
Mean, in	0.0013	0.0006	0.0005	0.0005
Mean, mm	0.0330	0.0151	0.0117	0.0137
Mean, phi	4.9196	6.0449	6.4180	6.1901
Median, in	0.0007	0.0007	0.0007	0.0007
Median, mm	0.0188	0.0188	0.0188	0.0188
Median, phi	5.7316	5.7323	5.7323	5.7323
Std Deviation, in	0.0015	0.0158	0.0069	0.0077
Std Deviation, mm	0.0377	0.4059	0.1767	0.1977
Std Deviation, phi	4.7265	1.3006	2.5007	2.3389
Skewness	1.4790	1.0386	0.3625	0.2635
Kurtosis	1.2620	0.2462	0.4368	0.9479
Mode, mm	0.0296			
95% Confidence	0.0257			
Limits, mm	0.0404			
Variance, mm2	0.0014			
Coef. of Variance, %	114.10			

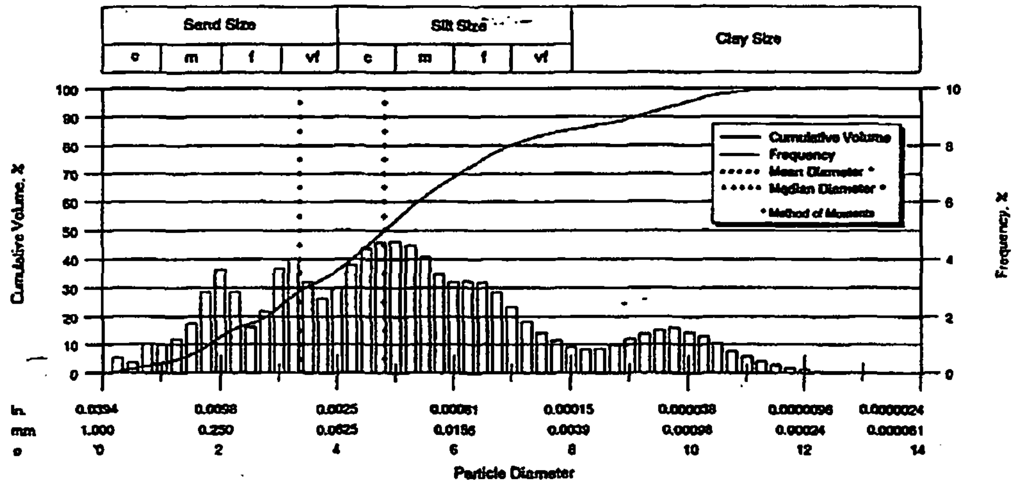
Percentiles	Particle Diameter		
[volume, %]	[in]	[mm]	[phi]
5	0.0047	0.1210	3.0464
10	0.0040	0.1013	3.3029
16	0.0026	0.0661	3.9163
25	0.0017	0.0445	4.4916
50	0.0007	0.0168	5.7323
75	0.0002	0.0052	7.5981
84	0.0001	0.0021	8.9196
90	0.0000	0.0013	9.6119
95	0.0000	0.0008	10.2311

S Laboratories, Inc.

Client: Levine-Fricke

File No: 26025
Date: February 1996
Project Name: Siemens-Scottsdale
Sample ID: SBTEX-IMA-220

Particle Size by Laser Light Scattering
(ASTM D4464)



Particle Size Distribution

	Diameter [U.S. Sieve]	[in]	[mm]	[phi]	Volume, % [Inc.]	[Cum.]
Coarse Sand	20	0.0331	0.84	0.25	1.00	1.00
	25	0.0280	0.71	0.50	0.37	1.37
	30	0.0232	0.59	0.75	1.02	2.39
	35	0.0197	0.50	1.00	1.00	3.39
Medium Sand	40	0.0165	0.42	1.25	1.18	4.57
	45	0.0138	0.35	1.50	1.75	6.32
	50	0.0118	0.30	1.75	2.86	9.18
	60	0.0098	0.25	2.00	3.62	12.80
Fine Sand	70	0.0083	0.210	2.25	2.86	15.66
	80	0.0070	0.177	2.50	1.63	17.29
	100	0.0059	0.149	2.75	2.17	19.46
	120	0.0049	0.125	3.00	3.66	23.12
Very Fine Sand	140	0.0041	0.105	3.25	4.03	27.15
	170	0.0035	0.088	3.50	3.20	30.35
	200	0.0029	0.074	3.75	2.63	32.98
	230	0.0025	0.063	4.00	2.97	35.95
Silt	270	0.0021	0.053	4.25	3.79	39.74
	325	0.0017	0.044	4.50	4.39	44.13
	400	0.0015	0.037	4.75	4.58	48.71
	450	0.0012	0.031	5.00	4.62	53.33
	500	0.0010	0.025	5.32	5.70	59.03
	635	0.0008	0.020	5.64	4.87	63.90
		0.00061	0.0156	6.00	4.67	68.57
		0.00031	0.0078	7.00	11.61	80.18
		0.00015	0.0039	8.00	5.29	85.47
Clay		0.000079	0.0020	9.00	3.85	89.32
		0.000039	0.00098	10.0	5.93	95.26
		0.000019	0.00049	11.0	3.68	98.93
		0.0000094	0.00024	12.0	0.98	99.91
		0.0000047	0.00012	13.0	0.09	100.00
		0.0000039	0.00010	13.3	0.00	100.00

Sorting Statistics

Parameter	[Moment]	[Trask]	[Inman]	[Folk]
Mean, in	0.0038	0.0014	0.0013	0.0013
Mean, mm	0.0974	0.0357	0.0321	0.0332
Mean, phi	3.3605	4.8069	4.9593	4.9125
Median, in	0.0014	0.0014	0.0014	0.0014
Median, mm	0.0354	0.0354	0.0354	0.0354
Median, phi	4.8185	4.8187	4.8187	4.8187
Std Deviation, in	0.0058	0.0143	0.0062	0.0063
Std Deviation, mm	0.1491	0.3673	0.1578	0.1606
Std Deviation, phi	2.7456	1.4450	2.6536	2.6385
Skewness	2.6130	0.8718	0.3068	0.1217
Kurtosis	7.6130	0.2313	0.6189	1.0435
Mode, mm	0.0355			
95% Confidence	0.0681			
Limits, mm	0.1266			
Variance, mm2	0.0222			
Coef. of Variance, %	153.20			

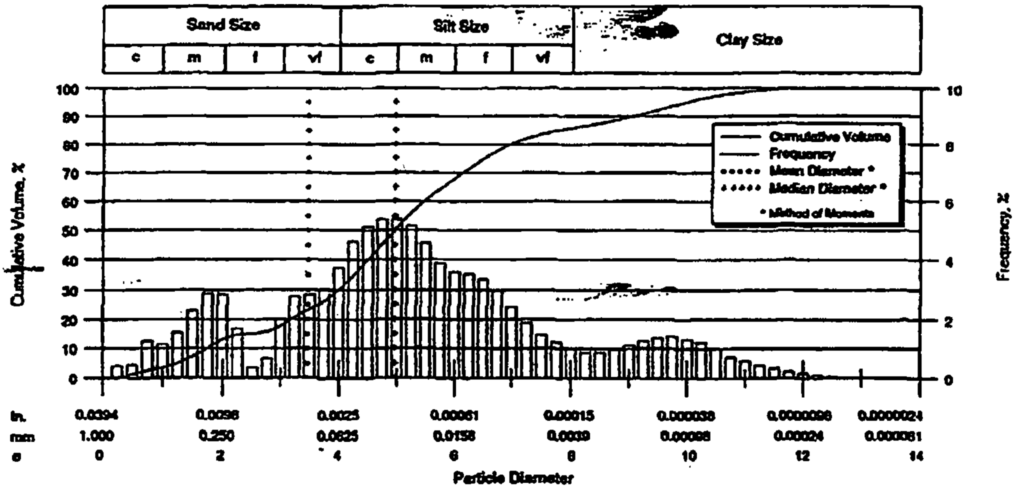
Percentiles [volume, %]	Particle Diameter [in]	[mm]	[phi]
5	0.0155	0.3982	1.3288
10	0.0111	0.2859	1.8065
16	0.0079	0.2037	2.2957
25	0.0045	0.1156	3.1132
50	0.0014	0.0354	4.8187
75	0.0004	0.0110	6.5000
84	0.0002	0.0051	7.6229
90	0.0001	0.0018	9.1291
95	0.0000	0.0010	9.9529

'S Laboratories, Inc.

Client: Levine-Fricke

File No: 26025
Date: February 1996
Project Name: Siemens-Scottsdale
Sample ID: SBTEX-IMA-310

Particle Size by Laser Light Scattering
(ASTM D4464)



Particle Size Distribution

	Diameter				Volume, %	
	[U.S. Sieve]	[in]	[mm]	[phi]	[Inc.]	[Cum.]
Coarse Sand	20	0.0331	0.84	0.25	0.61	0.61
	25	0.0280	0.71	0.50	0.44	1.05
	30	0.0232	0.59	0.75	1.26	2.31
	35	0.0197	0.50	1.00	1.11	3.42
Medium Sand	40	0.0165	0.42	1.25	1.55	4.97
	45	0.0138	0.35	1.50	2.29	7.26
	50	0.0118	0.30	1.75	2.88	10.14
	60	0.0098	0.25	2.00	2.86	13.00
Fine Sand	70	0.0083	0.210	2.25	1.67	14.67
	80	0.0070	0.177	2.50	0.37	15.04
	100	0.0059	0.149	2.75	0.68	15.72
	120	0.0049	0.125	3.00	2.01	17.73
Very Fine Sand	140	0.0041	0.105	3.25	2.78	20.51
	170	0.0035	0.088	3.50	2.85	23.36
	200	0.0029	0.074	3.75	3.05	26.41
	230	0.0025	0.063	4.00	3.76	30.17
Silt	270	0.0021	0.053	4.25	4.62	34.79
	325	0.0017	0.044	4.50	5.16	39.95
	400	0.0015	0.037	4.75	5.36	45.31
	450	0.0012	0.031	5.00	5.38	50.69
	500	0.0010	0.025	5.32	6.50	57.19
	635	0.0008	0.020	5.64	5.48	62.67
		0.00061	0.0156	6.00	5.25	67.92
		0.00031	0.0078	7.00	12.28	80.20
		0.00015	0.0039	8.00	5.58	85.78
Clay		0.000079	0.0020	9.00	3.87	89.65
		0.000039	0.00098	10.0	5.38	95.03
		0.000019	0.00049	11.0	3.55	98.58
		0.0000094	0.00024	12.0	1.17	99.75
		0.0000047	0.00012	13.0	0.24	99.99
		0.0000039	0.00010	13.3	0.01	100.00

Sorting Statistics

Parameter	[Moment]	[Trask]	[Inman]	[Folk]
Mean, in	0.0035	0.0012	0.0011	0.0011
Mean, mm	0.0890	0.0296	0.0274	0.0283
Mean, phi	3.4751	5.0763	5.1919	5.1168
Median, in	0.0012	0.0012	0.0012	0.0012
Median, mm	0.0320	0.0320	0.0320	0.0320
Median, phi	4.9671	4.9668	4.9668	4.9668
Std Deviation, in	0.0058	0.0134	0.0074	0.0069
Std Deviation, mm	0.1483	0.3958	0.1905	0.1743
Std Deviation, phi	2.7534	1.3378	2.3921	2.5202
Skewness	2.6480	0.9609	0.2747	0.1222
Kurtosis	7.2630	0.1959	0.8267	1.2481
Mode, [illegible]	0.0356			
95% Confidence	0.0609			
Limits, mm	0.1190			
Variance, mm2	0.0220			
Coef. of Variance, %	164.90			

Percentiles	Particle Diameter		
[volume, %]	[in]	[mm]	[phi]
5	0.0163	0.4192	1.2542
10	0.0117	0.2997	1.7386
16	0.0056	0.1436	2.7998
25	0.0031	0.0803	3.6390
50	0.0012	0.0320	4.9668
75	0.0004	0.0109	6.5136
84	0.0002	0.0052	7.5839
90	0.0001	0.0019	9.0751
95	0.0000	0.0010	9.9935

Project No.: 1593.96	Field Logbook No.:	Date: 1/31/96	Serial No.: № N- 5816
Project Name: Siemens - Scottsdale	Project Location: 75th st - Scottsdale		
Sampler (Signature)			Samplers: DAK, JAB

SAMPLES | ANALYSES

SAMPLE NO.	DATE	TIME	LAB SAMPLE NO.	NO. OF CON-TAINERS	SAMPLE TYPE	Hydrometer EPA 601	Bulk Density EPA 628	Specific Gravity	USCS ID	Effective Porosity	Hydraulic Conductivity	HOLD	RUSH	REMARKS
SBTEX-1MA40	12/18	12:43		1	Soil	✓	✓	✓	✓	✓	✓			Results to Ian Goltz.
↓ 140	12/19	5:00		↓	↓	✓	✓	✓	✓	✓	✓			
220	12/20	11:35				✓	✓	✓	✓	✓	✓			
310	12/21	10:30				✓	✓	✓	✓	✓	✓			

RELINQUISHED BY: (Signature)	DATE 1/31/96	TIME 4:00	RECEIVED BY: (Signature)	DATE 2/1/96	TIME 11:20 AM
RELINQUISHED BY: (Signature)	DATE 2/15/96	TIME 4:00 pm	RECEIVED BY: (Signature) Lisa Gerdes	DATE 2/16/96	TIME 9:30 AM
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	DATE	TIME
METHOD OF SHIPMENT:	DATE	TIME	LAB COMMENTS:		

Sample Collector:

LEVINE-FRICKE
1920 Main Street, Suite 750
Irvine, California 92714
(714) 955-1390 FAX (714) 955-0683

Analytical Laboratory: Attn: Dave Sarkisian
EcoLabs - West Lake Village
(805)495-2197

Shipping Copy (White) Lab Copy (Green) File Copy (Yellow) Field Copy (Pink) FORM NO. 86/COC/ARF

VSITE
RONMENTAL
LATORIES, INC.

RECEIVED
DEC 19 1996
LEVINE-FRICKE

OELI ID: A61207

November 27, 1996

Levine-Fricke-Recon
8260 E. Raintree Dr., Ste 108
Scottsdale, AZ 85260

Attention: Brad Cross

Project Name/No: *Siemens* NIBW/1583.97
Samples Received: December 11, 1996
Matrix: Aq
Mobile Lab No.: OEL03

Onsite Environmental Laboratories received and analyzed samples on the above date(s). The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data are enclosed.

Due to the high concentrations of TCE found in samples A61207-(06-09) and the time critical analysis of these samples for the pump test, they were analyzed at higher dilutions. The reporting limits for 1,1,1-TCA and PCE were elevated for these samples.

If you have any questions or comments, please do not hesitate to contact us at (602)731-7255.

Sincerely,

Michael E. Barber

Michael E. Barber
Laboratory Director

ADHS License No.: AZM489

ed on recycled paper.

ONSITE Environmental Laboratories, Inc.
Analyti Results

Client Name: Levine-Fricke-Recon
Project Name/No.: Siemens NIBW/1583.97
Samples Received: December 11, 1998

OELI ID No.: A61207
ADHS Cert. No.: AZM489

OELI ID/ SAMPLE NUMBER	CLIENT ID	Matrix	Units	EPA METHOD 601/8010						
				Date Extracted	Date Analyzed	Dil.	1,1,1-TCA	TCE	PCE	Surr. Rec. %
A61207 -01	PG-55-PT-1	Aq	ug/L	NA	12/11/98	1	<1.0	4.7	<1.0	85
A61207 -02	PG-55-PT-2	Aq	ug/L	NA	12/11/98	1	<1.0	2.5	<1.0	82
A61207 -03	PG-55-PT-3	Aq	ug/L	NA	12/11/98	1	<1.0	2.1	<1.0	97
A61207 -04	7EX-4MA-1	Aq	ug/L	NA	12/11/98	1	<1.0	4.8	<1.0	94
A61207 -05	7EX-4MA-2	Aq	ug/L	NA	12/11/98	1	<1.0	170 D	<1.0	99
A61207 -06	7EX-4MA-3	Aq	ug/L	NA	12/11/98	10	<10	430 D	<10	96
A61207 -07	7EX-4MA-4	Aq	ug/L	NA	12/11/98	20	<20	480	<20	78
A61207 -08	7EX-4MA-5	Aq	ug/L	NA	12/11/98	50	<50	600	<50	88
A61207 -09	7EX-4MA-IN-1	Aq	ug/L	NA	12/11/98	200	<200	6400 D	<200	95

Notes:

D *Indicates the compound was analyzed at a greater dilution.*

ONSITE Environmental Laboratories, Inc.
Analytical Quality Control Data

Client Name: Levine-Fricke-Recon
Project Name/No.: Siemens NIBW/1583.97
Samples Received: December 11, 1998

OELI ID No.: A61207
ADHS Cert. No.: AZM489

Reagent Blank Method 601/8010 SL

Units:	ug/L
Matrix:	Aqueous
1,1,1-Trichloroethane	<1.0
Trichlorethane	<1.0
Tetrachloroethene	<1.0
Surrogate Recovery %:	94
Date Extracted:	NA
Date Analyzed:	12/11/98
Samples Linked:	A61207 -(1-7)

ONSITE Environmental Laboratories, Inc.
Analytical Qu Control Data

Client Name: Levine-Fricke-Recon
Project Name/No.: Siemens NIBW/1583.97
Samples Received: December 11, 1998

OELI ID No.: A61207
ADHS Cert. No.: AZM489

MS/MSD Method 601/8010 SL

	1,1,1-TCA	TCE	PCE
Units:	ug/L	ug/L	ug/L
Matrix:	Aqueous	Aqueous	Aqueous
Sample Result:	<1.0	4.8	<1.0
Spike Amount:	20.0	20.0	20.0
Spike Result:	14.9	21.5	16.0
Percent Recovery:	75%	84%	80%
Duplicate Result:	16.4	23.4	17.6
Percent Recovery:	82%	93%	88%
RPD:	10%	8%	10%
Date Extracted:	NA		
Date Analyzed:	12/11/98		
Samples Linked:	A61207 -(1-7)		
Sample Spiked:	A61207 -4		

Exhibit A
Page 152 of 495
Attachment 3

City of Scottsdale Contract No. 1998-006-COS-A2

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

ONSITE ENVIRONMENTAL LABORATORIES, INC. 2121 W. UNIVERSITY SUITE 124 TEMPE, AZ 85281 602-731-7255 602-731-7226 FAX

ONSITE ENVIRONMENTAL LABORATORIES, INC.

Date: 12/11/96
Page: 1 of 1
Laboratory: OEL # 3 BK
Lab Number: A61207

Project Manager: Brad Cross
Client Name: Levine-Fricke-Recon
Address: 8260 E. Raintree Dr. #108
City, State ZIP: Scottsdale, AZ 85260
Phone: 905-9311
Fax: 905-9553

Project Name: Siemens NIBW
Project Number: 1583.97

Bill to: SAME
Company: ↓
Address:
City, State ZIP
Phone:
Fax: ↓

P.O. No.:

Analysis Requested

Sample Identification	Date Sampled	Time Sampled	Matrix	Sampled & Relinquished By:	Time Relinquished	Received By:	Lab ID	TRPH (418.1AZ)	BTEX (8020)	TPH - Gas (8015M)	TPH - Diesel (8015M)	XRF Metals	8260 SL			No. Containers	Remarks
AG55-PT-1	12/10/96	740	H_2O	REF	245	BK	1						X			3	
PG55-PT-2	↓	1830	↓	↓	↓	↓	2						X			3	
B655-PT-3	↓	1910	↓	↓	↓	↓	3						X			3	
7Ex-4MA-1	12/11/98	1455	↓	↓	1430	BK	4						X			2	
7Ex-4MA-2	↓	1545	↓	↓	1550	BK	5						X			2	
7Ex-4MA-3	↓	1635	↓	↓	1640	BK	6						X			2	
7Ex-4MA-4	↓	1725	↓	↓	1730	BK	7						X			2	
7Ex-4MA-5	↓	1830	↓	↓	1835	BK	8						X			2	
7Ex-4MA-In	↓	1835	↓	↓	1841	BK	5						X			2	

Initials:	Printed Name:	Signature:
BK	Blake Kracik	Blake Kracik
REF	Robert Forsberg	Robert Forsberg

Date: 12/11/61
Start Time: 1
Stop Time:
Hours:
Client Sign-off:

Total Containers: 21
Received Intact: Y
Received Cold: Y
Custody Seals: N

VSITE
RONMENTAL
RATORIES, INC.

OELI ID: A61018

November 08, 1996

Levine-Fricke
8260 E. Raintree
Scottsdale, AZ 85260

Attention: Brad Cross

Project Name/No: Siemens NIBW/1583.97
Samples Received: 10/28/96-11/07/96
Matrix: Water
Mobile Lab No.: OEL03

Onsite Environmental Laboratories received and analyzed samples on the above c [illegible] s). The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (602)731-7255.

Sincerely,

Michael E. Barber

Michael E. Barber
Laboratory Director

ADHS License No.: AZM489

on recycled paper.

ONSITE Environmental Laboratories, Inc.
Analytical Results

Client Name:	Levine-Fricke	**OELI ID No.:**	OEL03
Project Name/No.:	Siemens NIBW/1683.97	**ADHS Cert.**	AZM489
Samples Received:	10/28/96-11/07/96		

OELI ID/ SAMPLE NUMBER	CLIENT ID	Matrix	Units	EPA Method 601/8010					
				Date Analyzed	Dil.	1,1,1-TCA	Trichloro ethene	Tetrachloro ethene	Sur. Rec. %
A61018 -01	7EX-4MA@253'	Aq	ug/L	10/29/96	1	<1.0	170 D	<1.0	114
A61018 -02	7EX-4MA-TB	Aq	ug/L	10/29/96	1	<1.0	<1.0	<1.0	100
A61018 -03	7EX-4MA@220'	Aq	ug/L	10/29/96	5	<5.0	13000 D	26	103
A61018 -04	7EX-4MA@370'	Aq	ug/L	10/29/96	1	<1.0	1.2	<1.0	100
A61018 -05	7EX-4MA Dup	Aq	ug/L	10/29/96	1	<1.0	1.5	<1.0	119
A61018 -06	7EX-4MA-Discharge	Aq	ug/L	11/7/96	1	<1.0	34	<1.0	97
A61018 -07	D-7EX-A	Aq	ug/L	11/7/96	1	<1.0	2600 D	16	145
A61018 -08	D-7EX-B	Aq	ug/L	11/7/96	50	<50	2300 D	<50	94

Notes:

D *Indicates the compound was analyzed at a greater dilution.*

Exhibit A
Page **155** of **495**
Attachment 3

ONSITE Environmental Laboratories, Inc.
Analytical Quality Control Data

Client Name: Levine-Fricke
Project Name/No.: Siemens NIBW/1583.97
Samples Received: 10/28/96-11/07/96

OELI ID No.: OEL03
ADHS Cert. No.: AZM489

Reagent Blank EPA 601/8010

Units:	ug/L
Matrix:	Aqueous
1,1,1-Trichloroethane	<1.0
Trichlorethene	<1.0
Tetrachloroethene	<1.0
Surrogate Recovery %:	107
Date Analyzed:	10/29/96
Samples Linked:	A61018 -(1-5)

Units:	ug/L
Matrix:	Aqueous
1,1,1-Trichloroethane	<1.0
Trichlorethene	<1.0
Tetrachloroethene	<1.0
Surrogate Recovery %:	97
Date Analyzed:	11/7/96
Samples Linked:	A61018 -(6-8)

Exhibit A
Page 156 of 495
Attachment 3

City of Scottsdale Contract No. 1998-006-COS-A2

ONSITE Environmental Laboratories, Inc.
Analytical Quality Control Data

Client Name: Levine-Fricke
Project Name/No.: Siemens NIBW/1583.97
Samples Received: 10/28/96-11/07/96

OELI ID No.: OEL03
ADHS Cert. No.: AZM489

MS/MSD EPA 601/8010

	1,1,1-TCA	TCE	PCE
Units:	ug/L	ug/L	ug/L
Matrix:	Aq	Aq	Aq
Sample Result:	<1.0	1.2	<1.0
Spike Amount:	10.0	10.0	10.0
Spike Result:	9.0	11.9	10.2
Percent Recovery:	90%	112%	102%
Duplicate Result:	9.4	12.4	10.8
Percent Recovery:	94%	112%	108%
RPD:	4%	4%	4%
Date Analyzed:	10/29/96		
Samples Linked:	A61018 -(01-08)		
Sample Spiked:	A61018 -4		

ONSITE ENVIRONMENTAL LABORATORIES, INC. 2121 W UNIVERSITY SUITE 124 TEMPE, AZ 85281 602-731-7255 602-731-7228 FAX

ONSITE
ENVIRONMENTAL
LABORATORIES, INC.

[redacted]

Date:	10/28/96
Page:	1 of 1
Laboratory:	OEL03
Lab Number:	A61018

Project Manager:	Brad Gross
Client Name:	Levine - Fricke - Recon
Address:	8260 E. Raintree Dr. #108
City, State ZIP	Scottsdale, AZ 85
Phone:	(602) 905-9311
Fax:	905-9353

Project Name:	Siemens NIBW
Project Number:	1583.97.003

Bill to:	Same
Company:	〃
Address:	〃
City, State ZIP:	↓
Phone:	
Fax:	

P.O. No.:	

Analysis Requested

Sample Identification	Date Sampled	Time Sampled	Matrix	Sampled & Relinquished By:	Time Relinquished:	Received By:	Lab ID	TRPH (418.1AZ)	BTEX (8020)	TPH - Gas (8015M)	TPH - Diesel (8015M)	XRF Metals ___	8010 SL			No. Containers	Remarks
7EX-4MA@253'	10/26/96	1315	water	REF/MPB	0855	MJW	01						X			1	
7EX-4MA-TB	10/26/96	0900	water	REF/MPB			02						X			2	
7EX-4MA@220'	10/26/96	1015	water	REF/MPB			03						X			3	
7EX-4MA@370'	10/27/96	0834	water	MPB			04						X			3	Rush First Call w/ results
7EX-4MA-DUP	10/27/96	0845	water	MPB			05						X			3	

Initials:	Printed Name:	Signature:
MPB	Marshall Brown	
DFW	Donald F Wecker	

Date:	10/28/96
Start Time:	
Stop Time:	
Hours:	
Client Sign-off:	

Total Containers:	12
Received Intact:	Y
Received Cold:	Y
Custody Seals:	Y

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

ONSITE ENVIRONMENTAL LABORATORIES, INC. 2121 W. UNIVERSITY SUITE 124 TEMPE, AZ 85281 602-731-7255 602-731-7228 FAX

ONSITE
ENVIRONMENTAL
LABORATORIES, INC.

Date:	30 10/28/96
Page:	1 of 1
Laboratory:	OEL
Lab Number:	AG1018

Project Manager:	Brad Cross
Client Name:	Lovine Fricke
Address:	8260 E. Raintree, Ste 108
City, State ZIP:	Scottsdale, AZ 85260
Phone:	602-905-5311
Fax:	602-905-5353

Project Name:	Semens NIBW
Project Number:	1583.96 X

Bill to:	SAME
Company:	↓
Address:	
City, State ZIP	
Phone:	
Fax:	

P.O. No.:	

Analysis Requested

Sample Identification	Date Sampled	Time Sampled	Matrix	Sampled & Relinquished By:	Time Relinquished:	Received By:	Lab ID	TRPH (418.1AZ)	BTEX (8020)	TPH - Gas (8015M)	TPH - Diesel (8015M)	XRF Metals	601(TCE, PCE, T			No. Containers	Remarks
7EX-4MA-dischg	10/30/96	15:55	Aq	REF	16:40	DW	6						✓			2	

Initials:	Printed Name:	Signature:
REF	Robert Forsberg	Robert Forsberg
DW	Dwain F. Weber	

Date:	
Start Time:	
Stop Time:	
Hours:	
Client Sign-off:	

Total Containers:	2
Received Intact:	Y
Received Cold:	~~N~~ Y
Custody Seals:	N

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

SITE ENVIRONMENTAL LABORATORIES, INC. 2121 V IVERSITY SUITE 124 TEMPE, AZ 85281 602-731-7255 602-731-7228

ONSITE ENVIRONMENTAL LABORATORIES, INC.

Date:	11/6/96
Page:	1 of 1
Laboratory:	OEL03
Lab Number:	A61018

Project Manager:	Brad Craig
Client Name:	Levine · Fricke · Recon
Address:	8260 E. Raintree Dr. #108
City, State ZIP	Scottsdale, Az 85
Phone:	(602) 905-9311
Fax:	(602) 905-9353

Bill to:	Same
Company:	
Address:	
City, State ZIP	
Phone:	
Fax:	

Project Name:	Siemens NEW
Project Number:	1583.97-009

P.O. No.:	1583.97-009

Analysis Requested

Sample Identification	Date Sampled	Time Sampled	Matrix	Sampled & Relinquished By:	Time Relinquished:	Received By:	Lab ID	TRPH (418.1A2)	BTEX (8020)	TPH - Gas (8015M)	TPH - Diesel (8015M)	XRF Metals	8010 SL			No. Containers	Remarks
D-7BX-A	11/6/96	1238	Water	MPB	1515	[illegible]	7						X			3	
D-7BX-B	11/6/96	1301	Water	MPB	1515	[illegible]	8						X			3	

Initials:	Printed Name:	Signature:
MPB	Marshall Brown	
[illegible]	Michael E Barber	Michael E Barber

Date:	11/6/96
Start Time:	
Stop Time:	
Hours:	
Client Sign-off:	

Total Containers:	6
Received Intact:	Y
Received Cold:	Y
Custody Seals:	J

qualab inc.
3902 E. University Dr. #4 Phoenix AZ 85034 (602) 437-0979 Fax 437-0826 aqualab01@aol.com

Levine Fricke Recon
8260 E. Raintree Dr., Suite 108
Scottsdale, AZ 85254

Received:	11/6/96
Reported:	11/28/96
Lab ID:	611011-02

SAMPLE IDENTIFICATION: D-7EX-B

METHODS AND QUALITY CONTROL:

The results in this report are Arizona Certified and were generated using approved methods referenced by the U.S. EPA and the Arizona Department of Health Services.

RESULTS:

PARAMETER	METHOD	RESULT	UNITS	ADHS No.	ANALYZED
Biochemical Oxygen Demand	405.1	<1	mg/L	AZ0477	11/7/96
Nitrogen, Ammonia	350.2	<0.3	mg/L	AZ0477	11/10/96
Nitrogen, Kjeldahl	351.3	<0.1	mg/L	AZ0477	11/7/96
Nitrogen, Nitrate	353.3	9.8	mg/L	AZ0477	11/7/96
O-Phosphate	365.3	<0.1	mg/L	AZ0477	11/7/96
Turbidity	180.1	29.0	NTU	AZ0477	11/8/96
Conductivity	120.1	1544	us/cm	AZ0477	11/8/96
Calcium	200.7	75	mg/L	AZ0536	11/25/96
Copper	200.7	<0.020	mg/L	AZ0536	11/11/96
Iron	200.7	1.1	mg/L	AZ0536	11/11/96
Magnesium	200.7	47	mg/L	AZ0536	11/25/96
Manganese	200.7	0.260	mg/L	AZ0536	11/11/96
Potassium	200.7	5.9	mg/L	AZ0536	11/25/96
Sodium	200.7	240	mg/L	AZ0536	11/25/96
Zinc	200.7	0.58	mg/L	AZ0536	11/11/96
Alkalinity	2320B	228.	mg/L	AZ0536	11/19/96
Chemical Oxygen Demand	410.4	21.	mg/L	AZ0536	11/25/96
Chloride	SM4500CLB	291	mg/L	AZ0477	11/27/96
pH	150.1	7.63	s.u.	AZ0536	11/8/96
Sulfate	300.0	190	mg/L	AZ0536	11/18/96
Total Dissolved Solids	160.1	750.	mg/L	AZ0536	11/11/96
Suspended Solids	160.2	10.	mg/L	AZ0536	11/11/96
Hardness	200.7	380	mg/L	AZ0536	11/25/96

Vladimir D. Bolin
Laboratory Director

qualab inc.
3 . University Dr. #4 Phoenix AZ 85034 (602) 437-0979 Fax 437-0826 aqualab01@aol.com

Levine Fricke Recon
8260 E. Raintree Dr., Suite 108
Scottsdale, AZ 85254

Received: 11/8/96
Reported: 11/28/96
Lab ID: 611011-03

SAMPLE IDENTIFICATION: D-7EX-C

METHODS AND QUALITY CONTROL:

The results in this report are Arizona Certified and were generated using approved methods referenced by the U.S. EPA and the Arizona Department of Health Services. This analysis was completed by Del Mar Analytical-Irvine (AZ0428).

RESULTS:

PARAMETER	METHOD	RESULT	UNITS	ADHS No.	ANALYZED
Total Organic Carbon	415.2	13	mg/L	AZ0428	11/21/96

Vladimir D. Bolin
Laboratory Director

ualab inc
02 E. University Dr. #4 Phoenix AZ 85034
one 602-437-0979 ~ Fax 602-437-0826

Page 1 of 1

[ ] 710 E. Evans Blvd. Tucson AZ 85713
Phone 520-884-5811 Fax 884-5812

[illegible]

Levine · Fricke · Recon
s 8260 E. Raintree Dr. Suite #108
tate & Zip Scottsdale, Az 85
t Marshall Brown / Ned Overs
(602) 905-9311
(602) 905-9353
umber 1583.97-009

Project Name Siemens NIBW
Project Number 1583.97-009
Fax Results [✓ Y] N
QC Report Y N

PUBLIC WATER SYSTEM INFORMATION
System Name
PWS No.
Report to ADEQ Y N
POE No.
DWR No.
Collection Point
Collector's Name
Location (City)

SAMPLE TYPE CODES
rinking water
waste water
nonitoring well
azardous waste
TB = travel blank
SD = solid
SO = soil
SL = sludge

Compliance Monitoring Y N

TURNAROUND TIME REQUESTED
rd 7/10 day X
rd UST 3 day

Lab Director Approve Rush

[redacted]

ANALYSES REQUESTED

ENT'S SAMPLE ID/LOCATION	Date	Time	Spl Type	No. of Cont.	Metals (attached list)	TOC	Cl⁻, SO₄, NO₃⁻, PO₄⁻	CO₃, HCO₃, OH⁻	Alkalinity	Conductivity	Hardness	pH, NH₃, TKN	TDS, TSS	Turbidity	BOD	COD	Lab No.
7EX-A	11/6	1238	MW	4	Do	Not	Analyze			this		Sample		(hold)			-01
EX-B	11/6	1301	MW	4	X		X	X	Y	Y	X	X	X	X	X	X	-02
EX-C	11/6	1520	MW	1		X	~~X~~										-03

[redacted]

tions/Comments:

SAMPLE RECEIPT		Date	Time	Samples Relinquished By	Samples Received By
ature Blank	cold	11/6	1525		
Containers	9	89	1640		Kimberly A. Barker
y Seals	No	11/6	1650	Kimberly J. Barker	
ntact	NA				

Aqualab's terms are: Net 40 (Payment must be received by the date shown on the invoice or any discount is void).

exce\forms\chain.xls

RECEIVED
FEB - 4 1997
LEVINE-FRICKE

AEN I.D. 701809

January 30, 1997

Levine-Fricke
8230 E. Raintree Dr.
Suite 103
Scottsdale, AZ 85260

Project Name/Number: Siemens NIBW/1583.97-~~007~~ 009

Attention: Ned Overs

On 01/21/97, American Environmental Network (Arizona), Inc., received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

D indicates the compound was analyzed at a greater dilution.

If you have any questions or comments, please do not hesitate to contact us at (602) 496-4400.

Kris Kommalan

Kris Kommalan
Project Manager

KK/jk

Enclosure

ADHS License No. AZ0061
Sherman McCutcheon, General Manager

9830 S. 51st Street, Suite B-113 • Phoenix, AZ 85044 • (602) 496-4400 • Fax (602) 496-4101

American Environmental Network (Arizona), Inc.

ENT : LEVINE FRICKE
JECT # : 1583.97-007
JECT NAME : SIEMENS NIBW
ATI I.D. : 701809

DATE RECEIVED : 01/21/97
REPORT DATE : 01/30/97

#	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
1	GW-I	AQUEOUS	01/21/97
2	GW-E	AQUEOUS	01/21/97
3	TRIP BLANK	AQUEOUS	01/21/97

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	3

ATI STANDARD DISPOSAL PRACTICE

samples from this project will be disposed of in thirty (30) days from the of this report. If an extended storage period is required, please contact sample control department before the scheduled disposal date.

American Environmental Network (Arizona), Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 70180901

ST : VOLATILE HALOCARBON/AROMATIC (EPA 8010/8020)

IENT	: LEVINE FRICKE	DATE SAMPLED	: 01/21/97
JECT #	: 1583.97-007	DATE RECEIVED	: 01/21/97
JECT NAME	: SIEMENS NIBW	DATE EXTRACTED	: N/A
IENT I.D.	: GW-I	DATE ANALYZED	: 01/23/97
PLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 5

POUNDS	RESULTS
ZENE	<2.5
MODICHLOROMETHANE	<2.5
MOFORM	<2.5
MOMETHANE	<10
BON TETRACHLORIDE	<2.5
OROBENZENE	<2.5
OROETHANE	<2.5
OROFORM	3
OROMETHANE	<2.5
ROMOCHLOROMETHANE	<2.5
3-DICHLOROBENZENE	<2.5
CHLOROETHYL VINYL ETHER	<25
4-DICHLOROBENZENE	<2.5
2-DICHLOROBENZENE	<2.5
CHLORODIFLUOROMETHANE	<2.5
1-DICHLOROETHANE	<2.5
2-DICHLOROETHANE	<2.5
1-DICHLOROETHENE	<2.5
S-1,2-DICHLOROETHENE	<2.5
2-DICHLOROPROPANE	<2.5
S-1,3-DICHLOROPROPENE	<2.5
ANS-1,3-DICHLOROPROPENE	<2.5
HYLBENZENE	<2.5
THYLENE CHLORIDE	<10
1,2,2-TETRACHLOROETHANE	<2.5
TRACHLOROETHENE	18
UENE	<2.5
1,1-TRICHLOROETHANE	<2.5
1,2-TRICHLOROETHANE	<2.5
ICHLOROETHENE	650 D
ICHLOROFLUOROMETHANE	<2.5
NYL CHLORIDE	<2.5
TAL XYLENES	<2.5
ICHLOROTRIFLUOROETHANE	<10
ANS-1,2-DICHLOROETHENE	<2.5

SURROGATE PERCENT RECOVERIES

CHLORO-2-FLUOROBENZENE (%) (PID)	91
MOFLUOROBENZENE (%) (HALL)	98

American Environmental Network (Arizona), Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 70180902

T : VOLATILE HALOCARBON/AROMATIC (EPA 8010/8020)

ENT : LEVINE FRICKE
JECT # : 1583.97-007
JECT NAME : SIEMENS NIBW
ENT I.D. : GW-E
PLE MATRIX : AQUEOUS

DATE SAMPLED : 01/21/97
DATE RECEIVED : 01/21/97
DATE EXTRACTED : N/A
DATE ANALYZED : 01/23/97
UNITS : UG/L
DILUTION FACTOR : 1

POUNDS	RESULTS
ZENE	<0.5
MODICHLOROMETHANE	<0.5
MOFORM	<0.5
MOMETHANE	<2.0
BON TETRACHLORIDE	<0.5
OROBENZENE	<0.5
OROETHANE	<0.5
OROFORM	<0.5
OROMETHANE	<0.5
ROMOCHLOROMETHANE	<0.5
-DICHLOROBENZENE	<0.5
HLOROETHYL VINYL ETHER	<5.0
-DICHLOROBENZENE	<0.5
-DICHLOROBENZENE	<0.5
HLORODIFLUOROMETHANE	<0.5
-DICHLOROETHANE	<0.5
-DICHLOROETHANE	<0.5
-DICHLOROETHENE	<0.5
-1,2-DICHLOROETHENE	<0.5
-DICHLOROPROPANE	<0.5
-1,3-DICHLOROPROPENE	<0.5
NS-1,3-DICHLOROPROPENE	<0.5
YLBENZENE	<0.5
HYLENE CHLORIDE	<2.0
,2,2-TETRACHLOROETHANE	<0.5
RACHLOROETHENE	<0.5
UENE	<0.5
,1-TRICHLOROETHANE	<0.5
,2-TRICHLOROETHANE	<0.5
CHLOROETHENE	0.7
CHLOROFLUOROMETHANE	<0.5
YL CHLORIDE	<0.5
AL XYLENES	<0.5
CHLOROTRIFLUOROETHANE	<2.0
NS-1,2-DICHLOROETHENE	<0.5

SURROGATE PERCENT RECOVERIES

HLORO-2-FLUOROBENZENE (%) (PID)	91
MOFLUOROBENZENE (%) (HALL)	93

merican Environmental Network (Arizona), Inc.

GAS CHROMATOGRAPHY - RESULTS

ATI I.D. : 70180903

: VOLATILE HALOCARBON/AROMATIC (EPA 8010/8020)

ENT : LEVINE FRICKE
ECT # : 1583.97-007
ECT NAME : SIEMENS NIBW
ENT I.D. : TRIP BLANK
LE MATRIX : AQUEOUS

DATE SAMPLED : 01/21/97
DATE RECEIVED : 01/21/97
DATE EXTRACTED : N/A
DATE ANALYZED : 01/24/97
UNITS : UG/L
DILUTION FACTOR : 1

OUNDS	RESULTS
ENE	<0.5
ODICHLOROMETHANE	<0.5
OFORM	<0.5
OMETHANE	<2.0
ON TETRACHLORIDE	<0.5
ROBENZENE	<0.5
ROETHANE	<0.5
ROFORM	<0.5
ROMETHANE	<0.5
OMOCHLOROMETHANE	<0.5
-DICHLOROBENZENE	<0.5
L ETHYL VINYL ETHER	<5.0
-DICHLOROBENZENE	<0.5
-DICHLOROBENZENE	<0.5
LORODIFLUOROMETHANE	<0.5
-DICHLOROETHANE	<0.5
-DICHLOROETHANE	<0.5
-DICHLOROETHENE	<0.5
-1,2-DICHLOROETHENE	<0.5
-DICHLOROPROPANE	<0.5
-1,3-DICHLOROPROPENE	<0.5
S-1,3-DICHLOROPROPENE	<0.5
LBENZENE	<0.5
YLENE CHLORIDE	<2.0
.2,2-TETRACHLOROETHANE	<0.5
ACHLOROETHENE	<0.5
ENE	<0.5
.1-TRICHLOROETHANE	<0.5
.2-TRICHLOROETHANE	<0.5
HLOROETHENE	<0.5
HLOROFLUOROMETHANE	<0.5
L CHLORIDE	<0.5
L XYLENES	<0.5
HLOROTRIFLUOROETHANE	<2.0
S-1,2-DICHLOROETHENE	<0.5

— SURROGATE PERCENT RECOVERIES

LORO-2-FLUOROBENZENE (%) (PID)	92
OFLUOROBENZENE (%) (HALL)	101

American Environmental Network (Arizona), Inc.

GAS CHROMATOGRAPHY - RESULTS

REAGENT BLANK

: VOLATILE HALOCARBON/AROMATIC (EPA 8010/8020)

ENT. : LEVINE FRICKE
JECT # : 1583-97-007
JECT NAME : SIEMENS NIBW
ENT I.D. : REAGENT BLANK

ATI I.D. : 701809
DATE EXTRACTED : N/A
DATE ANALYZED : 01/23/97
UNITS : UG/L
DILUTION FACTOR : N/A

OUNDS	RESULTS
ENE	<0.5
ODICHLOROMETHANE	<0.5
OFORM	<0.5
OMETHANE	<2.0
ON TETRACHLORIDE	<0.5
ROBENZENE	<0.5
ROETHANE	<0.5
ROFORM	<0.5
ROMETHANE	<0.5
OMOCHLOROMETHANE	<0.5
-DICHLOROBENZENE	<0.5
LOROETHYL VINYL ETHER	<5.0
-DICHLOROBENZENE	<0.5
-DICHLOROBENZENE	<0.5
LORODIFLUOROMETHANE	<0.5
-DICHLOROETHANE	<0.5
-DICHLOROETHANE	<0.5
-DICHLOROETHENE	<0.5
-1,2-DICHLOROETHENE	<0.5
-DICHLOROPROPANE	<0.5
-1,3-DICHLOROPROPENE	<0.5
S-1,3-DICHLOROPROPENE	<0.5
LBENZENE	<0.5
YLENE CHLORIDE	<2.0
.2,2-TETRACHLOROETHANE	<0.5
ACHLOROETHENE	<0.5
ENE	<0.5
.1-TRICHLOROETHANE	<0.5
.2-TRICHLOROETHANE	<0.5
HLOROETHENE	<0.5
HLOROFLUOROMETHANE	<0.5
L CHLORIDE	<0.5
L XYLENES	<0.5
HLOROTRIFLUOROETHANE	<2.0
S-1,2-DICHLOROETHENE	<0.5

SURROGATE PERCENT RECOVERIES

LORO-2-FLUOROBENZENE (%) (PID)	92
OFLUOROBENZENE (%) (HALL)	99

American Environmental Network (Arizona), Inc.

QUALITY CONTROL DATA

ATI I.D. : 701809

T : VOLATILE HALOCARBON/AROMATIC (EPA 8010/8020)

ENT : LEVINE FRICKE
JECT # : 1583.97-007
JECT NAME : SIEMENS NIBW
I.D. : 70163801

DATE ANALYZED : 01/22/97
SAMPLE MATRIX : AQUEOUS
UNITS : UG/L

POUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
-DICHLOROETHENE	<0.5	20.0	19.5	98	20.0	100	3
CHLOROETHENE	<0.5	20.0	20.7	104	22.6	113	9
RACHLOROETHENE	<0.5	20.0	20.8	104	22.8	114	9
ZENE	<0.5	20.0	19.1	96	19.5	98	2
MODICHLOROMETHANE	<0.5	20.0	16.7	84	18.4	92	10
OROFORM	<0.5	20.0	21.0	105	22.6	113	7
,1-TRICHLOROETHANE	<0.5	20.0	20.6	103	22.6	113	9
JENE	<0.5	20.0	19.4	97	19.9	100	3
OROBENZENE	<0.5	20.0	20.5	103	21.9	110	7
YLENE	<0.5	20.0	19.5	98	20.0	100	3

ecovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

(Relative % Difference) = (Spiked Sample Result - Duplicate Spike Sample Result) / Average of Spiked Sample X 100

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

AEN # 701809

FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

CHAIN-OF-CUSTODY RECORD

№ 009477

Page 1 of 1

Contact Person Marshall Brown
Company Levine · Fricke · Recon
Address 9220 E. Raintree Dr. #103 City Scottsdale State AZ Zip 85260
Phone (602) 905-9311 FAX (602) 905-9353
Collected By: Signature

Project Info:
P.O. # 1503.97-007
Project # 1503.97-007
Project Name Siemens NIBW

Turn Around Time:
☒ Normal
☐ Rush ______ Specify

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum		
				Initial	Final	Receipt
1	GW-I	1/21/97 @ 14:15	8010 & 8020 (BTEX)			
2	GW-E	1/21/97 @ 14:25	"			
3	TRIP BLANK	1/21/97 1430	"			

Relinquished By: (Signature) Date/Time 1/21/97 @ 15:30 Print Name Marshall Brown
Relinquished By: (Signature) Date/Time Received By: (Signature) Date/Time 1/21/97 1530
Relinquished By: (Signature) Date/Time Received By: (Signature) Date/Time

Notes:

Lab Use Only	Shipper Name	Air Bill #	Opened By	Date/Time	Temp (°C)	Condition	Custody Seals Intact?	Work Order #
							Yes No None N/A	

Form 1293 rev. 08

Appendix D

APPENDIX D

TIME DRAWDOWN AND RECOVERY DATA

DRAWDOWN

Time from Pump Start (min)	Drawdown from Static W.L. (feet)	Transducer Reading (feet)	Discharge Rate (gpm)	Remarks
0.00	0.00	36.82	172.3	
0.25	28.69	8.12	172.3	
0.50	31.84	4.98	172.0	
0.75	32.42	4.40	172.3	
1.00	33.20	3.62	172.3	
1.25	32.94	3.88	172.3	
1.50	33.20	3.62	172.3	
1.75	32.72	4.09	172.3	
2.00	34.13	2.69	172.3	
2.50	33.59	3.23	172.3	
3.00	33.83	2.99	172.3	
3.50	54.14	-17.32	172.3	
4.00	14.49	22.33	172.3	
4.50	14.62	22.20	172.3	
5.00	14.79	22.02	172.3	
6.00	15.20	21.61	172.3	
7.00	15.51	21.31	172.3	
8.00	15.86	20.96	172.3	
9.00	16.07	20.75	172.3	
10.00	16.31	20.51	172.3	
11.00	16.91	19.90	172.3	
12.00	17.11	19.71	172.3	
13.00	17.29	19.53	172.3	
14.00	17.46	19.36	172.3	
15.00	17.76	19.06	172.3	
16.00	17.98	18.84	172.3	
20.00	18.19	18.62	172.3	
25.00	18.67	18.15	172.3	
30.00	19.06	17.76	172.3	
35.00	19.40	17.41	172.3	
40.00	19.69	17.13	172.3	
45.00	19.92	16.89	172.3	
50.00	20.18	16.65	172.3	
55.00	20.36	16.46	172.3	
60.00	20.56	16.26	172.3	
70.00	20.92	15.90	172.3	
80.00	21.18	15.64	172.3	
90.00	21.42	15.40	172.3	
100.00	21.57	15.25	172.3	
125.00	21.98	14.84	172.3	
150.00	22.37	14.45	172.3	
175.00	22.67	14.14	172.3	
200.00	22.98	13.84	172.3	
225.00	23.19	13.62	172.3	
250.00	23.41	13.41	172.3	
275.00	23.65	13.17	172.3	
300.00	23.92	12.90	172.3	
350.00	24.08	12.73	172.3	
400.00	24.36	12.45	172.3	
450.00	24.52	12.30	172.3	
500.00	24.67	12.15	172.3	
550.00	24.84	11.98	172.3	
600.00	25.06	11.76	172.3	
702.22	25.20	11.62	172.3	
801.20	25.47	11.35	172.3	
901.20	25.77	11.05	172.3	
1003.46	25.95	10.87	172.3	
1049.83	10.27	26.55	172.3	

RECOVERY

T[illegible]om Start of Test (T) (min)	Time from Pump Stop (T') (min)	T/T' (min)	Recovery from Pump Stop (feet)	Transducer Reading (feet)	Remarks
1050.33	0.25	4149.55	10.11	26.70	
1050.58	0.50	2085.82	10.05	26.77	
1050.83	0.75	1395.90	9.99	26.83	
1051.08	1.00	1047.58	9.92	26.90	
1051.33	1.25	839.40	9.85	26.96	
1051.58	1.50	699.64	9.81	27.01	
1051.83	1.75	599.61	9.72	27.09	
1052.08	2.00	525.33	9.68	27.14	
1052.58	2.50	420.63	9.55	27.27	
1053.08	3.00	350.62	9.48	27.35	
1053.58	3.50	300.75	9.36	27.46	
1054.08	4.00	263.33	9.25	27.57	
1054.58	4.50	234.22	9.16	27.66	
1055.08	5.00	210.85	9.07	27.74	
1056.08	6.00	175.92	8.90	27.92	
1057.08	7.00	150.99	8.77	28.05	
1058.08	8.00	132.21	8.62	28.20	
1059.08	9.00	117.64	8.49	28.33	
1060.08	10.00	105.87	8.36	28.46	
1062.08	12.00	88.48	8.14	28.67	
1064.08	14.00	75.99	7.93	28.89	
1066.08	16.00	66.62	7.73	29.08	
1068.08	18.00	59.33	7.56	29.26	
1070.08	20.00	53.50	7.43	29.39	
1072.08	22.00	48.72	7.28	29.54	
1074.08	24.00	44.75	7.13	29.69	
1076.08	26.00	41.38	7.04	29.78	
1078.08	28.00	38.50	6.89	29.93	
1080.08	30.00	36.00	6.78	30.04	
1085.08	35.00	31.00	6.54	30.28	
1090.08	40.00	27.25	6.30	30.51	
1095.08	45.00	24.33	6.13	30.69	
1100.08	50.00	22.00	5.93	30.88	
1105.08	55.00	20.09	5.72	31.10	
1110.08	60.00	18.50	5.48	31.34	
1120.08	70.00	16.00	5.13	31.69	
1130.08	80.00	14.13	4.92	31.90	
1140.12	90.04	12.66	4.70	32.12	
1150.12	100.04	11.50	4.51	32.31	
1169.12	119.04	9.82	4.20	32.61	
1189.12	139.04	8.55	3.94	32.87	
1199.12	149.04	8.05	3.81	33.00	
1249.12	199.04	6.28	3.34	33.48	
1299.12	249.04	5.22	2.97	33.85	
1349.12	299.04	4.51	2.71	34.11	
1399.12	349.04	4.01	2.47	34.35	
1449.12	399.04	3.63	2.27	34.54	
1499.12	449.04	3.34	2.10	34.72	
1549.12	499.04	3.10	1.97	34.85	
1649.12	599.04	2.75	1.76	35.06	
1752.02	701.94	2.50	1.56	35.26	
1852.02	801.94	2.31	1.41	35.41	
1952.02	901.94	2.18	1.30	35.52	
2052.02	1001.94	2.05	1.21	35.60	
2152.02	1101.94	1.95	1.13	35.69	
2242.30	1192.22	1.88	1.06	35.76	

DRAWDOWN

Time from Pump Start (min)	Drawdown from Static WL (feet)	Transducer Reading (feet)	Discharge Rate (gpm)	Remarks
0.00	0.00	79.63	50	
1.00	7.08	72.61	50	
2.00	8.48	71.11	50	
3.00	9.02	70.58	50	
4.00	9.46	70.13	50	
5.00	9.85	69.73	50	
6.00	10.11	69.48	50	
7.00	10.29	69.30	50	
8.00	10.50	69.08	50	
9.00	10.55	69.04	50	
10.00	10.83	68.76	50	
12.00	11.08	68.51	50	
14.00	11.26	68.33	50	
16.00	11.48	68.11	50	
18.00	11.62	67.97	50	
20.00	11.77	67.82	50	
22.00	11.91	67.68	50	
24.00	11.99	67.60	50	
26.00	12.06	67.53	50	
28.00	12.19	67.42	50	
30.00	12.24	67.35	50	
35.00	12.42	67.17	50	
40.00	12.53	67.06	50	
45.00	12.71	66.88	50	
50.00	12.78	66.81	50	
55.00	12.92	66.67	50	
60.00	12.96	66.63	50	
65.00	13.07	66.52	50	
70.00	13.10	66.49	50	
74.00	13.46	66.12	50	
75.00	13.54	66.05	70	
76.00	16.03	63.56	70	
77.00	16.29	63.30	70	
78.00	16.57	63.02	70	
79.00	16.64	62.95	70	
80.00	16.75	62.84	70	
81.00	16.86	62.73	70	
82.00	16.96	62.62	70	
83.00	17.00	62.59	70	
84.00	17.04	62.55	70	
86.00	17.15	62.44	70	
88.00	17.22	62.37	70	
90.00	17.29	62.30	70	
92.00	17.36	62.23	70	
94.00	17.43	62.16	70	
96.00	17.58	62.01	70	
98.00	17.54	62.05	70	
100.00	17.58	62.01	70	
105.00	17.72	61.87	70	
110.00	17.83	61.76	70	
115.00	17.94	61.65	70	
120.00	17.98	61.61	70	
125.00	18.09	61.50	70	
130.00	18.16	61.43	70	
140.57	18.23	61.36	70	
150.57	18.34	61.25	70	
160.57	18.48	61.11	70	
170.57	18.55	61.04	70	
180.57	18.63	60.96	70	
190.57	18.70	60.89	70	
200.57	18.77	60.82	70	
210.57	18.81	60.78	70	
220.43	18.91	60.67	70	
224.43	18.91	60.67	70	

RECOVERY

Time from Start of Test (min:sec)	Tim[illegible] Start of Test (T) (sec)	Time from Pump Stop (T') (min:sec)	T (sec)	T/T' (sec)	T/T' (min)	Recovery from Pump Stop (feet)	Transducer Reading (feet)	Remarks
224:37	13477	00:01	1	13477.00	224.62	17.85	61.74	
224:39	13479	00:03	3	4493.00	74.89	16.21	63.38	
224:40	13480	00:04	4	3370.00	56.17	15.85	63.74	
224:41	13481	00:05	5	2696.20	44.94	15.45	64.14	
224:42	13482	00:06	6	2247.00	37.45	14.80	64.79	
224:43	13483	00:07	7	1926.14	32.10	14.55	65.04	
224:44	13484	00:08	8	1685.50	28.09	14.19	65.40	
224:45	13485	00:09	9	1498.33	24.97	13.86	65.73	
224:46	13486	00:10	10	1348.60	22.48	13.61	65.98	
224:51	13491	00:15	15	899.40	14.99	12.63	66.96	
224:56	13496	00:20	20	674.80	11.25	11.88	67.71	
225:01	13501	00:25	25	540.04	9.00	11.28	68.30	
225:06	13506	00:30	30	450.20	7.50	10.88	68.72	
225:11	13511	00:35	35	386.03	6.43	10.47	69.12	
225:17	13517	00:41	41	329.68	5.49	10.14	69.44	
225:26	13526	00:50	50	270.52	4.51	9.71	69.88	
225:36	13536	01:00	60	225.60	3.76	9.28	70.31	
225:46	13546	01:10	70	193.51	3.23	8.99	70.60	
225:56	13556	01:20	80	169.45	2.82	8.70	70.89	
226:06	13566	01:30	90	150.73	2.51	8.45	71.14	
226:17	13577	01:41	101	134.43	2.24	8.23	71.36	
226:26	13586	01:50	110	123.51	2.06	8.05	71.54	
226:36	13596	02:00	120	113.30	1.89	7.87	71.72	
227:06	13626	02:30	150	90.84	1.51	7.44	72.15	
227:36	13656	03:00	180	75.87	1.26	7.08	72.51	
228:06	13686	03:30	210	65.17	1.09	6.75	72.84	
228:36	13716	04:00	240	57.15	0.95	6.50	73.09	
229:06	13746	04:30	270	50.91	0.85	6.28	73.31	
229:36	13776	05:00	300	45.92	0.77	6.06	73.52	
230:06	13806	05:30	330	41.84	0.70	5.89	73.70	
230:36	13836	06:00	360	38.43	0.64	5.70	73.89	
231:06	13866	06:30	390	35.55	0.59	5.56	74.03	
231:36	13896	07:00	420	33.09	0.55	5.41	74.17	
232:36	13956	08:00	480	29.08	0.48	5.16	74.43	
233:36	14016	09:00	540	25.96	0.43	4.95	74.64	
234:36	14076	10:00	600	23.46	0.39	4.77	74.82	
235:36	14136	11:00	660	21.42	0.36	4.55	75.04	
236:36	14196	12:00	720	19.72	0.33	4.40	75.18	
237:36	14256	13:00	780	18.28	0.30	4.28	75.30	
238:36	14316	14:00	840	17.04	0.28	4.12	75.47	
239:36	14376	15:00	900	15.97	0.27	4.01	75.58	
244:36	14676	20:00	1200	12.23	0.20	3.47	76.12	
249:36	14976	25:00	1500	9.98	0.17	3.10	76.49	
254:36	15276	30:00	1800	8.49	0.14	2.82	76.77	
264:36	15876	40:00	2400	6.62	0.11	2.35	77.24	
274:36	16476	50:00	3000	5.49	0.09	2.02	77.57	
299:36	17976	75:00	4500	3.99	0.07	1.52	78.07	
324:36	19476	100:00	6000	3.25	0.05	1.23	78.36	
349:41	20981	125:05	7505	2.80	0.05	1.05	78.54	
374:41	22481	150:05	9005	2.50	0.04	0.87	78.72	
425:11	25511	200:35	12035	2.12	0.04	0.69	78.90	
475:11	28511	250:35	15035	1.90	0.03	0.58	79.01	
525:11	31511	300:35	18035	1.75	0.03	0.51	79.08	
575:11	34511	350:35	21035	1.64	0.03	0.43	79.16	
625:11	37511	400:35	24035	1.56	0.03	0.36	79.23	
725:11	43511	500:35	30035	1.45	0.02	0.29	79.30	
825:11	49511	600:35	36035	1.37	0.02	0.26	79.33	
925:11	55511	700:35	42035	1.32	0.02	0.22	79.37	
1025:11	61511	800:35	48035	1.28	0.02	0.22	79.37	
1055:11	63311	830:35	49835	1.27	0.02	0.18	79.41	

Appendix E

APPENDIX E

LETTER REPORT TO EPA, DATED MARCH 4, 1997

Levine·Fricke·Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

March 4, 1997

Emily Roth
U.S. Environmental Protection Agency
Mail Code H-7-2
75 Hawthorne Street
San Francisco, California 94105

Subject: Area 7 MAU Aquifer Testing

Dear Emily:

Attached please find our report on the results of aquifer testing at two proposed MAU groundwater extraction wells in the vicinity of Area 7 of the North Indian Bend Wash Superfund site. The purpose of the testing was to obtain data regarding aquifer properties in the Middle Alluvial Unit (MAU) in the area of the proposed extraction wells necessary for the design of the proposed MAU groundwater extraction and treatment system at Area 7. If you have any questions or comments, please call me at (602)905-9311.

Sincerely;

Bradley D. Cross, R.G.
Senior Associate Hydrogeologist
Scottsdale Operations Manager

cc: John Wyss, Siemens Components, Inc.
Mike Vandenbergh, Latham & Watkins
Winifred Au, CH2M Hill
Tim Graves, CH2M Hill
Ed Pond, ADEQ
Phil Whitmore, ADEQ

8230 East Raintree Drive, Suite 103, Scottsdale, Arizona 85260-2516 • (602) 905-9311 fax (602) 905-9353

~~1583.97-9~~

Offices Worldwide

Levine·Fricke·Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

RESULTS OF MIDDLE ALLUVIAL UNIT AQUIFER TESTING AT THE PROPOSED GROUNDWATER EXTRACTION WELLS 7EX-3MA & 7EX-4MA LOCATED NEAR NORTH INDIAN BEND WASH AREA 7

1.0 INTRODUCTION

On behalf of Siemens Components, Inc. (Siemens), Levine·Fricke·Recon (LFR) is designing a groundwater extraction and treatment system to address the presence of volatile organic compounds (VOCs) at elevated concentrations in the Middle Alluvial Unit (MAU) near Area 7 of the North Indian Bend Wash (NIBW) Superfund site. A conceptual work plan, dated September 22, 1995, was submitted to the U.S. Environmental Protection Agency for review and comment. That work plan described the procedures to implement an effective source-area extraction program in three phases.

The first phase included installation and testing of a single extraction well to a depth of approximately 350 feet below ground surface (bgs), the anticipated vertical extent of VOC concentrations of concern for source area remediation. Based on that work, treatment and end-use alternatives for extracted groundwater would be evaluated. The second and third phases address the design, installation, and start-up of the proposed groundwater extraction and treatment (GWET) system, and the monitoring and evaluation of the system's effectiveness.

traction well 7EX-3MA was installed in January 1996 in the parking lot adjacent to the southern boundary of Area 7. Depth-specific soil and groundwater samples collected during drilling, using the SimulProbe™ sampling technique, confirmed that significant reductions in VOC concentrations occur vertically between 300 and 350 feet bgs. The base of the screen interval was therefore set at 350 feet bgs to avoid creating vertical conduits to cleaner zones below.

Following initial testing at 7EX-3MA, a more detailed work plan for MAU groundwater extraction and treatment was prepared and submitted to EPA on March 8, 1996. That work plan summarized the results of an aquifer test during which 7EX-3MA was pumped for approximately 20 hours. The report also proposed a response action based on an evaluation of groundwater treatment and end-use alternatives. Subsequent to the submittal of that work plan, it was determined that a second extraction well would be beneficial to the source-area extraction program.

In October 1996, extraction well 7EX-4MA was installed approximately 1500 feet south of Area 7, near monitoring well W-2MA. While installing 7EX-4MA, VOCs concentrations detected in depth-specific soil and groundwater samples reduced significantly beneath 250 feet bgs. As such, the base of the screen interval was set at 300 feet bgs. Following installation, a second aquifer test was conducted using 7EX-4 as the pumping well. An assessment of MAU aquifer properties in the general vicinity of Area 7 was then made by integrating data from both aquifer tests. This report summarizes the esults of that assessment. Those results will then be incorporated into the design of the rea 7 GWET system.

2.0 OBJECTIVE

The objective of aquifer testing at 7EX-3MA and 7EX-4MA was to characterize aquifer properties within the upper portion of the MAU. That information will then be used in the design of a GWET system at NIBW Area 7 to estimate optimum extraction rates and analyze anticipated hydraulic capture associated with those extraction rates.

3.0 GENERAL METHODOLOGY

Aquifer tests were conducted following installation of extraction wells 7EX-3MA and 7EX-4MA. Both aquifer tests were conducted using several neighboring monitoring wells as observation wells. General information regarding the design and configuration of the various pumping and observation wells is shown on Figure 1. During testing, discharge from 7EX-3MA was conveyed to temporary above ground storage tanks and then to the Area 7 UAU groundwater treatment facility for treatment before disposal in the municipal sanitary sewer. Discharge from 7EX-4MA was conveyed to a portable carbon vessel for treatment and discharge to the sanitary sewer. Effluent from the carbon vessel was sampled and analyzed by an on site laboratory to verify that discharges to the sanitary sewer were within permitted levels for the VOCs of concern.

During each aquifer test, electronic data loggers were used in the pumping well and observation wells to obtain detailed drawdown data. In-line flow meters and totalizers were used to monitor extraction rates. Samples of extracted groundwater were periodically collected and analyzed using an on-site laboratory to monitor water quality.

The aquifer test at 7EX-3MA was preceded by a short-term step drawdown test to assess well efficiency and yield. After a sufficient recovery period, a 20-hour aquifer test was conducted at an extraction rate of approximately 175 gallons per minute (gpm). At 7EX-4MA, the initial step test commenced at a pumping rate of 50 gpm. After approximately one hour, the pumping rate was increased to approximately 70 gpm. During that second step, effluent samples from the portable carbon vessel indicated that breakthrough may be occurring sooner than anticipated. As such, the 70 gpm pumping rate was maintained for the remainder of the test. The test was terminated after approximately four hours when effluent concentrations approached the limit for disposal to the sanitary sewer.

4.0 LABORATORY ANALYSES OF EXTRACTED GROUNDWATER

Table 1 shows the results of analytical testing of extraction well effluent water during the aquifer tests. The average effluent concentration for 7EX-3MA and 7EX-4MA was 6.59 mg/l, and 6.4 mg/l, respectively.

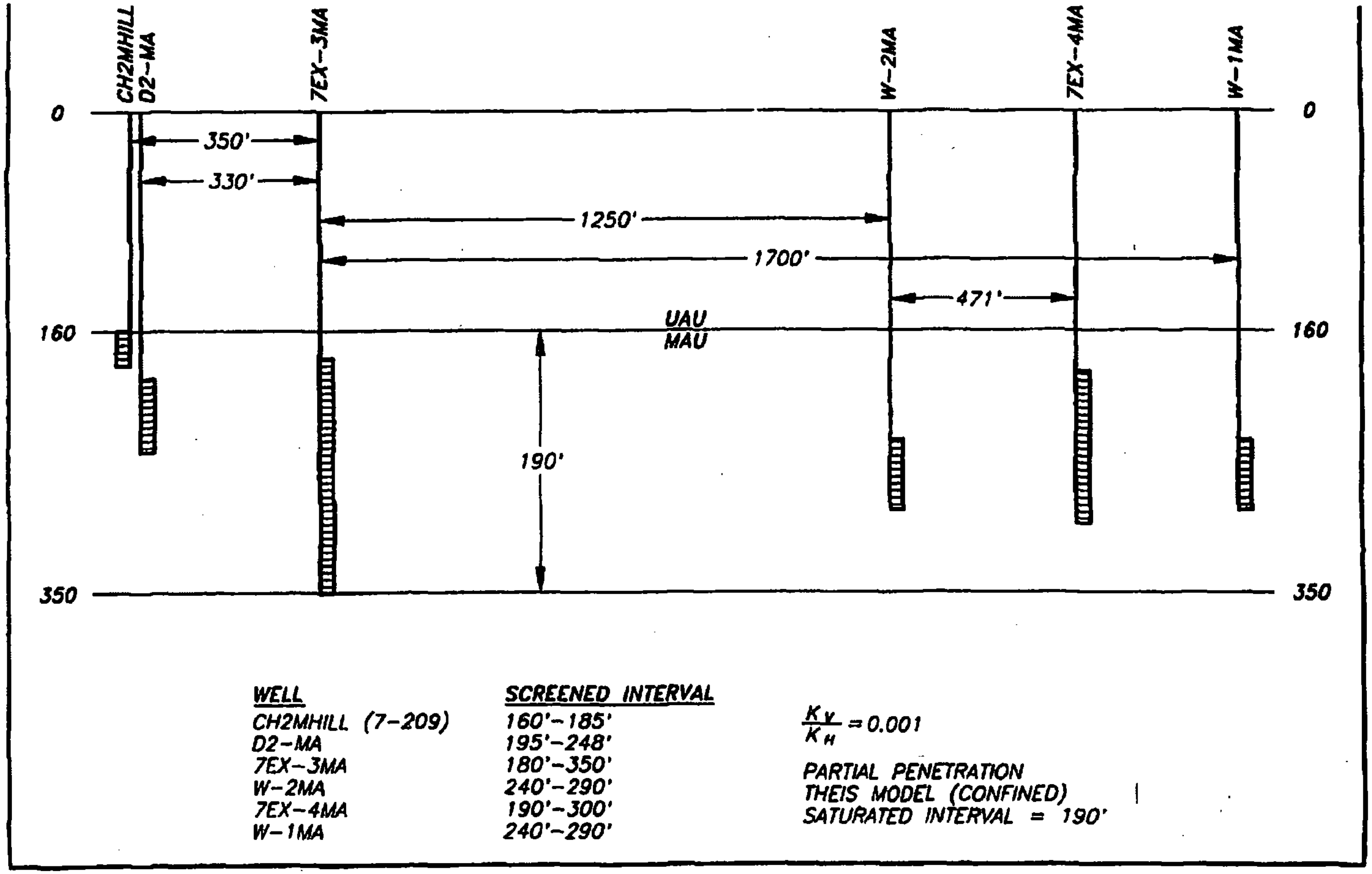
5.0 ANALYSIS OF AQUIFER TEST DATA

Data collected from the data loggers were downloaded to a portable computer and formatted to spreadsheet tables which are included in the diskettes attached to this report. The data was analyzed using the AQTESOLV™ aquifer test solver program (version 2.01) developed by Geraghty & Miller, Inc. Figure 1 shows the conceptual model used to evaluate the data from both extraction wells. For the purpose of this analysis, the aquifer was assumed to be 190-feet thick and confined with an anisotropy factor (Kv/Kh) of 0.001. Partial penetration effects were also considered.

Figures 2 through 10 show the results of our analyses using the AQTESOLV™ program for each pumping and observation well. Estimated values for transmissivity ranged from 0.81 ft^2/m (8700 gpd/ft) to 1.67 ft^2/m (18000 gpd/ft). Estimated values for storativity ranged from 0.0001 to 0.003 (excluding results based on the pumping well as the observation well).

6.0 CONCLUSIONS

Based on the conceptual model for the general vicinity of Area 7, and the various assumptions presented, the estimated transmissivity of the MAU within the depth interval from 160 to 350 feet bgs is approximately 10,000 to 15,000 gpd/ft. The estimated storativity within that same interval is approximately 0.0003. These estimates will be used as the basis for developing optimum long-term pumping rates and to assess anticipated hydraulic capture associated with extraction at wells 7EX-3MA and 7EX-4MA. The Area 7 MAU GWET system design report will summarize the results of those analyses.



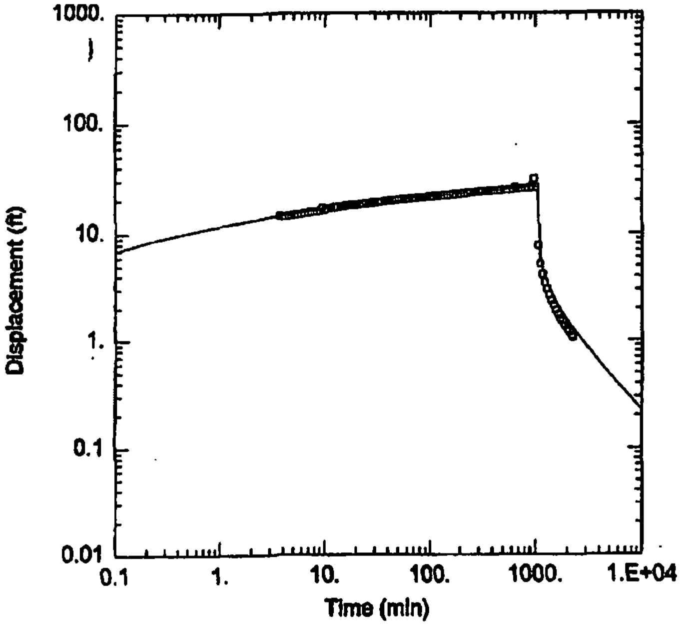
WELL	SCREENED INTERVAL
CH2MHILL (7-209)	160'-185'
D2-MA	195'-248'
7EX-3MA	180'-350'
W-2MA	240'-290'
7EX-4MA	190'-300'
W-1MA	240'-290'

$\frac{K_V}{K_H} = 0.001$

PARTIAL PENETRATION
THEIS MODEL (CONFINED)
SATURATED INTERVAL = 190'

FIGURE 1 - CONCEPTUAL MODEL MAU-AQUIFER TEST

Levine·Fricke·Recon
Project No. 1583.97-009



MAU AQUIFER TEST (AREA 7)

Data Set: A:\7EX3MA.AQT
Date: 02/13/97 Time: 14:44:44

PROJECT INFORMATION

Company: LFR
Client: Siemens-NIBW
Project: 1583.96-9
Test Location: Scottsdale, AZ
Test Well: 7EX-3MA
Test Date: 01/11/96

SOLUTION

Aquifer Model: Confined
Solution Method: Theis
T = 0.9665 ft^2/min
S = 0.03316

AQUIFER DATA

Saturated Thickness: 190. ft

Anisotropy Ratio (Kz/Kr): 0.001

WELL DATA

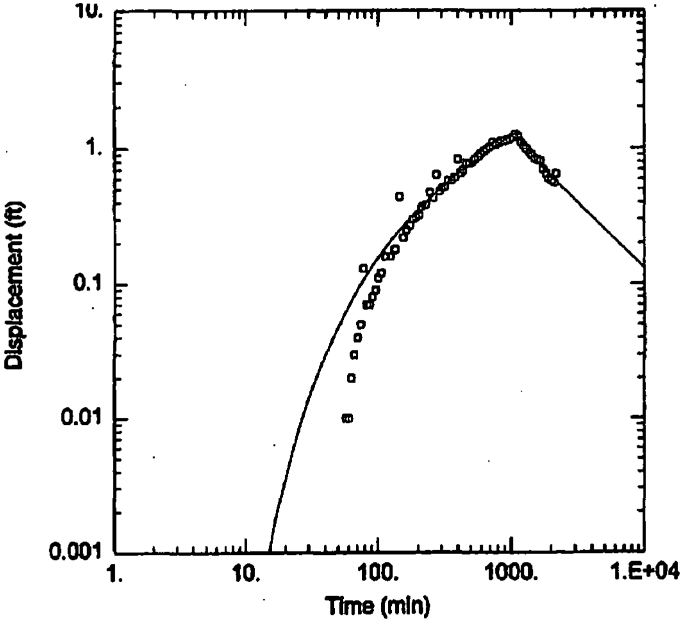
Pumping Wells

Well Name	X (ft)	Y (ft)
7EX-3MA	0.25	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ 7EX-3MA	0.25	0

FIGURE 2



MAU AQUIFER TEST (AREA 7)

Data Set: A:\CH2MHILL.AQT
Date: 02/13/97 Time: 14:40:06

PROJECT INFORMATION

Company: LFR
Client: Siemens-NIBW
Project: 1583.96-9
Test Location: Scottsdale, AZ
Test Well: 7EX-3MA
Test Date: 01/11/96

SOLUTION

Aquifer Model: Confined
Solution Method: Theis
T = 1.45 ft^2/min
S = 0.0029

AQUIFER DATA

Saturated Thickness: 190. ft

Anisotropy Ratio (Kz/Kr): 0.001

WELL DATA

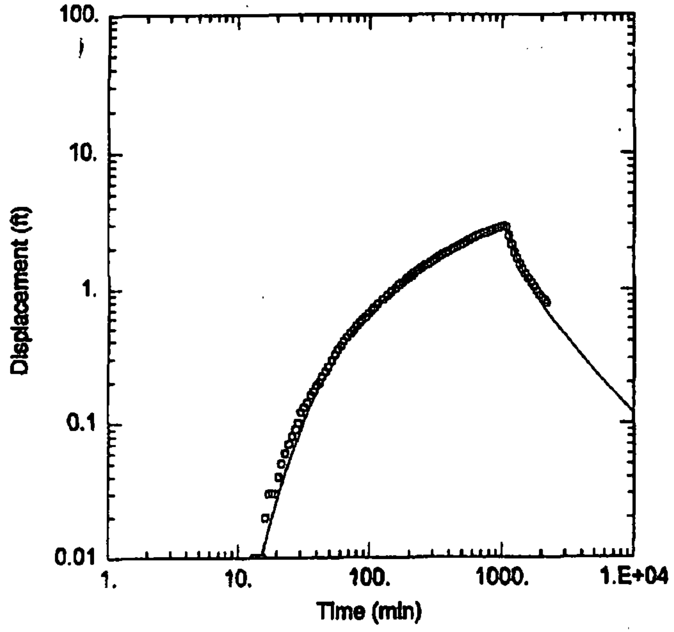
Pumping Wells

Well Name	X (ft)	Y (ft)
7EX-3MA	0.25	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ CH2MHILL	350	0

FIGURE 3



MAU AQUIFER TEST (AREA 7)

Data Set: A:\D2MA.AQT
Date: 02/13/97 Time: 14:37:12

PROJECT INFORMATION

Company: LFR
Client: Siemens-NIBW
Project: 1583.96-9
Test Location: Scottsdale, AZ
Test Well: 7EX-3MA
Test Date: 01/11/96

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

$T = 1.671\ \text{ft}^2/\text{min}$
$S = 0.003168$

AQUIFER DATA

Saturated Thickness: 190. ft

Anisotropy Ratio (Kz/Kr): 0.001

WELL DATA

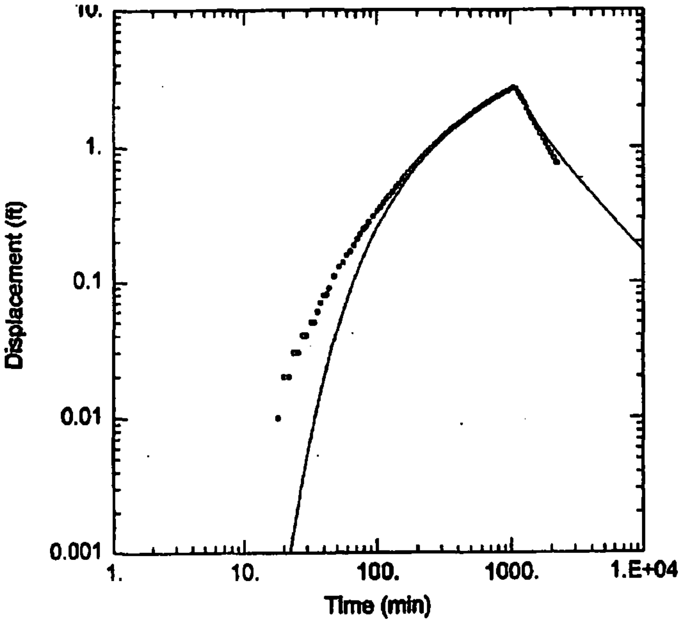
Pumping Wells

Well Name	X (ft)	Y (ft)
7EX-3MA	0.25	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ D2MA	330	0

FIGURE 4



MAU AQUIFER TEST (AREA 7)

Data Set: A:\W1MA.AQT
Date: 02/13/97 Time: 15:35:46

PROJECT INFORMATION

Company: LFR
Client: Siemens-NIBW
Project: 1583.96-9
Test Location: Scottsdale, AZ
Test Well: 7EX-3MA
Test Date: 01/11/96

SOLUTION

Aquifer Model: Confined
Solution Method: Theis
$T = 1.185\ ft^2/min$
$S = 0.000205$

AQUIFER DATA

Saturated Thickness: 190. ft

Anisotropy Ratio (Kz/Kr): 0.001

WELL DATA

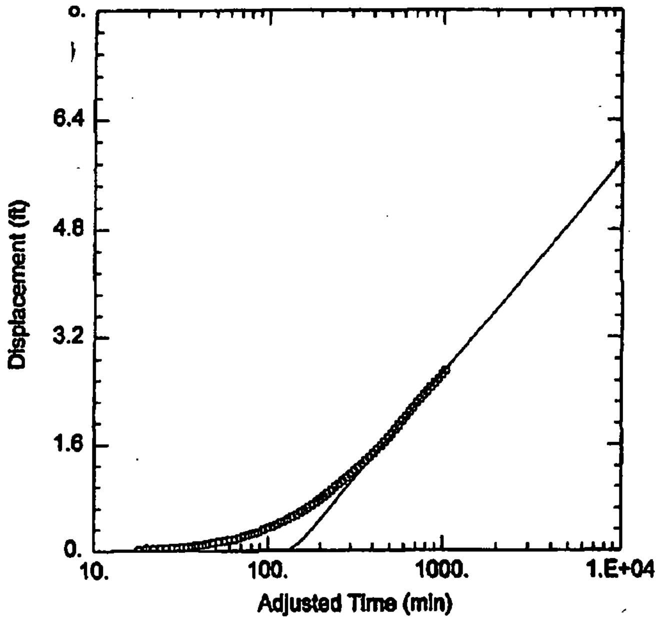
Pumping Wells

Well Name	X (ft)	Y (ft)
7EX-3MA	0.25	0

Observation Wells

Well Name	X (ft)	Y (ft)
• W1-MA	1700	0

FIGURE 5



MAU AQUIFER TEST (AREA 7)

Data Set: A:\W2MA.AQT
Date: 02/12/97 Time: 12:42:43

PROJECT INFORMATION

Company: LFR
Client: Siemens-NIBW
Project: 1583.86-9
Test Location: Scottsdale, AZ
Test Well: 7EX-3MA
Test Date: 01/11/96

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob
T = 1.342 ft^2/min
S = 0.0001476

AQUIFER DATA

Saturated Thickness: 190. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

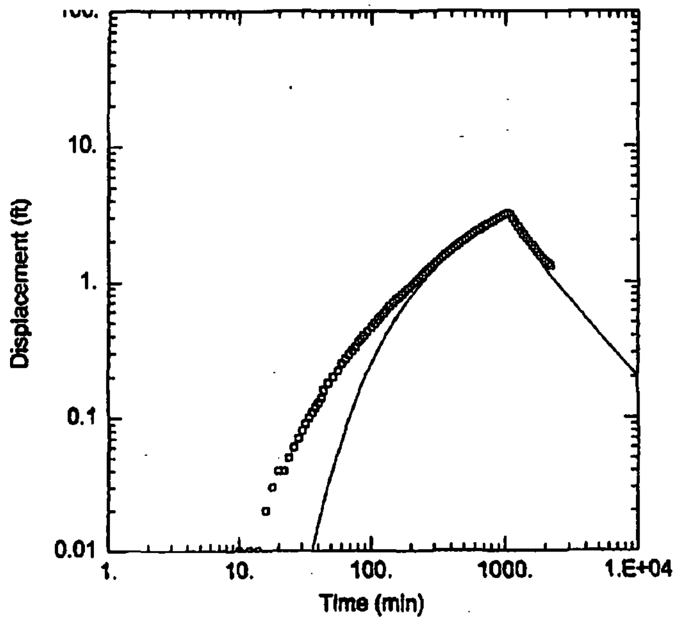
Pumping Wells

Well Name	X (ft)	Y (ft)
7EX-3MA	0.25	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ W1-MA	1700	0

FIGURE 6



MAU AQUIFER TEST (AREA 7)

Data Set: A:\W2MA.AQT
Date: 02/13/97 Time: 16:05:47

PROJECT INFORMATION

Company: LFR
Client: Siemens-NIBW
Project: 1583.96-9
Test Location: Scottsdale, AZ
Test Well: 7EX-3MA
Test Date: 01/11/96

SOLUTION

Aquifer Model: Confined
Solution Method: Theis
T = 1.014 ft^2/min
S = 0.000353

AQUIFER DATA

Saturated Thickness: 190. ft

Anisotropy Ratio (Kz/Kr): 0.001

WELL DATA

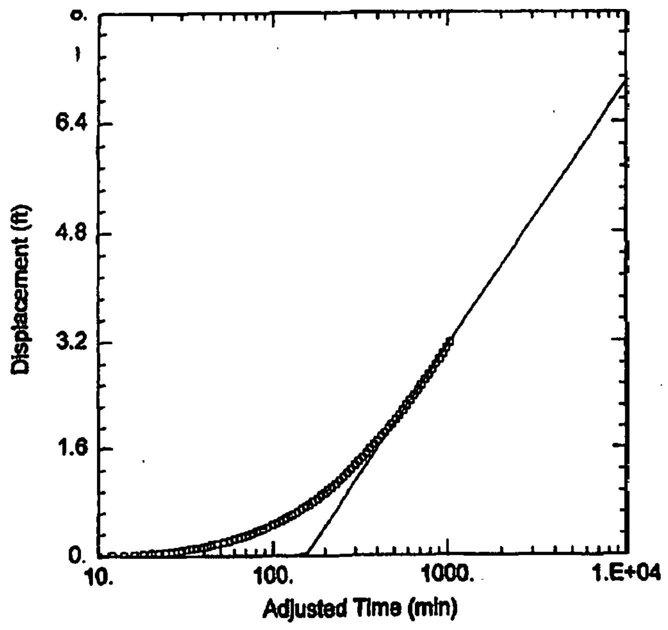
Pumping Wells

Well Name	X (ft)	Y (ft)
7EX-3MA	0.25	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ W2-MA	1250	0

FIGURE 7



MAU AQUIFER TEST (AREA 7)

Data Set: A:\7EX3MA.AQT
Date: 02/12/97 Time: 12:31:56

PROJECT INFORMATION

Company: LFR
Client: Siemens-NIBW
Project: 1583.98-9
Test Location: Scottsdale, AZ
Test Well: 7EX-3MA
Test Date: 01/11/98

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Jacob
T = 1.093 ft^2/min
S = 0.000243

AQUIFER DATA

Saturated Thickness: 190. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

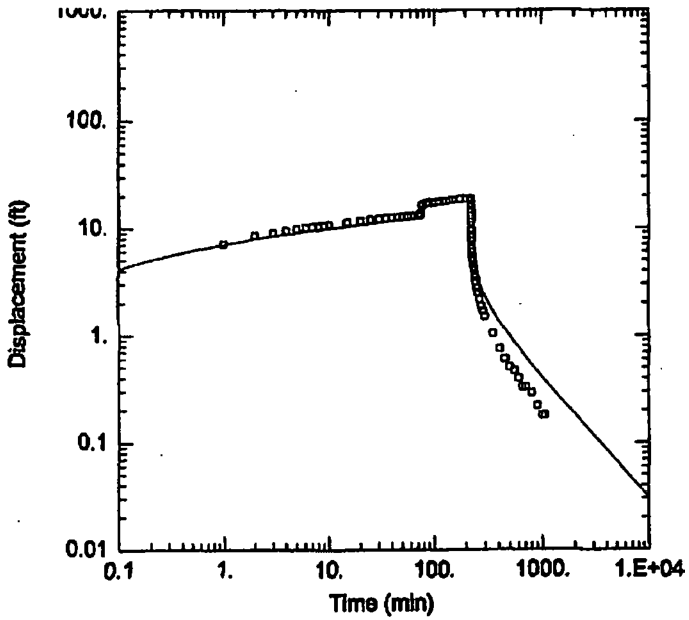
Pumping Wells

Well Name	X (ft)	Y (ft)
7EX-3MA	0.25	0

Observation Wells

Well Name	X (ft)	Y (ft)
○ W2-MA	1250	0

FIGURE 8



7EX4MAU PUMPTEST

Data Set: C:\MAUPTEST\3RD\7EX4MA\7EX4MA.AQT
Date: 02/13/97 Time: 16:22:53

PROJECT INFORMATION

Company: LFR
Client: SIEMENS-NIBW
Project: 1583.97-001
Test Location: Scottsdale, AZ
Test Well: 7EX4MAU
Test Date: Dec. 11, 1996

SOLUTION

Aquifer Model: Confined
Solution Method: Theis
T = 0.8053 ft^2/min
S = 0.02652

AQUIFER DATA

Saturated Thickness: 190. ft

Anisotropy Ratio (Kz/Kr): 0.001

WELL DATA

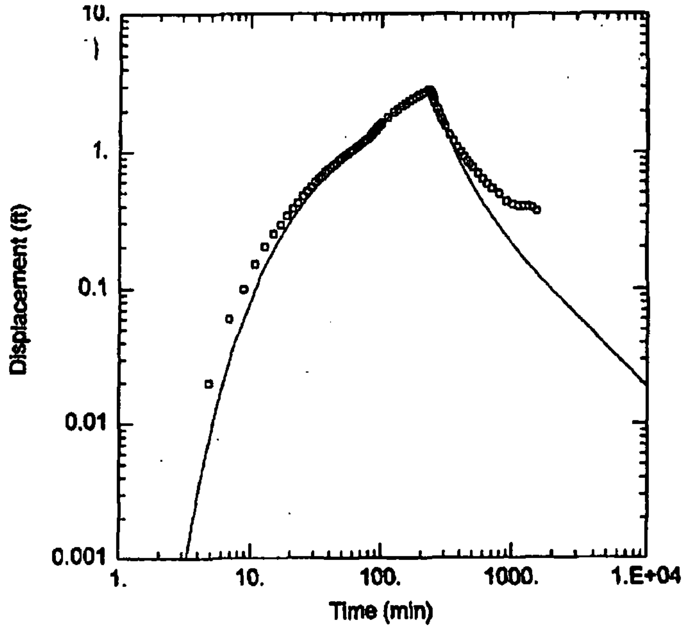
Pumping Wells

Well Name	X (ft)	Y (ft)
7EX4MAU	0.25	0

Observation Wells

Well Name	X (ft)	Y (ft)
○ 7EX4MAU	0.25	0

FIGURE 9



7EX4MAU PUMPTEST

Data Set: C:\MAUPTEST\3RD\7EX4MA\W-2MA.A
Date: 02/13/97 **Time:** 16:25:17

PROJECT INFORMATION

Company: LFR
Client: SIEMENS-NIBW
Project: 1583.97-001
Test Location: Scottsdale, AZ
Test Well: 7EX4MAU
Test Date: Dec. 11, 1996

SOLUTION

Aquifer Model: Confined
Solution Method: Theis
T = 0.8659 ft^2/min
S = 0.0002645

AQUIFER DATA

Saturated Thickness: 190. ft
Anisotropy Ratio (Kz/Kr): 0.001

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
7EX4MAU	0.25	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ W-2MA	471	0

FIGURE 10

SUMMARY OF WATER QUALITY DATA: WELL DEVELOPMENT AND AQUIFER TEST WATER SAMPLES
GROUND-WATER EXTRACTION WELLS 7EX-3MA AND 7EX-4MA
North Indian Bend Wash - Area 7 MAU

Well ID	Task	Ground-Water Extracted (Gallons)	Sample Date	Halogenated Organic Compounds EPA Method 601
				Trichloroethane (TCE)
7EX-3MA	Well Development	4,500	1/9/96	6.60
	Aquifer Test	13,080	1/12/96	7.40
		20,350	1/12/96	6.00
		34,160	1/12/96	8.10
		54,600	1/12/96	7.40
		75,150	1/12/96	2.40
		96,060	1/12/96	7.50
		115,900	1/12/96	6.00
		136,120	1/12/96	7.90
7EX-4MA	Well Development*	1,500	11/6/96	2.60
	Aquifer Test	14,215	12/11/96	6.40
	Effluent from Carbon Vessel		12/11/96	0.0048 0.17 0.43 0.48 0.60

Notes: all concentrations reported in milligrams per liter (mg/l)
* PCB was detected in this sample at a concentration of 0.016 mg/l

QA/QC______

Appendix F

APPENDIX F

CALGON CARBON OXIDATION TECHNOLOGIES TREATABILITY STUDY AND VENDOR SPECIFICATIONS FOR UV/Ox REACTOR

CALGON CARBON CORPORATION

Oxidation Technologies

Proposal To

Levine·Fricke·Recon

for the supply of a

Groundwater Treatment System

for

North Indian Bend Wash Area 7
Scottsdale, Arizona

NO. P620 **APRIL 1, 1997**

Calgon Carbon Oxidation Technologies

Toronto **Pittsburgh** **Tucson**

CONTENTS

EXECUTIVE SUMMARY

Calgon Carbon Oxidation Technologies (CCOT) is pleased to submit this proposal for a Rayox® UV/Oxidation system to treat contaminated groundwater at the North Indian Bend Wash Area 7 in Scottsdale, AZ.

The treatment requirements upon which this proposal is based are to remove TCE from the groundwater at a flow rate of 385 gpm.

The proposed Rayox® system will be designed to achieve the treatment requirements using CCOT's patented process. This process utilizes UV light to photolyze hydrogen peroxide, generating highly reactive oxidizing species (hydroxyl radicals) in solution which accelerates the oxidation of the target organic contaminants. The system size and optimum Rayox® treatment process conditions were based upon test results obtained with actual water samples, and on Calgon Carbon's expertise and broad experience in treating waters with similar characteristics and treatment requirements. CCOT is confident that the proposed Rayox® system will achieve the treatment objectives and offers a performance guarantee to that effect. A full description of the proposed system and the treatment process is included in the attached proposal.

- ***Proven Performance.*** With approximately 100 systems built for treating a broad spectrum of contaminated groundwater, industrial wastewater, process water and drinking water, Rayox® has proven its capability to meet the most demanding performance requirements.
- ***Technology Leadership.*** As a result of its strong commitment to R&D, Calgon Carbon has introduced a number of important features to the industry, including:
  - High efficiency, high power UV lamps, with strong output in the spectral region (UV-C) of greatest photochemical activity.
  - Proven lamp quartz cleaning mechanism, which maximizes system availability while ensuring the integrity of the treatment process.
  - State of the Art PLC control system enabling around the clock operation with minimum operator attendance and involvement, with the capability of remote diagnosis through the use of a modem.
  - Proprietary photo-catalysts which reduce treatment costs and expand the range of economic application of UV/oxidation.
- ***Reliability.*** Field experience with the extensive installed base of treatment systems has shown Rayox® to be the industry leader in terms of performance and reliability. Calgon Carbon has never had to remove an installed Rayox® system for unsatisfactory performance.
- ***Safety.*** CCOT is a CSA (Canadian Standards Association) certified manufacturer. CSA is recognized by the US Occupational Safety and Health Administration (OSHA) as an accredited Nationally Recognized Testing Laboratory (NRTL). CSA is also a Los Angeles Department of Building and Safety approved electrical

testing laboratory. Our facilities are inspected regularly to ensure that the high standards of CSA are maintained.

- *System Quality.* CCOT's quality assurance manufacturing program has fully met the requirements of NASA, Ontario Hydro, Hydro Quebec, US DOD and the US DOE for low level mixed waste applications.
- *Contaminant Destruction.* As Rayox® is an oxidation technology, it converts the contaminants into harmless products such as water, carbon dioxide and mineral salts, eliminating the need for secondary material handling or disposal requirements.
- *No Gaseous Emissions.* Rayox® has been certified by the South Coast Air Quality Management District (SCAQMD) and the Bay Area Air Quality Management District (BAAQMD) as having no air emissions. Thus the costs, effort and time involved with air permits are avoided.
- *Ease of transport and installation.* The Rayox® system is modular in design, with the modules skid mounted for ease of transport and installation.

SECTION 1

DESIGN VALIDATION

1.1 DESIGN TEST SUMMARY

A design test was performed to demonstrate the effectiveness of CCOT's Rayox® process in destroying VOCs in groundwater from the North Indian Bend Wash Area 7 in Scottsdale, Arizona. UV oxidation will be used in conjunction with an air stripping system for treatment of the extracted groundwater. Based on the design tests conducted, a full scale system for treatment of the groundwater at a flow rate of 385 gpm is proposed. The objectives of the design tests were:

- to identify the most effective Rayox® process for reducing the total VOC content in the groundwater to allow efficient air stripping
- to determine the system size to meet discharge requirements.

1.2 THEORY

In UV/Oxidation processes, a high powered lamp emits UV radiation into the contaminated water. An oxidizing agent such as hydrogen peroxide is added which, when activated by the UV light, forms hydroxyl radicals which destroy the toxic organic compounds in groundwater. The photolysis of hydrogen peroxide produces a highly reactive radical, (•OH), which initiates a rapid cascade of oxidation reactions. If allowed to proceed to completion, the end products are carbon dioxide and water. This oxidation can be greatly enhanced, in some cases, by the addition of homogenous catalysts which increase the efficiency of the UV light reactions.

1.2.1 UV Dose

In the UV oxidation process, a high powered lamp emits UV radiation through a quartz sleeve into the contaminated water. The photons of light activate hydrogen peroxide or a catalyst and generate highly reactive radicals which destroy the organic contaminants. The destruction of organic contaminants is therefore dependent upon the amount of UV light which is applied to the contaminated water.

CCOT's design parameter for the scale-up of UV oxidation systems is the "UV dose" which is defined as the amount of UV lamp energy (in kWh) applied to 1000 gallons of water. This design parameter can be calculated from either flow through or batch situations as follows;

$$\text{UV Dose (Batch)} = \frac{\text{Lamp Size (kW) x Time (min) x 3785 (L / 1000 gal)}}{\text{Volume (L) x 60 (min / hr)}}$$

and

$$\text{UV Dose (Flow)} = \frac{\text{Lamp Size (kW) x 1000 (gal / 1000 gal)}}{\text{Flow Rate (gpm) x 60 (min / hr)}}$$

The UV Dose is used to scale-up from a batch design test to a full scale system. For full scale systems using 30 kW lamps, the calculation uses the 27.5 kW nominal running power instead of the 30 kW maximum power.

1.2.2 *Electrical Energy per Order (EE/O)*

The destruction of a contaminant by a UV/Oxidation process involves a complex series of chemical reactions. However, experience has shown that this destruction generally follows a first order relationship with the amount of energy input into a unit volume of water (UV Dose). A simple design parameter, which incorporates the UV Dose input to the system and the number of orders of contaminant destruction, can be used to compare and scale-up processes. This design parameter is known as the Electrical Energy per Order or the EE/O and its units are in kWh/1000gal/order.

For example, if it takes 10 kWh of electrical energy to reduce the concentration of a target compound from 10 ppm to 1 ppm (1 order of magnitude or 90% destruction) in 1000 gallons of water, then the EE/O is 10 kWh/1000gal/order for this compound. It will take another 10 kWh/1000gal of UV Dose to reduce the compound from 1 ppm to 0.1 ppm.

The EE/O values obtained in a batch system can be applied directly to a full scale flowthrough system. The equation for the EE/O which applies to both batch and flow through situations is:

$$\text{EE / O} = \frac{\text{UV Dose}}{\text{Log}\,(C_i / C_f)}$$

where C_i is the initial concentration and C_f is the final concentration.

In scaling up from bench scale results to a full scale system the EE/O value is calculated. In systems with more than one compound of interest the EE/O for each compound must be determined in the batch testing. The effluent concentration for each compound can then be calculated for the full scale design.

1.2.3 Rayox™ UV Oxidation Processes

UV/Peroxide is the most common advanced oxidation process used today. It utilizes the reaction of UV with hydrogen peroxide to generate highly reactive hydroxyl radicals (•OH) as shown below:

$$H2O2 + UV\ Light \rightarrow 2 \bullet OH \qquad [1]$$

This reaction relies on the absorbance of UV light by the hydrogen peroxide molecule. Peroxide absorbs UV light between 200 and 300 nm but absorbs most strongly in the 200 to 240 nm range. Calgon Carbon's medium pressure UV lamps have been designed to give out significantly more UV light in the 200 to 240 nm range than any other UV light source.

The adjustment of sample pH and the addition of catalysts may enhance the UV/Peroxide treatment of certain contaminants. Two patented CCOT processes involve the addition of iron based catalyst and adjustment of the water pH to between 2 and 4 prior to UV/Peroxide treatment. In this case, treatment improvements must be weighed against added process complexity associated with pH adjustment and catalyst addition.

The hydroxyl radicals created by the UV light oxidize contaminants in the water to form non-toxic by-products. Hydroxyl radicals react faster with some compounds that they do with others. This means that where a number of compounds are targeted for treatment, the one compound that treats the slowest will determine the system requirements.

1.3 DESIGN TEST RESULTS

1.3.1 Sample Characterization

A drum of groundwater was received at CCOT on April 22, 1996. The groundwater was well mixed and a sample was collected for analysis. Results of the preliminary groundwater analysis conducted at CCOT are shown in Table 1.

Table 1: Results of Preliminary Analysis

Parameter	Mixed Sample
Appearance	clear, no color
TSS, mg/L	< 10
pH	7.9
COD, mg/L	< 5
Alkalinity, mg/L	320
Fe, mg/L	< 1
Chloride, mg/L	420
Bromide, mg/L	< 10
Nitrate, mg/L	85
TCE, mg/L	2.6

The UV absorbance of the mixed sample was also measured. The optical density values at different wavelengths are shown in Table 2.

Table 2: Measured UV Absorbance Values

Wavelength (nm)	Mixed Sample
200	15.6
210	10.8
220	5.2
230	1.6
240	0.05
250	0.04
260	0.06
270	0.04
280	0.04
290	0.03
300	0.03

The groundwater has a relatively high UV absorbance due to the high nitrate level indicating that non-target water constituents are competing for UV light energy against the target contaminants and hydrogen peroxide, thus decreasing treatment efficiency.

1.3.2 Pilot Unit

Design testing at CCOT is performed using a 1 kW Pilot Unit. This unit consists of a 10 gallon cylindrical stainless steel Rayox® reactor equipped with a 1 kW lamp. The lamp used has an identical UV output to the 30 kW lamps which are used in a full scale system so that scale-up using the design parameter, UV Dose, is extremely accurate. The 1 kW lamp is mounted vertically in the reactor and separated from the water by a quartz sleeve. An air-actuated transmittance controller automatically wipes the quartz sleeve at regular intervals to ensure that the quartz remains clean throughout the entire run. A mixer in the reactor ensures complete mixing of the sample during the testing. The Pilot Unit also has a steel shutter which, when closed, serves to block the transmittance of UV light into the sample.

1.3.3 Experimental Procedure

For the experiments, 8 gallons of the groundwater were added to the Pilot Unit. The samples were then spiked with TCE to the expected level. An initial sample was taken for analysis. The UV Lamp was then ignited with the steel shutter closed. Reagents were then added as required (i.e. Hydrogen Peroxide as a treatment reagent). After several minutes were allowed for reagent mixing and lamp warm-up, the shutter was opened and the run timer was started. Samples were taken at periodic intervals corresponding to increasing UV doses and were analyzed in house for TCE. During the final test, samples were collected and submitted to an outside analytical laboratory (Barringer Laboratories, Mississauga, Ontario) for VOC analysis by purge and trap gas chromatography/mass spectrometry using US EPA Method 8260A.

Results of the different test runs were compared by plotting the concentration of the TCE as a function of UV dose (expressed as total lamp energy per thousand gallons of water).

1.3.4 Test Results

CCOT carried out three treatment tests on the groundwater. The test matrix is summarized in Table 3 and the design test results are presented in Table 4.

Table 3: Design Testing of Groundwater

Run #	Treatment Process	pH	H_2O_2 ppm
1	Rayox® UV/Peroxide	as is	75
2	Rayox® UV/Peroxide	as is	150
3	Rayox® UV/Peroxide	as is	75

Table 4: Analytical Data from Design Test Runs

Run 1: Rayox® 75 ppm H_2O_2

UV Dose kWh/1000 gal	TCE ppb
0	10200
3	1320
6	190
9	50

Run 2: Rayox® 150 ppm H_2O_2

UV Dose kWh/1000 gal	TCE ppb
0	10000
3	690
6	140
9	30

Run 3: Rayox® 75 ppm H_2O_2

UV Dose	TCE
kWh/1000 gal	ppb
0	8700
1.27	3000
2.55	1700
3.82	340

For each test run conducted, the measured concentrations of TCE in each sample are plotted as a function of the applied UV Dose in Figure 1.

During Run 3, samples were collected for VOC analysis at an independent professional laboratory. Results of this analysis are presented in Table 5.

Table 5: VOC Concentrations in Run 3 Samples

Compound	Concentration (ppb) at Different UV Doses			
	0	1.27	2.55	3.82
chloroform	< 200	na	7.4	6.0
TCE	11000	na	107	65.4

na = not available

1.3.5 *Discussion of Results*

The initial two runs were conducted to identify a suitable hydrogen peroxide dose for UV/peroxide treatment of the groundwater. As shown in Figure 1, the higher peroxide dose did not significantly improve treatment and the final confirmation run was therefore conducted with a peroxide dose of 75 ppm.

The final run was conducted to confirm the results obtained in Run 1 and to determine treatment rates for other VOCs in the groundwater. While the initial TCE concentration measured at the outside laboratory correspond to the Calgon Carbon result, there was significant discrepancy in the other samples. For the final two samples, the TCE concentration detected by Barringer were 107 and 65.4 ppb while the CCOT analysis showed concentrations of 1700 and 340 ppb respectively. The rate of TCE treatment indicated by the Barringer data is somewhat faster than expected in groundwaters of this type based on previous CCOT experience. As the CCOT data also showed good repeatability between test runs, it is recommended that design calculations are based on these results. If the recommended design is over-conservative, the lamp power of the system may be turned down, to reduce operating costs.

The VOC analysis conducted by the outside laboratory showed that the groundwater did not contain significant quantities of other VOCs. The only other VOC detected beside

TCE was chloroform and after a UV dose of 3.82 kWh/1000 gal the chloroform concentration was only 6 ppb.

1.3.6 Extrapolation of Results

In scaling up from bench scale results to a full-scale system the EE/O value is calculated. The larger the EE/O the more energy required and hence treatment is less efficient. By comparing EE/O values from each run one can easily see the reduction in electrical power required for treatment as the conditions are varied. By multiplying the EE/O by the number of orders of magnitude of destruction required, the UV dose is obtained.

For example, based on Calgon Carbon's data from Run 3 a UV dose of 3.82 kWh/1000 gallons reduced the TCE from 8700 to 340 ppb. The EE/O value is therefore calculated as follows.

$$EE/O = \frac{3.82}{Log(8700/340)} = 2.71$$

Using this EE/O value, the full size system is easily scaled to any flow rate or concentration.

Based on the design test results, a 2 x 30 kW Rayox® system followed by air stripping is recommended for this application. For design purposes, the nominal lamp power output of this system is 55 kW. Maximum flow rate and TCE loading conditions for this system must be calculated to ensure that air stripper emissions will meet regulatory requirements.

Assuming a groundwater flow rate of 385 gpm and an influent TCE concentration of 6,870 ppb, the effluent TCE concentration can be calculated as follows:

$$\text{UV Dose} = \frac{55\text{ kW} \times 1000\ (\text{gal}/1000\text{ gal})}{385\ (\text{gpm}) \times 60\ (\text{min}/\text{hr})} = 2.38\text{ kWh}/1000\text{ gal}$$

$$\text{Log}\,(C_i/C_f) = \frac{\text{UV Dose}}{\text{EE/O}} = \frac{2.38}{2.71} = 0.88$$

$$C_f = 909\text{ ppb}$$

Therefore, the TCE concentration will be reduced from 6,870 to 909 ppb at a flow rate of 385 gpm, an 87 percent reduction.

By comparison, using Run 3 effluent data from Barringer, the following design parameters are calculated:

EE/O = 1.34
UV Dose = 2.38 kWh/1000 gallons (based on a 2 x 30 kW Rayox®)
Log (C_f/C_t) = 1.78
C_f = 115 ppb
TCE Reduction = 98 percent

As noted above, the recommended 2 x 30 kW Rayox® system and design is based on CCOT's data and is considered conservative. The actual TCE reduction will likely by greater than 87 percent, but less than the 98 percent calculated using the Barringer data. In any case, the estimated effluent quality based on the CCOT study data and recommended design is adequate for efficient treatment using a low profile air stripper. If the influent TCE concentration decreases or the actual treatability is higher in the 2 x 30 kW Rayox® system than estimated, then adjustments to lamp power, and/or peroxide dose can be employed to reduce operating costs while still meeting the design criteria for the air stripper.

SECTION 2

SYSTEM DESCRIPTION

2.1 *OVERVIEW*

The proposed treatment train consists of a hybrid UV/Oxidation - Air Stripping system, where the Rayox® UV/Oxidation reactors will reduce the organic loading in the contaminated water to a level where the off gas from the air stripping system can be directly discharged to the atmosphere, in compliance with the controlling regulations.

2.2 *PROCESS DESCRIPTION*

A process flow schematic for the proposed system is illustrated on Drawing No. 620-RD-500821 enclosed with this proposal. The following is a description of the process of the system when operated at the design flow rate of 385 gpm.

Groundwater is fed to the treatment train at a flow rate of 385 gpm. Hydrogen peroxide is injected and mixed with the influent water in a static mixer upstream of the 60 kW Rayox® system. Inside the reactors, the UV light combines with hydrogen peroxide to form highly reactive oxidizing species which destroy TCE and chloroform molecules in the groundwater to allow compliance with both air and water discharge limits after downstream treatment in the air stripper system. Levels to which the organic concentrations will be reduced for the various flow conditions are shown in Section 1 above.

The Rayox® reactor is a cylindrical stainless steel vessel at the center of which is a single high powered CCOT ultraviolet lamp. A quartz sleeve separates the lamp from the water. The quartz sleeve is kept clean automatically by a patented air-actuated quartz cleaner that wipes the surface at regular intervals.

From the Rayox® system, water is fed to the top of the air stripping system through a jet spray nozzle. The air stripping system consists of a four tray ShallowTray® column equipped with a direct drive air blower, a mist eliminator, a treated water sump and discharge pump. The mist eliminator removes the moisture content in the organic-laden air stream prior to discharge to the atmosphere. Treated water is collected in the sump located at the bottom of the air stripping column, and then discharged to the sewer line using the treated water pump. Level switches located in the sump control the operation of the treated water pump.

The system operates under the control of a PLC (Programmable Logic Controller). The main functions of the PLC software are to control the process, monitor the system status and alert the operator to any fault conditions. The system is fail-safe for operator and equipment safety. The PLC will be designed and equipped with a Network Interface Module to be integrated in the centralized plant control system.

2.3 *EQUIPMENT SPECIFICATION*

Rayox® *Reactor System*

Rayox® Reactor : Two (2) 30 kW CCOT UV lamps
: Fully shielded for protection from UV light
: Air cooling fan on lamp end

Quartz Cleaner : Automatic action for cleaning UV reactor quartz sleeve
: Pneumatic drive
: 40 micron filter, pressure regulator, oilier
: Proximity switches to detect operation
: Adjustable cycle frequency via PLC

Air Compressor *(Optional)* : Reciprocating instrument air compressor, rated at 2 scfm and 100 psig, complete with cooler and dual tower desiccant system

Hydraulic System

Treatment Capacity : 385 gallons per minute
Pipe Diameter : 6" 316L stainless steel, schedule 10
Maximum Hydraulic Capacity : 600 gallons per minute
Minimum Flow rate : 50 gallons per minute
Materials of Construction : 316 or 316L stainless steel, quartz, Teflon (wetted) and Viton
Sample Points : Influent and effluent
Maximum System Pressure : 25 psig
System Test Pressure : 50 psig
Pressure Loss @ 385 gpm : 5.3 psi
Rayox® Feed Pump : Supplied by Others
Flow Measurement : Magnetic flowmeter
Flow Totalizer : Integral digital flow totalizer

Electrical System

Electrical Supply Required :

Rayox® System : 480 VAC, 60 Hz, 3 Phase protected supply
Full Load Running Current : 141 Amps
Air Stripping System : 480 VAC, 60 Hz, 3 Phase
Full Load Running Current : 14 Amps

Air Compressor *(Optional)*	:	120 VAC, 60 Hz, 15 Amp dedicated wall outlets
High Voltage Rayox® System	:	Housed in a NEMA 1 ventilated and drip-proof enclosure
	:	480 VAC for Lamp Power Supply
	:	2 x 30 kW Lamp Power Supplies
	:	480/120 VAC Transformer
	:	Treated Water Pump motor control
	:	Transformers in the high voltage enclosure are capable of rugged long term performance
	:	Power factor better than 0.9 at full power
Low Voltage Rayox® System	:	120 VAC for cooling fans, air solenoids, metering pump controls, and PLC
	:	24 VDC for interlock and input devices

Physical Specifications

The Rayox® system is mounted on one (1) skid. Physical specifications for the skid are as follows:

Approximate Overall Dimensions	:	4'W x 6.5'L x 7.5'H Rayox® Reactor Skid (see attached Drawing No. 000-RD-000112)
Required Height Clearance	:	10.5'
Skid Material	:	Structural steel, with acid wash primer, chemical resistant 2 part epoxy paint
System Weight (dry)	:	5,000 lbs

Peroxide Delivery System

All peroxide delivery system components are mounted on a separate stainless steel frame suitable for floor or wall installation. The skid includes an electrical junction box. A drawing of the peroxide delivery system is included (Drawing No. 000-RX-400001). Specifications for the peroxide delivery system are as follows:

Approximate Dimensions	:	1'W x 1'L x 4'H peroxide skid
	:	72"DIA x 120" H 2000 gallon storage tank *(optional)*
Hydrogen Peroxide System	:	2,000 gallon HDPE (cross linked) storage tank with low level switch *(optional)*

System Description

: 50% Hydrogen Peroxide
: Estimated requirement 70 gpd (based on 385 gpm and 75 ppm peroxide)
: Delivery via metering pump
: Prominent Model Gamma4
: Redundant metering pump *(Optional)*
: Proportional flow control to influent flow rate *(Optional)*
: Manual override on stroke length/speed
: Electronic Solid State low flow switch
: Rotameter
: Pressure indicator on pump discharge
: Externally adjustable stainless steel back pressure /check valve
: Pulsation damper
: Automatic priming valve
: 6" Static mixer in process line

Regulatory Compliance

- Certified by CSA, an OSHA accredited Nationally Recognized Testing Laboratory (NRTL)
- Conforms to NFPA National Electric Code (NEC)

2.4 PROCESS CONTROL SPECIFICATION

The system operates under the control of a Programmable Logic Controller (PLC). The main functions of the PLC software are to control the process and monitor the system status, and to alert the operator to any fault conditions. The system is fail-safe for the operator's safety and equipment protection. Alarm and status messages are displayed on the alpha-numeric annunciator on the control panel. Control system specifications are as follows:

Control System

Control Panel
: NEMA 12 Enclosure
: System Start/Stop buttons
: Lamp selector switches
: Digital display flow indicator
: Lamp current, power and voltage display
: Alphanumeric fault and system status display
: Integral operator interface for testing components during servicing

System Description

Programmable Logic Controller	: Siemens Model TI-435
Variable Frequency Drives	: Siemens (30 hp) (shipped loose) Siemens (10 hp) (shipped loose)
Level Transmitter	: Rosemount Model 1151LT (shipped loose)
Level Switch	: Effector Proximity (shipped loose)

Fail-safe Operation

Flow	: Alarm and automatic system shutdown on influent flow rate out of range : Alarm and shutdown on leak detection
Hydrogen Peroxide Delivery	: Alarm and shutdown on low peroxide flow : Alarm on low peroxide level in storage tank
Temperature	: Alarm and shutdown on high water temperature within reactor
Lamp	: Alarm and shutdown on lamp failure : Alarm and shutdown on lamp cooling fan failure : Power interlock on HV cabinet door : Alarm and shutdown on UV access covers
Quartz Cleaner	: Alarm on failure to operate Alarm on low air pressure
Air Stripping System	: Alarm on high water level in stripper sump : Alarm on low air pressure through air stripper column

SECTION 3

SYSTEM PERFORMANCE

The proposed Rayox® water treatment system will treat the groundwater to the specified discharge limits. The specific performance to which the performance guarantee applies and the estimated operating requirements are as follows:

3.1 PERFORMANCE OF RAYOX® *SYSTEM*

The proposed Rayox® /air stripper system will treat water at a design flow rate of 385 gpm from the maximum influent concentrations to the required effluent concentration listed below.

Treatment flow rate : 385 gpm

Treatment Specification:	Influent ppb	Effluent ppb
TCE	6.870	< 1,000

The performance guarantee is based on tests performed by CCOT on a sample of the groundwater provided by the customer. These tests characterize the groundwater chemistry as follows:

TSS, mg/L	< 10
pH	7.9
COD, mg/L	< 5
Alkalinity, mg/L	320
Fe, mg/L	< 1
Chloride, mg/L	420
Bromide, mg/L	< 10
Nitrate, mg/L	85

Note: If these parameters vary slightly, the effluent TCE quality can be reached by increasing the peroxide dose and the lamp power. Also, the nitrate is as nitrate not as nitrogen. Very high levels of nitrate can cause absorption of light and thus reduce the amount of light absorbed by the peroxide. The levels here are higher than has been seen in sampling profiles.

System Performance

UV Absorbance:

Wavelength (nm)	UV Absorbance/cm
200	15.6
210	10.8
220	5.2
230	1.6
240	0.05
250	0.04
260	0.06
270	0.04
280	0.04
290	0.03
300	0.03

3.2 OPERATING REQUIREMENTS

Chemical Reagents

The proposed Rayox® system requires the addition of hydrogen peroxide solution to the influent water. The estimated dosage is 75 ppm for the average design flow rate of 385 gpm, which corresponds to an estimated consumption of 50% hydrogen peroxide of 70 gallons per day.

Utilities

The utilities required to operate the Rayox® reactor are indicated below.

Electrical Power	:	480 VAC, 60 Hz, 3 phase supply, protected
	:	Full load running current 159 Amps
Instrument Air *(See optional air compressor)*	:	2 scfm, 80 - 100 psi

SECTION 4

SCOPE OF SUPPLY

4.1 *CCOT SUPPLY*

CCOT proposes to supply the following equipment and to provide the following services:

Equipment:

One (1)	Pre-piped, pre-wired and fully shop-tested Rayox® skid consisting of two (2) 30 kW reactors and power supplies; flanged four inch (6") influent and effluent piping connections; system controller (PLC), fully programmed
One (1)	Hydrogen peroxide delivery system
One (1)	Operating and Maintenance Manual
One (1)	Set of field and panel mounted instruments, consisting of the following:

1	Variable Frequency Drive (30 hp)
1	Variable Frequency Drive (10 hp)
1	Level Transmitter (Rosemount)
5	Level Switch
1	Motor Starter (7.5 hp), (Siemens)
1	Averaging Pitot Tube (Dwyer) + Transmitter (0-5 in)
1	Network Interface Module

Optional Equipment:

One (1)	Upgrade to adjustable power supply for Rayox® reactors
One (1)	2,000 gallon HDPE hydrogen peroxide storage tank with containment and level switches (2)
One (1)	Air compressor

Optional Services:

- Technical assistance during the start up and commissioning of the Rayox® system.

4.2 SUPPLY BY OTHERS

In order to clarify the scope of CCOTs supply, it has been assumed for the purposes of this proposal that the following items are supplied by others:

Installation of the system including:

- **provision of an industrial indoor environment, 40°F to 95°F, sealed or painted concrete floor**
- **unloading, placing, leveling, and anchoring equipment**
- **electrical hook-up**
- **supply and installation of connecting piping to and from Rayox® system and between Rayox® system and air stripping system**
- **1/4" OD tubing between metering pump and peroxide storage tank, and between metering pump and Rayox® skid**
- **electrical wiring between metering pump and Rayox® skid**
- **provisional of a lockable electrical disconnect in vicinity of Rayox® system**
- **provision of utilities including power (480V/120V) and instrument airs *(see optional air compressor).***

SECTION 5

Warranty and Terms

5.1 PERFORMANCE GUARANTEE AND WARRANTY

Performance Guarantee

CCOT warrants that the Rayox® water decontamination system specified in this proposal will perform in accordance with the treatment requirements specified in Section 3.1, provided it is installed in accordance with CCOT instructions and provided it is operated and maintained in accordance with the instructions contained in the CCOT Operation and Maintenance Manual delivered with the Rayox® system.

Should the Rayox® system not achieve the above specified performance and the influent conditions and water chemistry are not materially different than those specified in Section 3.1, CCOT shall adjust the operating conditions and replace defective system components as necessary to remedy the deficient performance. If necessary, CCOT shall supply additional Rayox® reactors or other components as necessary to remedy the deficient performance. These additional reactors or other components shall be supplied at no charge to the customer.

CCOT's obligations under this performance guarantee shall continue throughout the operating life of the Rayox® system, subject only to the condition that CCOT's liability for replacement components be limited by CCOT's material and lamp warranties.

Manufacturers Warranty

Material Warranty

CCOT warrants that, for a period of 12 months from delivery FOB CCOT's warehouse (Incoterms 1980) of the Rayox® component of the proposed water treatment system to the Buyer, CCOT will replace or repair non-consumable parts of Rayox® proved to be defective in material or workmanship provided that the Buyer gives prompt written notice of each defect to CCOT, and provided that the equipment is installed in accordance with CCOT instructions and operated and maintained in accordance with the instructions contained in the CCOT Operation and Maintenance Manual delivered with the Rayox® system. Travel time and expenses are charged at cost. CCOT will be liable for the direct labor and material cost of such repair or replacement by the Buyer only if CCOT gives prior authorization in writing for the repair or replacement involved.

For the extra charge of $3,000, CCOT offers to extend the warranty on the Rayox® equipment (excluding the optional equipment) for 12 additional months.

Lamp Warranty

CCOT lamps are guaranteed to operate at the rated level of contaminant destruction on the following basis, and provided that the service does not exceed 400 starts, or an average of less than 7.5 hours per start:

Operating Time	**Guaranteed Terms**
0 - 100 hours	**Lamp replaced at no charge.**
101 - 3000 hours	**Price prorated by allowing a credit for unused portion of 3000 hours, applied to the purchase of the replacement lamp.**

There are no representations, warranties or conditions, express or implied, statutory or otherwise, with respect to Rayox® or any part thereof except as expressly provided herein and in the immediately preceding sections.

5.2 TERMS AND CONDITIONS (ATTACHED)

CALGON CARBON CORPORATION

Terms and Conditions of Sale

These terms and conditions of sale shall apply to all equipment, goods or products manufactured distributed or sold by Calgon Carbon Corporation ("Seller") unless otherwise specified in writing by the Seller and the Purchaser.

1. ACCEPTANCE OF CONDITIONS

1.1 The Purchaser, upon receipt of the Seller's acknowledgment of an order, or upon receipt in whole or in part of the shipment sold under an order, or upon payment in whole or in part for the equipment, goods or products sold hereunder, (the Equipment") shall be deemed to have accepted these terms and conditions. Any deletions from, alterations or modifications or additions to the terms and conditions of this order, shall not be binding unless they are expressed in writing and signed by both the Seller and the Purchaser's authorized representatives.

2. DELIVERY

2.1 *Equipment sold hereunder shall be delivered FOB Calgon Carbon Corporation's warehouse (Incoterms 1980). Delivery dates specified in any quote are* approximate, unless specified as binding. Delivery performance is dependent upon prompt receipt from the Purchaser of all specifications, final approved drawings and any other details essential to the proper execution of the Purchaser's order.

2.2 Upon notification of readiness of Equipment by Seller, Equipment shall be delivered promptly to Purchaser. Any delay of Purchaser in accepting delivery of Equipment shall cause storage charges to be charged to Purchaser. Such storage shall be entirely at the Purchaser's risk. Payment terms tied to notification of readiness or delivery, shall apply.

2.3 Unless otherwise agreed upon between the parties, Purchaser shall have the sole responsibility of choosing the carrier and routing from Seller's manufacturing facilities to the final destination.

3. FORCE MAJEURE

3.1 The seller shall not be liable for delays in the execution of its obligations due to causes beyond its reasonable control including but not limited to acts of God, acts of the Purchaser, fires, strikes, labor disturbances, floods, epidemics, quarantine restrictions, war, insurrection or riot, acts of a civil or military authority, compliance with priority orders or preference ratings issued by any Government, freight embargos, car shortages, wrecks or delays in transportation, unusually severe, weather, or inability to obtain necessary labor, materials or manufacturing facilities or supplies or delays of sub-contractors. In the event of any such delay, the date of shipment will be extended for a minimum of time equal to the period of the delay. The contract of sale will in no event be subject to cancellation by the Purchaser, due either to delay in delivery or to any other cause, without the prior written consent of the Seller. In the case of cancellation, cancellation charges judged adequate by the Seller shall apply.

4. WARRANTIES

4.1 The Calgon Carbon Corporation Warranty attached to the Quote shall apply.

INSURANCE, CHARGES AND PROPER CARE

5.1 So long as sums shall remain owing by Purchaser to Seller hereunder, Purchaser shall exercise proper care in the possession and use of the Equipment and shall keep same at all times in good repair and free of all liens, options, taxes, charges, pledges, privileges and encumbrances. Purchaser shall insure Equipment against loss, destruction or theft for the full value of the replacement purchases price of the Equipment.

6. TITLE AND RISK

6.1 The title to and property in the Equipment sold hereunder and any substitutions or additions thereto and the right to possession thereof, whether attached to realty or otherwise, shall pass from the Seller to the Purchaser when the full purchase price of the Equipment has been paid. Upon failure to make any payment as herein provided, the whole purchase price and any note of security given on account therefor shall forthwith become due and payable and the Seller may immediately enter the premises where the Equipment is located and take possession of and remove the same as its personal property, and may retain any or all partial payments already received as a rental charge for the use of the Equipment without affecting any further or other claims which Seller may have against the Purchaser.

6.2 Equipment sold hereunder shall be at the Purchaser's risk on delivery to it as specified in Article 2 above, and the loss or destruction of all or part of said Equipment shall not release Purchaser from any obligations of payment hereunder.

7. LIMITATION OF LIABILITY

7.1 In no event whatsoever shall the Seller be liable for indirect, special or consequential damages for the failure to execute any of its obligations related to the sale of the Equipment. The Seller's liability on any other claim for loss or liability arising out of the sale of the Equipment (including but not limited to, loss or liability arising from breach of contract or tort) shall in no case exceed the net UNIT PRICE exclusive of any taxes, duties, transportation costs, etc. of such Equipment or part thereof involved in a claim.

8. PRICES AND PAYMENT TERMS

8.1 Prices are valid thirty (30) days from date of quotation by Seller. Price adjustment clauses, if applicable, will be included as part of these Terms and Conditions, in an Appendix thereto.

8.2 All prices are Ex Works Seller's plant unless otherwise specified in writing by Seller. Prices quoted do not include federal, state, local or any other taxes, charges, levies and duties, and if same are applicable these shall be promptly paid by the Purchaser.

8.3 In cases where Seller's price includes taxes, charges, levies and duties, in the event of any changes in any taxes charges, levies or duties, imposed under any federal, municipal or local legislation or authority, after the date of submitting of Seller's tender or quotation and applicable to Equipment sold hereunder, the Seller's sale price shall be adjusted to reflect such increases or decreases.

8.4 Seller reserves the right to adjust prices on any order for any alterations or changes authorized by the Purchaser subsequent to acceptance of the order.

8.5 All prices are in United States Dollars as specified in the quotation.

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21-Mar-97

8.6 Payment shall be made directly to Seller's office in accordance with the conditions stated in the order. Unless otherwise specified, payment shall be due as follows: 40% with purchase order; 50% upon shipment; 10% holdback for up to 30 days after delivery of equipment. Any late payment shall bear interest at the rate set by the Seller from time to time which is one percent (1%) per month, twelve percent per annum (12%), at the date of issue, calculated and due on a monthly basis.

9. PATENT INFRINGEMENT

9.1 Purchaser shall be indemnified and held harmless by Calgon Carbon Corporation against any claim of infringement of any Canadian, United States or International Patent rights of any third party on account of any use of the Equipment and processes associated with the water treatment system installed and started up by Calgon Carbon Corporation in accordance with the terms of the Purchase Order and for any Purchaser activities conducted prior thereto in preparation for issuance of said Purchase Order.

10. DAMAGES AND LOSS CLAIMS

10.1 Seller shall carefully pack all Equipment sold hereunder and the Seller shall assume no responsibility for damage after having received "in good order" receipts from the carrier at Seller's works.

10.2 All claims for loss, damage and delay in transit are to be transacted by the consignee directly with the carrier. Claims for shortages or incorrect equipment must be made in writing to the Seller within fifteen (15) days after receipt of the shipment. Failure to give such notice shall constitute unqualified acceptance and a waiver by the Purchaser of all claims for shortages or incorrect equipment.

11. DESIGN CHANGES

11.1 Seller reserves the right to make changes in design or to add any improvement on Equipment or other goods at any time, without incurring any obligations to install same on equipment or goods previously purchased or leased.

12. TESTING AND ACCEPTANCE OF GOODS

12.1 Testing of the Equipment before shipment is carried out in accordance with Seller's test procedures and at its cost. Additional tests shall be agreed upon specifically between Seller and Purchaser and shall be charged to the Purchaser.

12.2 The Purchaser shall examine the Equipment upon taking possession of same and shall inform Seller immediately in writing of all defects and deficiencies for which Seller is responsible. If Purchaser omits to so notify Seller within thirty (30) days of Purchaser's possession of the Equipment, same shall be deemed to have been accepted.

12.3 Acceptance tests are carried out only if they have been agreed upon in writing by the Seller. As far as circumstances allow, such tests will be carried out in Seller's factory. If, for reasons beyond Seller's control, the acceptance tests cannot be carried out within the specified time, the qualities to be determined by these tests shall be deemed proved.

12.4 If it is found from one of the aforementioned tests that the Equipment does not fulfill the terms of the order, the Purchaser shall make available to Seller suitable opportunity to remedy any deficiency.

12.5 The Purchaser shall have no other rights than the rights outlined above in case of delivery of deficient equipment.

13. TECHNICAL DOCUMENTS

13.1 Technical documents, such as drawings, descriptions, illustrations and the like, and all weight data, shall serve as an approximate indication only, provided they have not been expressly specified as binding. Seller reserves the right to make any alterations considered necessary.

13.2 Purchaser shall ensure the confidentiality of all plans, drawings, technical specifications documents, software, microfilm, data or proprietary information relating to the Equipment sold, distributed, or manufactured hereunder. They shall remain Seller's exclusive property and may be neither copied nor reproduced nor communicated to a third party in any way whatever nor used for manufacture of the Equipment, or parts thereof. They may be used only for operation and maintenance of the Equipment, under terms and conditions specified by the Seller.

13.3 All documents submitted with tenders which do not result in an order shall be returned to Seller on request.

14. GENERAL

14.1 Purchaser shall not assign this contract, or any part thereof, without the written consent of the Seller.

14.2 Any order received by the Seller is subject to credit approval and may be canceled if the Purchaser's credit standing is not satisfactory to Seller.

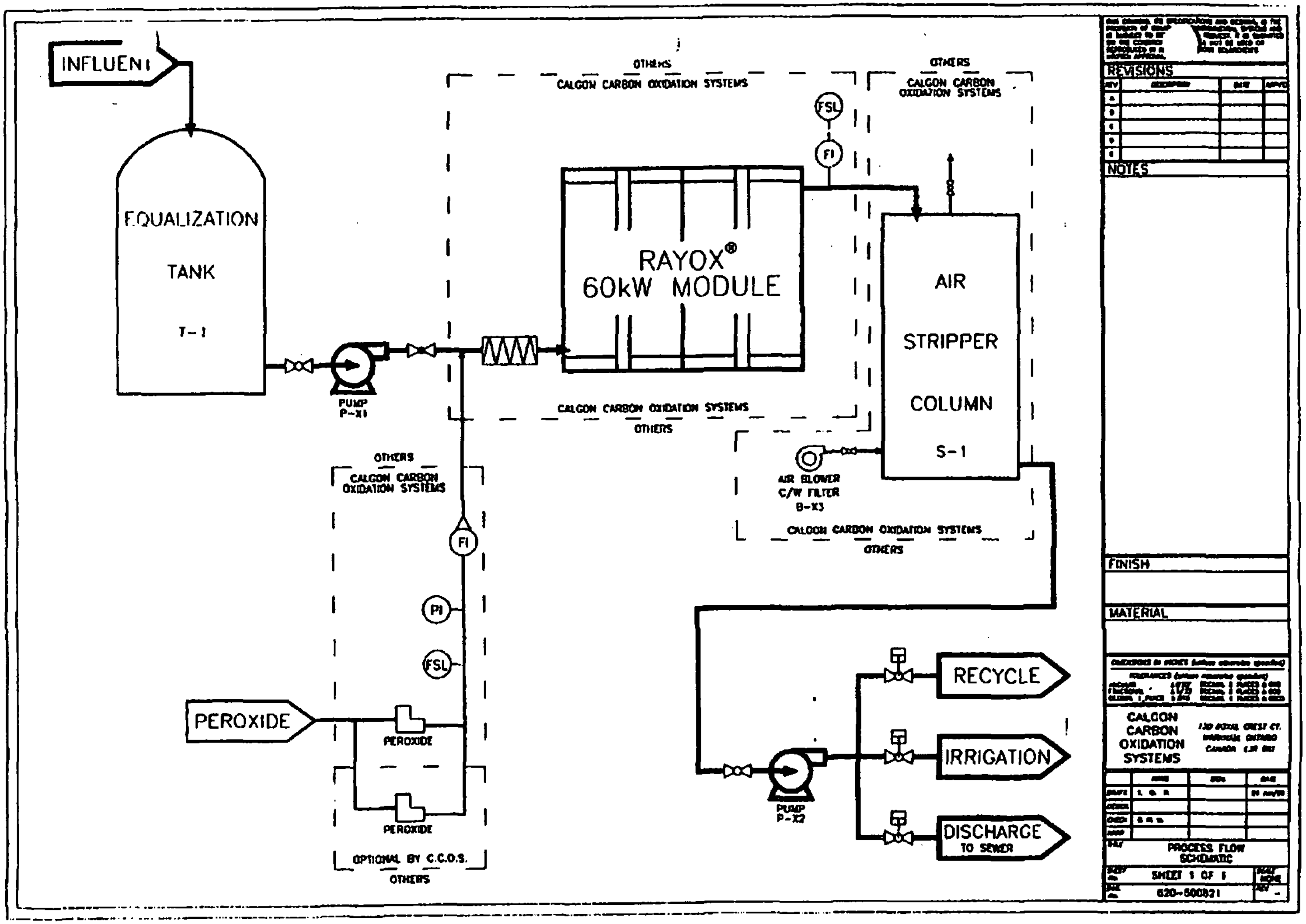
14.3 This Agreement and any order or contract placed hereunder shall be interpreted according to the laws of the State of Pennsylvania.

14.4 Purchaser and Seller acknowledge having specifically requested that this Agreement and all related documents and correspondence be drafted in English

14.5 Any addenda or appendices to this Agreement, to be applicable to any order hereunder, must be signed by both Purchaser's and Seller's respective representatives.

15. LAMP DISPOSAL

15.1 All spent lamps are to be returned to Calgon Carbon Corporation's Offices for disposal.


INFLUENT
EQUALIZATION TANK
T-1
PUMP P-X1
OTHERS
CALGON CARBON OXIDATION SYSTEMS
RAYOX® 60kW MODULE
FSL
FI
AIR STRIPPER COLUMN
S-1
AIR BLOWER C/W FILTER B-X3
PI
PEROXIDE
OPTIONAL BY C.C.O.S.
PUMP P-X2
RECYCLE
IRRIGATION
DISCHARGE TO SEWER
REVISIONS
NOTES
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CALGON CARBON OXIDATION SYSTEMS
PROCESS FLOW SCHEMATIC
SHEET 1 OF 1
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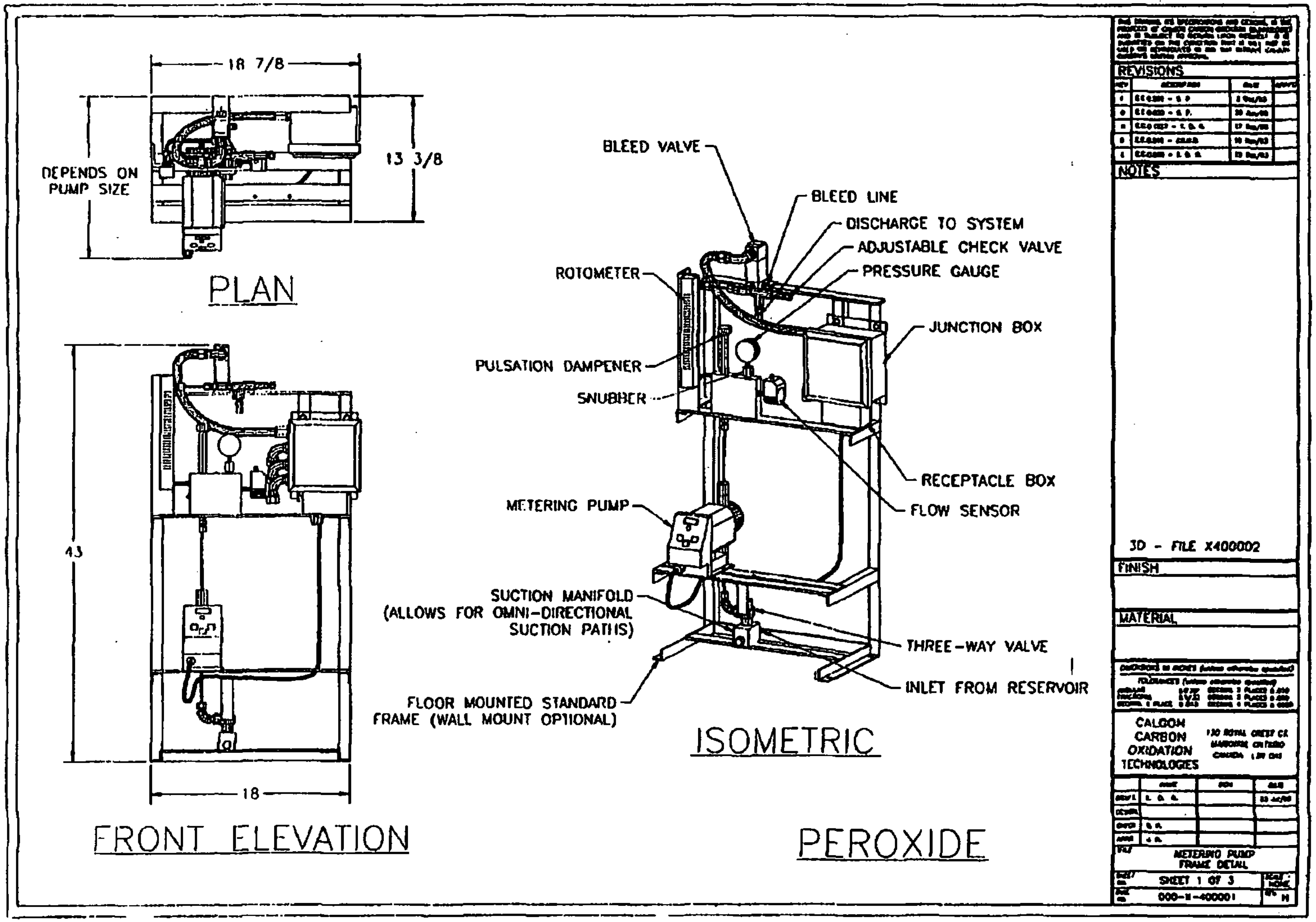
18 7/8
13 3/8
DEPENDS ON PUMP SIZE
PLAN
43
18
FRONT ELEVATION
BLEED VALVE
BLEED LINE
DISCHARGE TO SYSTEM
ADJUSTABLE CHECK VALVE
PRESSURE GAUGE
ROTOMETER
JUNCTION BOX
PULSATION DAMPENER
SNUBBER
RECEPTACLE BOX
FLOW SENSOR
METERING PUMP
SUCTION MANIFOLD (ALLOWS FOR OMNI-DIRECTIONAL SUCTION PATHS)
THREE-WAY VALVE
INLET FROM RESERVOIR
FLOOR MOUNTED STANDARD FRAME (WALL MOUNT OPTIONAL)
ISOMETRIC
PEROXIDE
REVISIONS
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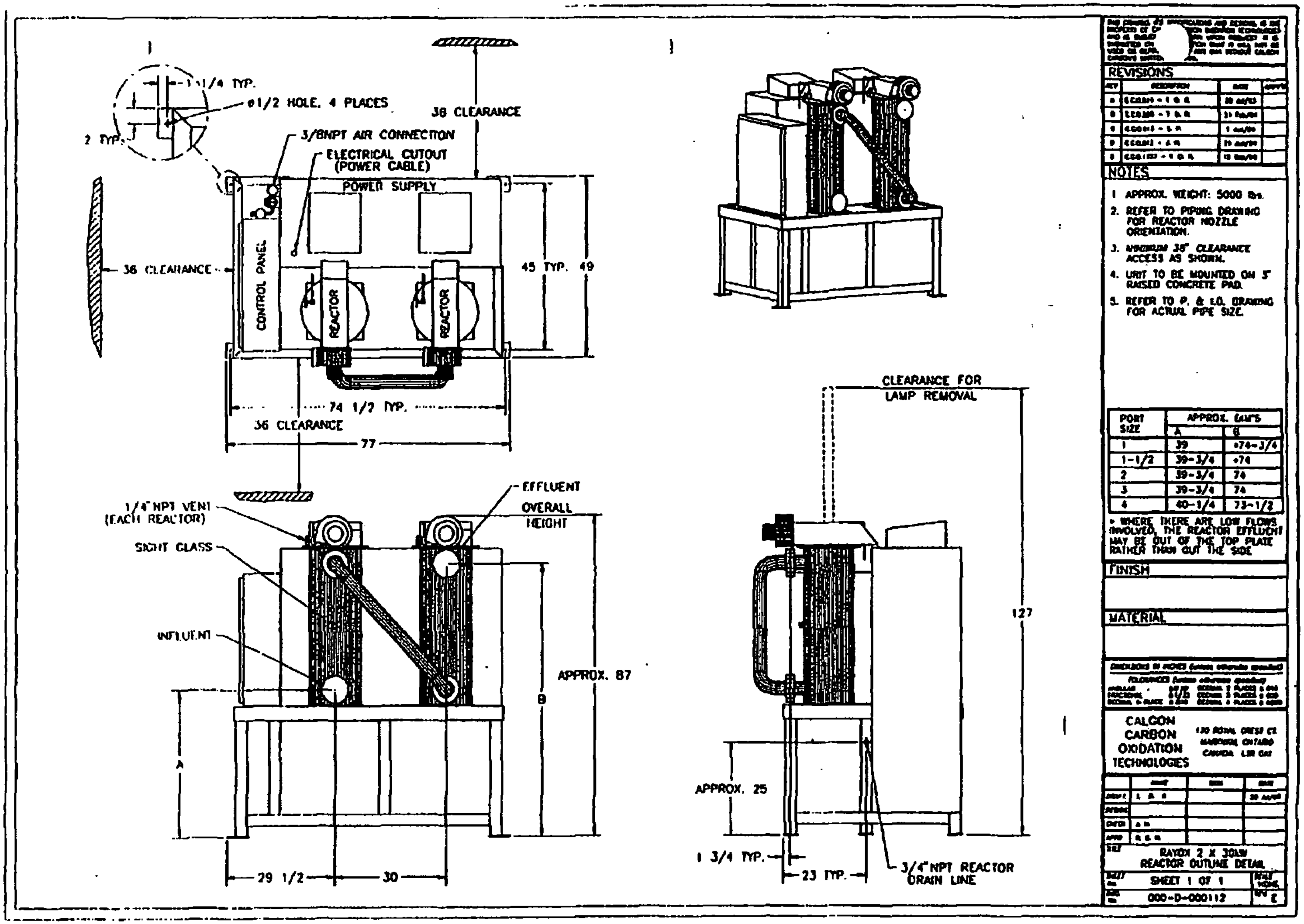

NOTES

1. APPROX. WEIGHT: 5000 lbs.
2. REFER TO PIPING DRAWING FOR REACTOR NOZZLE ORIENTATION.
3. MINIMUM 38" CLEARANCE ACCESS AS SHOWN.
4. UNIT TO BE MOUNTED ON 5" RAISED CONCRETE PAD.
5. REFER TO P. & I.D. DRAWING FOR ACTUAL PIPE SIZE.

PORT SIZE	APPROX. DIM'S	
	A	B
1	39	*74-3/4
1-1/2	39-3/4	*74
2	39-3/4	74
3	39-3/4	74
4	40-1/4	73-1/2

* WHERE THERE ARE LOW FLOWS INVOLVED, THE REACTOR EFFLUENT MAY BE OUT OF THE TOP PLATE RATHER THAN OUT THE SIDE

CALGON
CARBON
OXIDATION
TECHNOLOGIES

RAYOX 2 X 30kW
REACTOR OUTLINE DETAIL

SHEET 1 OF 1

000-D-000112

Calgon Carbon Oxidation Technologies

Statement of Qualifications

OVERVIEW

Calgon Carbon Oxidation Technologies is the leading firm in Advanced Oxidation Processes (AOP) and has over two hundred and fifty commercial installations throughout the world. Its sole business is the development, manufacture, and sale of equipment for the destruction of waterborne organic contaminants by photochemical processes. CCOT's corporate goal is to maintain its position of leadership through extraordinary commitment to research and development, excellence in design, quality centered manufacturing, and customer oriented service.

Manufacturing

CCOT has two manufacturing locations: a 19,000 square foot building located in the town of Markham just north of Toronto and a 15,000 square foot building in Tuscon, Arizona. CCOT has a full complement of equipment and tradesmen to manufacture and assemble all systems in-house.

Quality plays a major role at CCOT in the manufacturing cycle with a well established Quality Assurance program. In addition, all systems undergo a detailed hydraulic and electrical function test prior to shipment.

As a vital part of CCOT's manufacturing and assembly operation, high standards of quality are maintained by documented and thorough inspection procedures for critical purchased components such as power supplies and lamps, as well as for all machined parts. Systems are carefully assembled and thoroughly tested for up to 24 hours, using customer provided water if requested, before shipment. Overall quality control is the responsibility of the Manufacturing Manager. It should be noted that CCOT's quality assurance procedures have met the exacting standards of the U.S. Navy and NASA as part of recently completed contracts highlighted below.

CCOT is a CSA (Canadian Standards Association) certified manufacturer. CSA is recognized by the U.S. Occupational Safety and Health Administration (OSHA) as an accredited Nationally Recognized Testing Laboratory (NRTL). On August 18, 1993, the Department of Building and Safety of the City of Los Angeles approved CSA as an Electrical Testing Laboratory. CCOT facilities are inspected regularly to ensure that the high standards of CSA are maintained.

Customer Service

CCOT maintains service personnel in Toronto ON, and Tucson, AZ to assist owners during system commissioning as well as to provide a full range of after-sales service to customers. Furthermore, CCOT has contractual arrangements in place with qualified instrument sub-contractors to complement its own service personnel such as to assure rapid response to service requirements throughout North America.

CCOT's service capability far exceeds the minimum requirement of servicing **Rayox®** systems through the twelve-month warranty period. Optional Periodic Maintenance agreements provide for regular visits by CCOT Service Personnel to provide scheduled preventative maintenance. Full Service agreements provide all labor and materials for the complete operation of a system.

Engineering

CCOT's process engineering group provides the practical expertise for designing and installing treatment systems. The process engineering group becomes involved at the design test stage and follows a given project through process specification, materials selection, process control, quality control testing and installation. Individual responsibility is the key to ensuring project congruence and high quality.

CCOT's product engineering group includes electrical and mechanical engineering personnel as well as mechanical and electrical CAD designers. This group has many years of experience in designing and building UV/oxidation systems.

Project Management

Once a contract has been awarded to CCOT, the point of contact is transferred from the responsibility of the sales representative to the Director, Installations. He works with the customer's representative to ensure that all of the contract requirements are satisfied in a timely and effective manner. This effort includes issue of drawings, coordinating drawings approval with the owner's representative, issuing Operating and Maintenance manuals, and coordinating CCOT's training of the owner's operation and maintenance personnel as well as technical supervision during the commissioning of the **Rayox®** system.

Research and Development

CCOT's most valuable asset is its intellectual property. Even more valuable than its numerous process and product design patents and its non-patentable know how are the expertise and experience of its staff. This staff includes no fewer than four Ph.D. photochemists, dedicated to photochemical contaminants destruction, a resource unmatched in the world.

Continuing projects for CCOT's R&D staff include extending the application of AOP through the development of innovative processes, improving the commercial application and competitiveness of existing processes, improving organics analytical capabilities, and researching areas of new application.

CASE HISTORIES

CCOT has designed and built over one hundred commercial scale **Rayox®** advanced oxidation systems, approximately three-quarters of which are treating VOC's and semi-volatiles ranging from chlorinated solvents to aromatics in gasoline. As a result of this effort, and the high quality of its work, CCOT is proud to include major corporations such as ICI, Exxon, Mobil, Hoechst Celanese, W.R. Grace, United Technologies, Uniroyal Chemical, Nestle, Martin Marietta, and agencies of the U.S. government including the U.S. Navy, the U.S. Air Force, and NASA in its current customer base.

This section outlines a brief selection of CCOT's relevant design and commercial installation experience.

- At Kelly AFB in San Antonio, Texas where Roy F. Weston, Inc. is the prime engineering contractor, there are two current applications treating groundwater. The first 3 x 30 kW **Rayox®** system will treat vinyl chloride, DCE, and other VOC's at 163 gpm. The second 9 x 30 kW **Rayox®** system will treat DCA, TCA, TCE, and other VOC's at 250 gpm. These systems started up in October 1993.
- At a former dry cleaning operation in Santa Barbara, CA, a 2 x 6 kW **Rayox®** system is treating PCE in groundwater. This system treats 25 gpm of groundwater from 20 ppm PCE down to < 1 ppm, with the remainder polished by GAC.
- At a service station in Carson City, Nevada, a 1 x 30 kW **Rayox®** system was installed in October 1991 to treat BTEX in groundwater. This system destroys BTEX from 1 ppm down to < 5 ppb at a flowrate of up to 10 gpm.
- At a terminal in Albany, NY, a 3 x 30 kW **Rayox®** - T system was installed in November 1991 to treat BTEX in tank bottom water. This system destroys BTEX from 20 ppm down to < 5 ppb at a flowrate of 100 gpm.
- At a location in Troy, Ontario, a 1 x 30 kW **Rayox®** system was installed in February 1992 to treat BTEX in groundwater. This system destroys BTEX from 9 ppm down to < 5 ppb at a flowrate of 26 gpm.
- At a decommissioned refinery in Mississauga, Ontario, a 1 x 10 kW **Rayox®** system was installed in December 1992 to treat BTEX and chlorinated organics in groundwater. This system destroys the target compounds from 3 ppm down to < 10 ppb at a flowrate of 3 gpm.
- At the Six Nations Reserve at Ohswekan, Ontario, a 1 x 30 kW **Rayox®** system was installed in September 1993 to treat NDMA in drinking water. This system destroys NDMA from up to 100 ppt NDMA down to < 5 ppt at flowrates up to 88 gpm.

- At a rubber manufacturing facility in South-Western Ontario, a 1 x 10 kW Rayox® system is treating NDMA in rinse water. This system destroys NDMA from 20 ppb NDMA down to < 0.5 ppb ppt at a flowrate of 10 gpm.
- At the Wells G&H Superfund site in Woburn, Mass. a 2 x 5 kW Rayox® system is treating up to 30 gpm of groundwater from 2 ppm total chlorinated VOC's to below detection on each of 1,2-DCE, TCE, PCE and vinyl chloride.
- A Rayox® system was installed in March 1991 at the Uniroyal Chemical plant in Elmira, Ontario. This nine (9) 30 kW reactor system treats dimethylnitrosamine (NDMA) from 600 ppb to less than 500 ppt at a flow rate of 80 gpm. A second system of 9 x 30 kW reactors treating groundwater containing Chlorobenzene, NDMA, etc. was installed and started up in January 1992.
- At Elmira, Ontario, an 8 x 30 kW Rayox® system is treating groundwater at 600 gpm, with NDMA destruction from 20 ppb to < 30 ppt.
- A UV/peroxide based groundwater system has been operating at Nestle plant in Freehold, N.J. since April 1991, treating trichloroethylene (TCE) and other VOCs from 33 ppm to less than 5 ppb at a flow rate of 8 gpm.
- A groundwater system has been operating at the T.R. Miller plant in Brewton, Alabama since July 1990, treating PCP and PAH's from 5 ppm to less than 1 ppb at a flow of 105 gpm. A second system of 2 x 30 kW reactors treating PCP from 8 ppm to less than 9 ppb at a flow of 14 gpm was installed and started up in October 1991.
- At the International Paper site in Joplin, Missouri, a 2 x 30 kW Rayox® system is treating up to 120 gpm of groundwater from 1 ppm PCP to < 10 ppb PCP. The system was installed in November 1991.
- A process water system using CCOT's Rayox®-R process to treat rocket fuel (hydrazine, NDMA) for NASA at Kennedy Space Center, Florida was commissioned in June 1993.
- A significant customer is the US Navy for whom we have built a 4 x 30 kW Rayox® reactor system to treat the semi-volatile compound nitroglycerine in process wastewater at the Indian Head Naval Ordnance Station.
- A groundwater system treating vinyl chloride, DCE, and other VOC's at Kelly AFB in San Antonio Texas started up in July 1993. The system is a 1 x 30 kW Rayox® reactor unit treating the VOC's at 55 gpm.
- A 1 x 30 kW process water Rayox® system to treat rocket fuel, (hydrazines, NDMA) at the Martin Marietta plant in Denver, Colorado started up in July 1993.
- At an aerospace company in California, a 1 x 30 kW Rayox® system is treating MEK in steam condensate from a carbon regeneration system. This system treats in discrete batches from 35,000 ppm MEK down to < 1 ppm MEK.
- A process water system has been operating at a Domtar plant in Trenton, Ontario since 1988, treating phenols and PCP from 200 ppm to less than 10 ppb at a flow of 2,000 gpd.

- At a location in New Jersey, where ERM is the prime engineering contractor, there is an application to treat groundwater containing PCE, TCE, VC at 200 gpm. This 6 x 30 kW system started up in February 1994.
- At a State Superfund site in California, there is an application to treat groundwater containing PCE, TCE, DCE and TCA at 12 gpm. This 1 x 30 kW **Rayox®** system started up in February 1994.
- At a location in New Zealand, there is an application to treat groundwater containing PCP at 60 gpm. This 4 x 30 kW system was commissioned in July 1994.
- At a location in West Virginia, there is an application to treat process water containing NG at 2 gpm. This 2 x 30 kW system was started-up in December 1994.
- At a location in Maine, there is an application to treat groundwater containing VOC's at 30 gpm. This 30 kW system was started-up in November 1994.
- At a location in Kansas, there is an application to treat groundwater containing various VOC's at 5 gpm. This 1 x 30 kW system was started-up in November 1994.
- At a US Army base in Maryland, there is an application to treat groundwater containing TDG at 30 gpm. This 60 kW system was started-up in January 1995.
- At a location in Michigan, there is an application to treat groundwater containing high concentrations of DCP and TCE. This 60 kW system was started-up in February 1995.
- At a location in North Carolina, there is an application to treat groundwater containing 1,4-Dioxane at 615 gpm. This 270 kW system was started-up in February 1995.
- At a nuclear power plant in Ontario, there is an application to treat process water containing various organic contaminants at 2 gpm. This 10 kW system was started-up in March 1995.
- At Kelly Air Force base in Texas, there is an application to treat groundwater containing VOC's at 200 gpm. This 180 kW system was started-up in March 1995.
- At a manufacturing plant in Massachusetts, there is an application to treat process water containing thiourea and formaldehyde in 2,000 gpd batches. This 60 kW system was started-up in September 1995.
- At an aircraft manufacturing plant in Colorado, there is an application to treat groundwater containing acetone at 8 gpm. This 120 kW system was started-up in June 1995.
- At a synthetic resin manufacturing facility in Spain, there is an application to treat groundwater containing substituted dioxanes at 33 gpm. This 90 kW system was started-up in September 1995.
- At McClellan Air Force base in California, a system was constructed to treat groundwater containing TCE at 380 gpm. This 180 kW system was started-up in October 1995.

- For the General Electric plant in Hudson Falls, N.Y, a system was constructed to treat groundwater containing vinyl chloride and other contaminants at a flowrate of 125 gpm. This 60 kW system was started-up in November 1995.
- For Fort Ord in Monterey, California, a system was constructed to treat groundwater containing methylene chloride and other contaminants at flowrates of up to 1500 gpm. This system was started-up in December 1995.
- At Brooks Air Force base in San Antonio, Texas, a system was constructed to treat groundwater containing TCE at flowrates up to 75 gpm. This 30 kW system was started-up in February 1996.

Appendix G

APPENDIX G

AIR STRIPPER MODELING RESULTS AND VENDOR SPECIFICATIONS FOR AIR STRIPPER

ShallowTray®

ow profile air strippers

ystem Performance Estimate

lient and Proposal Information:

James Lutton
Levine Fricke
NEEP#: 395411-1

Model chosen:	41200
Water Flow Rate:	385.0 gpm
Air Flow Rate:	2400 cfm
Water Temp:	60.0 °F
Air Temp:	60.0 °F
A/W Ratio:	46.6
Safety Factor:	None

Contaminant	**Untreated Influent** Effluent Target	**Model 41211 Effluent** Air (lbs/hr) %removal	**Model 41221 Effluent** Air (lbs/hr) %removal	**Model 41231 Effluent** Air (lbs/hr) %removal	**Model 41241 Effluent** Air (lbs/hr) %removal
Trichloroethylene	1000 ppb	229 ppb	62 ppb	12 ppb	3 ppb
	5 ppb	0.148995	0.183102	0.190910	0.192697
		77.1083%	94.7597%	98.8004%	99.7254%

This custom modeling was done by North East Enviromental Products, Inc. as a performance estimate only. No warranty is expressed or implied. For complete details of NEEP's Perfomance Warranty contact your ShallowTray representative. Report Generated: 3/28/97

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ShallowTray

Low Profile

The discreet size of a ShallowTray® air stripper does not advertise a contamination site. It is easily accessed for maintenance and can be installed inside a building. The system is also ideal as a trailer-mounted, portable stripper for pump tests, pilot studies, short-term cleanup, or emergency response. There is no tower.

Resistant to Fouling

ShallowTray systems are resistant to fouling problems. Treatment trays have large 3/16" (4.8mm) diameter aeration holes. In addition, the turbulent action of the froth scours the surfaces of the tray reducing build-up of oxidized iron.

If, under extreme conditions, oxidized iron accumulates or hardness begins to scale up, trays can be easily cleaned through ports using a washing wand and pressure washer. Trays can also be easily removed for a thorough inspection and cleaning.

Full Range Turndown

Not only are ShallowTray systems forgiving of "surprise" inorganics in the water, they also allow operation anywhere within the rated flow range. In fact, as the flow rate is reduced, performance increases. Also, as demands change (stricter effluent contaminant levels) so can the ShallowTray system. Its modular design allows for the addition of trays which increase the percent removal of contaminants.

No Disposal

ShallowTray systems have no packing or diffusers to contend with and no costs associated with GAC breakthrough, fouling or disposal and replacement.

Guaranteed Performance

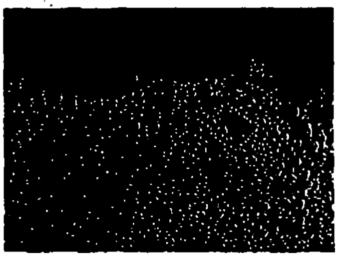
North East Environmental Products guarantees your system will perform as specified under the conditions specified.

Treatment

The ShallowTray process uses forced draft counter-current air stripping through horizontally extended aeration trays to remove volatile organic compounds from water.

Contaminated water is sprayed into the inlet chamber through a coarse mist spray nozzle. The water flows over a distribution weir and along the aeration tray. Clean air blown up through 3/16" (4.8mm) diameter holes in the aeration tray, forms a froth of bubbles generating a large mass transfer surface area where the contaminants are volatilized. The necessary contact or residence time to reach require volatilization is achieved through model size, addition of trays, and flow rate selection.

Air is blown up through hundreds of 3/16" (4.8mm) diameter holes in the aeration tray. The air forms a froth of bubbles approximately 6 inches (15.2cm) deep on the aeration tray, generating a large mass transfer surface area where the contaminants are volatilized.



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ShallowTray®
low profile air strippers

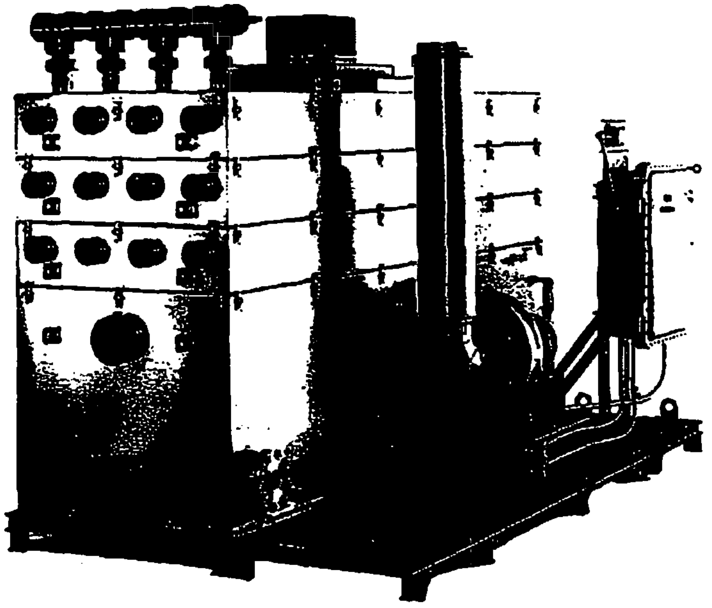
41200 Series

Model Pictured: 41231

Basic system includes the following components: Sump tank, cover, and trays, 304L stainless steel; TEFC air blower sized to number of trays; Blower inlet screen and damper; Demister pad, 304L stainless steel; Water inlet spray nozzle; Water level sight tube; Gaskets; Latches, stainless steel; Internal piping, Schedule 80 PVC; Tray cleanout ports.

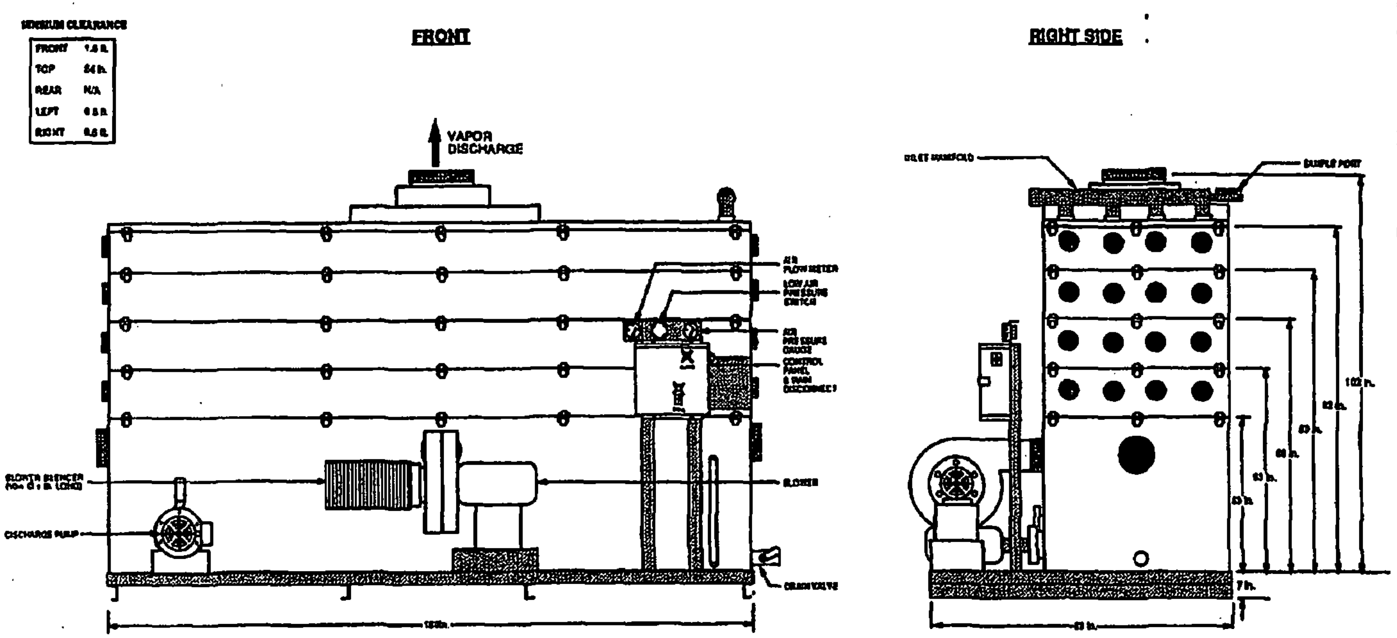
Options chosen for model pictured:

- ☑ Air pressure gauge
- ☐ Gravity discharge
- ☑ Steel frame
- ☑ EXP blower motors
- ☐ Discharge and/or feed pump, TEFC or EXP
- ☐ Blower start/stop panel only
- ☑ Main disconnect switch
- ☐ Standard NEMA 3R system control panel with alarm interlocks, motor starter, relays, alarm light, UL listed
- ☐ NEMA 3R control panel with level controls for pumps, alarm interlocks, [illegible]r starters, relays, alarm light, [illegible]sted
- ☐ PurgePanel™: NEMA 4X enclosure, small blower, pressure switch, and a small explosion-proof enclosure (NEMA 7)
- ☐ Control panel IS components for remote mounted NEMA 3R panel, UL listed
- ☑ NEMA 7 and/or custom control panel
- ☐ Strobe alarm light
- ☐ Alarm horn
- ☑ Low air pressure alarm switch
- ☑ High water level alarm switch
- ☑ Discharge pump level switch
- ☐ Water pressure gauges
- ☐ Digital water flow indicator & totalizer
- ☐ Air flow meter
- ☐ Temperature gauges
- ☑ Line sampling ports
- ☑ Air blower silencer
- ☐ Auto dialer
- ☐ Automatic operation components for multiple wells
- ☑ Other custom requirements (Please call)
  [illegible]mittent operation for the blower



The full range of options are available to meet your project's specifications.

Models	flow rate	# trays	width	length	height	min. cfm
41211	8-550gpm 1.8-125m³/hr	1	7'6" 2.3m	12'6" 3.8m	5'5" 1.7m	2400 4077m³/hr
41221	8-550gpm 1.8-125m³/hr	2	7'6" 2.3m	12'6" 3.8m	6'5" 2.0m	2400 4077m³/hr
41231	8-550gpm 1.8-125m³/hr	3	7'6" 2.3m	12'6" 3.8m	7'5" 2.3m	2400 4077m³/hr
41241	8-550gpm 1.8-125m³/hr	4	7'6" 2.3m	12'6" 3.8m	8'5" 2.6m	2400 4077m³/hr



BASIC SYSTEM

- ☑ SUMP TANK
- ☑ STRIPPER TRAYS
- ☑ BLOWER
- ☑ MIST ELIMINATOR
- ☑ PIPING
- ☑ SPRAY NOZZLE
- ☑ WATER LEVEL SIGHT TUBE
- ☑ GASKETS
- ☑ LATCHES

OPTIONAL ITEMS

- ☑ FRAME
- ☑ AIR PRESSURE GAUGE
- ☐ DISCHARGE PIPING
- ☑ DISCHARGE PUMP
- ☐ FEED PUMP
- ☐ ADDITIONAL BLOWER
- ☐ EXPLOSION-PROOF MOTOR(S)
- ☐ BLOWER START/STOP PANEL
- ☑ CONTROL PANEL
- ☑ MAIN DISCONNECT SWITCH
- ☐ I.S. COMPONENTS/REMOTE MOUNT
- ☐ INTERMITTENT OPERATION
- ☐ STROBE LIGHT
- ☐ ALARM HORN
- ☐ POWER LOSS INDICATOR
- ☑ LOW AIR PRESSURE ALARM SWITCH
- ☑ HIGH WATER LEVEL ALARM SWITCH
- ☑ DISCHARGE PUMP LEVEL SWITCH
- ☐ WATER PRESSURE GAUGE(S)
- ☐ DIGITAL WATER FLOW INDICATOR
- ☑ AIR FLOW METER
- ☐ TEMPERATURE GAUGE(S)
- ☑ LINE SAMPLING PORTS
- ☑ AIR BLOWER SILENCER
- ☑ WASHER WAND
- ☐ AUTO DIALER

NOTE:

1.) THIS DRAWING IS REPRESENTATIVE OF A TYPICAL CONFIGURATION SIMILAR TO THE UNIT REQUIRED, AND IS NOT INTENDED FOR ENGINEERING DESIGN OR LAYOUT. PLEASE CONTACT YOUR NEEP REPRESENTATIVE FOR DETAILED DESIGN INFORMATION.

POWER: 3Ø, 230 Volt, 4 WIRE + GROUND

*CONSULT N.E.E.P. FOR AMPACITIES AND OTHER VOLTAGE OPTIONS

CONNECTION INFORMATION

ITEM	SIZE
GRAVITY DISCHARGE	8 in. Ø SOCKET, PVC80
DISCHARGE PUMP	2.5 in. Ø FNPT
WATER INLET	6 in. Ø FNPT
AIR EXHAUST NOZZLE	18 in. Ø STUB W/18 in. CPLG

NORTH EAST ENVIRONMENTAL PRODUCTS, INC.
17 TECHNOLOGY DRIVE
WEST LEBANON, NEW HAMPSHIRE 03784
PHONE: 603-298-7061 FAX: 603-298-7063

TOLERANCES UNLESS OTHERWISE SPECIFIED: ± 1 INCH

DRAWING NAME: ShallowTray® Model 41241

DRAWING #: Proposal #385411-1

DRAWN: CJP

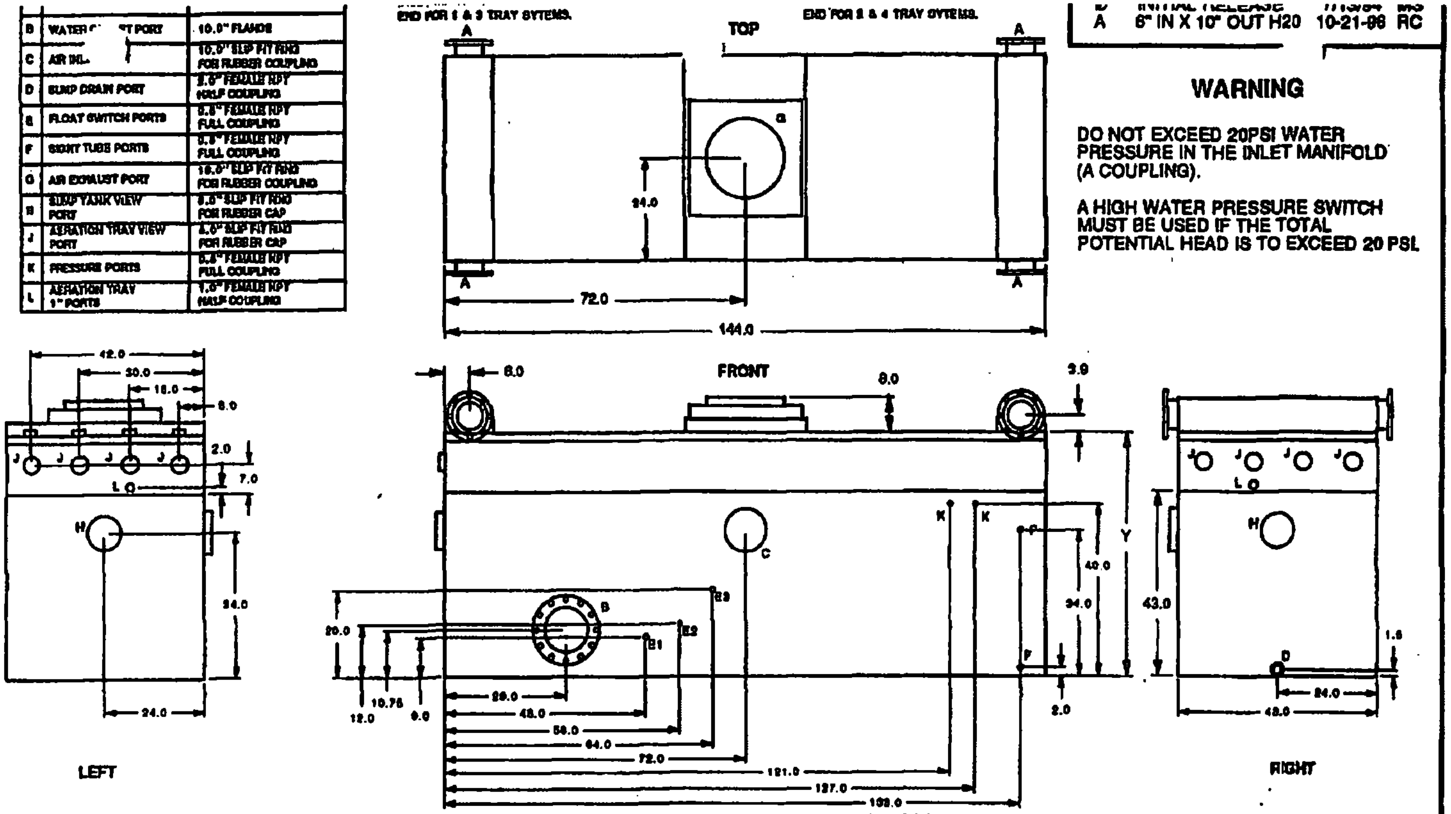
CUSTOMER: Levine & Fricke

DATE: 3/28/97

SCALE: NTS

SIZE: A

SHEET: 1 OF: 1



B	WATER [illegible] PORT	10.0" FLANGE
C	AIR INL	10.0" SLIP FIT RING FOR RUBBER COUPLING
D	SUMP DRAIN PORT	2.0" FEMALE NPT HALF COUPLING
E	FLOAT SWITCH PORTS	0.5" FEMALE NPT FULL COUPLING
F	SIGHT TUBE PORTS	0.5" FEMALE NPT FULL COUPLING
G	AIR EXHAUST PORT	10.0" SLIP FIT RING FOR RUBBER COUPLING
H	SUMP TANK VIEW PORT	6.0" SLIP FIT RING FOR RUBBER CAP
J	AERATION TRAY VIEW PORT	4.0" SLIP FIT RING FOR RUBBER CAP
K	PRESSURE PORTS	0.5" FEMALE NPT FULL COUPLING
L	AERATION TRAY 1" PORTS	1.0" FEMALE NPT HALF COUPLING

A 6" IN X 10" OUT H20 10-21-96 RC

WARNING

DO NOT EXCEED 20PSI WATER PRESSURE IN THE INLET MANIFOLD (A COUPLING).

A HIGH WATER PRESSURE SWITCH MUST BE USED IF THE TOTAL POTENTIAL HEAD IS TO EXCEED 20 PSI.

SWITCH LOCATION

E1	E2	E3	
			FLOAT SWITCH, NORMALLY OPEN
			FLOAT SWITCH, NORMALLY CLOSED
			0.5" NPT PLUG

DIMENSION CHART (INCHES)

	Y
41211	55.25
41221	67.5
41231	79.75
41241	92

NOTE:
INCLUDES ADDITIONAL HEIGHT OF GASKET BETWEEN TRAYS AND COVER.

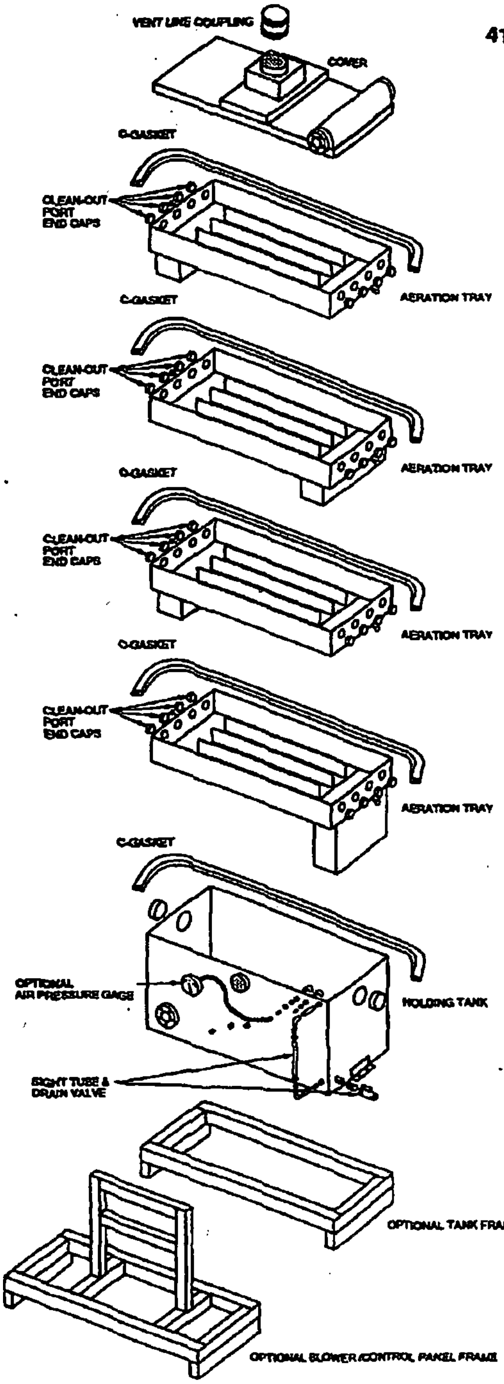
NORTH EAST ENVIRONMENTAL PRODUCTS, INC.
17 TECHNOLOGY DRIVE
WEST LEBANON, NEW HAMPSHIRE 03784

TITLE
41200 COUPLING LAYOUT

SIZE	DWG NO.	SHEET	REV
A	900-160-00076	1 of 1	A

SCALE		DRAWN	DATE
NONE	DO NOT SCALE DRAWING	MS	7/13/94

41241 BASE SUBASSEMBLY



1 - (200-160-00199), COVER ASSEMBLY
1 - (200-150-00216), AERATION TRAY ASSEMBLY, 41" DC
3 - (200-160-00210), AERATION TRAY ASSEMBLY, 11" DC
1 - (200-150-00200), HOLDING TANK ASSEMBLY
1 - (200-140-00020), SIGHT TUBE ASSEMBLY
1 - (300-140-00250), NIPPLE FOR DRAIN VALVE
1 - (300-140-02700), DRAIN VALVE
8 - (300-140-02020), PLUG, 1" THREAD, PVC40
1 - (300-160-00020), DEMISTER PAD, 41200
1 - (300-150-00197), FERNCO RUB. COUPLING 16"x16"
32 - (300-130-00250), CAP, RUBBER 4"
2 - (300-150-00200), CAP, RUBBER 8"
2 - (300-140-02550), 1/8" HOSE BARB
3 - (300-140-02520), 1/2"Mx1/2"F STREET EL, BRASS
2 - (300-140-02205), 1/2"Mx1/8"F BUSHING, BRASS
1 - (300-140-02735), 1/8"Mx1/8"F VALVE, BRASS
160 ft. - (300-150-00250), O-SHAPED GASKET

SELECT OPTIONAL FRAME COMPONENTS AS REQUIRED:

☐ 1 - (300-170-00100), TANK FRAME, 41200
☐ 1 - (300-170-00090), BLOWER FRAME, 41200
☐ 1 - (300-170-00045), CONTROL PANEL MOUNT

NORTH EAST ENVIRONMENTAL PRODUCTS, INC.
17 TECHNOLOGY DRIVE
WEST LEBANON, NH 03784
[illegible]

TOLERANCES UNLESS OTHERWISE SPECIFIED
DRAWING NAME: 41241 BASE SUBASSEMBLY
DRAWING #: 200-160-00524
DRAWN: MS 10/8/02
REV:

Appendix H

APPENDIX H

RECON REPORT ON AIR-QUALITY MODELING

Air Quality Modeling of Proposed
Groundwater Remediation System
at North Indian Bend Wash (NIBW) Area 7
Superfund Site.
Scottsdale, Arizona

CONTENTS

1.0 INTRODUCTION AND SUMMARY

Levine·Fricke·Recon Inc. (LFR) conducted an air quality modeling analysis for the proposed groundwater extraction and treatment system to be installed at the North Indian Bend Wash (NIBW) Area 7 Superfund site in Scottsdale, Arizona. This analysis was performed to determine whether expected air emissions from an air stripper at the site would result in off-site concentrations of trichloroethene (TCE) in excess of applicable state and local requirements.

Dispersion modeling was conducted using five years of representative meteorological data from the Phoenix/Scottsdale area, and accounted for wake effects associated with nearby structures both within and beyond the property boundaries. Baseline emissions from the treatment system stack were used as input to the Industrial Source Complex - Short Term (ISCST3) model to predict maximum boundary line and off-site TCE concentrations. The predicted concentrations were compared to applicable regulatory requirements to determine the allowable emission rates to maintain air quality impacts below regulatory thresholds. LFR also evaluated the effect of changes in stack height and stack diameter on overall air quality impacts.

This document contains the results of the modeling effort as well as an analysis of the resulting contaminant impacts compared to established criteria. Results for each condition studied indicated that short-term (1-hour and 24-hour) concentration impacts from the stack are well below the Arizona Ambient Air Quality Guidelines. Acceptable long-term (annual) average impacts can be achieved by limiting total daily TCE emissions through the use of supplementary emission control.

2.0 REGULATORY REQUIREMENTS

Atmospheric dispersion modeling was conducted to determine whether the proposed groundwater extraction and remediation system stack at the NIBW Area 7 will be able to operate in compliance with the Arizona Ambient Air Quality Guidelines for trichloroethene (TCE). A copy of these guidelines is attached as Appendix I.

The Guidelines list the acceptable ambient levels of over 350 compounds, in terms of 1-hour, 24-hour, or annual average concentrations. Facilities must demonstrate that emissions will not result in ground-level concentrations of any toxic air contaminant beyond their property boundary in excess of the acceptable level. Ambient levels are intended to be protective of human health. Short-term (1- and 24-hour standards) represent levels protective of acute health impacts, while annual average standards are developed to protect against chronic impacts (e.g., carcinogenic effects).

The NIBW Area 7 treatment system will emit small quantities of TCE as a result of the process of stripping the contaminant from groundwater. The applicable Ambient Air Quality Guidelines for this contaminant are as follows:

Averaging Time	Maximum Allowable TCE Concentration
1-hour	1,100 micrograms per cubic meter
24-hour	280 micrograms per cubic meter
Annual	0.76 micrograms per cubic meter

In addition, the Maricopa County Air Pollution Control Division (MCAPCD) requires that any remediation installation emitting more than three pounds of total volatile organic compounds (VOCs) must obtain an air permit. The state Ambient Air Quality Guidelines are still applicable to this site if air emissions are less than 3 lb/day. Therefore, modeling is necessary to assure acceptable off-site impacts.

3.0 PROJECT DESCRIPTION

3.1 Project Overview

The NIBW Area 7 site is a parcel of approximately 2.25 acres located at the southeast corner of 75th and Second Streets in Scottsdale, Arizona. The site is in an area of mixed commercial and residential land uses, and is occupied by office buildings and light industrial facilities. The City of Scottsdale operates a police impound yard at Area 7 as well.

Reportedly, past industrial activities at Area 7 have resulted in releases of solvents which impacted vadose zone soil and groundwater beneath and down gradient of the site. Recent remedial activities at the site have addressed VOC-contaminated soil and shallow groundwater. A groundwater extraction and treatment system is proposed to address VOCs in the Middle Alluvial Unit groundwater beneath and down gradient of the site. The major components of this system will include submersible water pumps, well head equipment, piping from the well heads to the treatment plant, an equalization tank, a UV/Ox reactor, a low-profile air stripper, vapor-phase GAC, and a treated groundwater discharge system.

Simplified site and area maps are provided in Appendix II. The groundwater treatment system will be located within a structure with a pitched roof a maximum of 14 feet above grade. The system is located near the southeastern corner of the site, at approximately 3705900 m North, 414680 m East using Universal Transverse Mercator (UTM) coordinates.

The stack base elevation, from USGS topographic maps of the area, is approximately 1240 feet above mean sea level (MSL). However, due to the relatively flat topography in the general area of the site, flat terrain has been assumed for all model runs.

3.2 Facility Layout

Site layout drawings are provided in Appendix II, which show additional detail of the NIBW Area 7 site and proposed treatment system location. The facility layout drawings include a scale and an indication of the direction to true North.

3.3 Source Data

The relevant stack parameters for input to the dispersion model are as follows:

Base Elevation:	0 ft (assumed)
Stack Height:	16 ft (baseline), 18ft
Stack Diameter:	11 inches (baseline), 10 inches
Flow Rate:	2,400 CFM
Exit Temperature:	80°F
Stack Exit Velocity:	60 ft/sec (3600 ft/min)

Stack base elevation was set at zero, as flat terrain was assumed for modeling. Stack height and diameter were based on conceptual designs by LFR, as were gas flow rate and exit temperature.

In order to evaluate variations in offsite impact, additional model runs were conducted using alternate stack heights (16 and 18 feet above grade) and stack exit diameters (10 and 11 inches). The "baseline" condition for this analysis is defined as a 16-foot stack with an 11-inch exhaust diameter.

3.4 Emission Data

The model runs were conducted using a baseline emission rate of 0.125 lb/hr of TCE, corresponding to the 3 lb/day limit at which air permitting is required by Maricopa County. The resulting concentration impacts were then converted to true modeled impacts by scaling the unit impacts up or down corresponding to the actual stack emission rate as described in Section 6 of this report. The actual modeled impacts were then evaluated against the Arizona Ambient Air Quality Guidelines described in Section 2.

4.0 SITE CHARACTERISTICS

4.1 Land Use

In order to determine the proper dispersion coefficients to be used with the model, an analysis of surrounding land use was conducted. LFR utilized a simplified version of the Auer land use technique to identify and classify land usage. In the Auer method, land use is evaluated within a 3-kilometer radius of the source and subdivided into twelve categories depending on use, structures, and vegetation.

In the case of the NIBW Area 7 modeling, maximum impacts were expected to occur within one kilometer of the stack. LFR evaluated the topographic maps for land use classifications within the area of interest and concluded that the area was best characterized as urban in nature. LFR therefore selected urban rather than rural dispersion coefficients for use in the model.

4.2 Local Topography

USGS topographic maps were also used to assess the general topography in the region of the NIBW Area 7 site and define any features of importance to the modeling analysis.

The site is located in Scottsdale, Arizona on relatively flat terrain approximately 1240 above mean sea level. Terrain within a 2- to 3-kilometer radius of the site is best described as flat or gently rolling, with overall elevations gradually increasing to the west and northwest. The two most significant terrain features are Camelback Mountain, located 3 kilometers to the northwest and reaching an elevation of 2700 feet above MSL, and Barnes Butte, located 3.5 kilometers to the southwest, at 1750 feet above MSL. However, because maximum air impacts are expected to occur within several hundred meters of the stack, complex terrain features were not addressed as part of this study.

4.3 GEP Stack Height

In situations where building wake effects may have an impact on the stack plume, EPA requires that a Good Engineering Practice (GEP) stack height analysis be conducted. GEP stack height is determined based on the parameters of surrounding structures. EPA stack height regulations (40 CFR 51) define the GEP stack height to be

$$H_{GEP} = H_b + 1.5L$$

where H_b is the height of a nearby structure. The variable L is called the critical dimension, and is equal to the lesser of the structure height or maximum projected width.

For most structures, the width exceeds the height, and the formula reduces to HGEP = 2.5Hb. In other words, the GEP stack height is typically 2.5 times the height of the highest nearby structure. Stacks shorter than GEP stack height are assumed to be influenced by wake effects from nearby structures. A structure is considered to be "nearby" if its impact area encompasses the stack location. The impact area is assumed to extend outward from a structure to a distance of 5 times the critical dimension.

The NIBW Area 7 groundwater treatment system will be housed in a structure which is 14 feet above grade at its highest point. The exhaust stack is designed to be 16 feet above grade. There are other structures in the vicinity of the treatment system which are as tall as 25 feet above grade. Under these conditions, buildings may exert wake effects on the exhaust plume. In order to properly account for building wake effects, the dominant structure must be determined for each wind direction relative to the stack, and building downwash must be accounted for in the model.

To properly account for building downwash, LFR used the BPIP add-on software developed by Trinity Consultants, Inc. of Dallas, TX. Coordinates and heights for all structures in the vicinity of the NIBW Area 7 site were entered. The BPIP program calculated direction-specific building dimensions (height and projected width) at 10 degree increments from 10 to 360 degrees about the stack. These data were then used as input to the ISCST3 model, described in further detail in Section 5.1.

4.4 Meteorology

LFR used preprocessed hourly meteorological data from approved National Weather Service (NWS) monitoring stations in the vicinity of the NIBW Area 7 site. The meteorological data set used for the model is from the Phoenix, AZ surface station (#23183) and the Tuscon, AZ mixing height station (#23160) for the years 1988-1992 inclusive. These data represent the nearest stations with respect to the project site, and were thus deemed to be the most representative available. Long-term air toxics modeling is relatively insensitive to specific data years; therefore, we would not expect the choice of different years of meteorological data to appreciably affect the modeling results.

Windrose plots showing the frequency of wind speeds and directions from the Phoenix surface station are provided in Appendix III.

5.0 MODELING ANALYSIS

5.1 Model Selection

LFR conducted the modeling analysis using the Industrial Source Complex - Short-Term (ISCST3) model, version 96113. This model is capable of calculating short-term averages (1-hour and 24-hour) as well as annual averages. This model is the EPA-preferred model for single or multiple point sources in simple terrain.

LFR used a PC-compatible adaptation of the ISCST3 model developed by Trinity Consultants, Inc. of Dallas, TX. This model incorporates a user-friendly front-end interface, but is in all other ways identical to the EPA model.

5.2 Model Options

LFR conducted the ISCST model runs using the following model option settings:

Number of Source Groups:	1
Concentrations or Depositions:	Concentrations
Dispersion Mode:	Urban
Regulatory Default Option:	On
Source Emission Variation:	None
Anemometer Height:	10 meters
Source Rate Conversion Factor:	1.0E6
Decay Coefficient:	0
Wind Direction Correction:	0
Acceleration due to Gravity:	9.8 m/s^2

5.3 Receptor Selection and Location

The modeling analysis was designed to assess whether exceedances of the applicable air toxics standards would occur at or beyond the NIBW Area 7 site boundaries. Since the groundwater treatment system stack is relatively short, maximum impacts were expected to occur close to the facility.

A network of 360 receptors was established using a polar grid system. Radials were established at 10-degree intervals in all directions. Rings were placed downwind of the stack at the following distances: 50 m; 100 m; 150 m; 200 m; 250 m; 300 m; 400 m; 500 m; 600 m; 800 m; and 1000 m. Preliminary screening modeling indicated that maximum impacts dropped off sharply in all directions at distances beyond 200 m; therefore, refined modeling was confined to a 1000 m radius around the facility. The stack is located in the approximate center of the grid system, at coordinates (-4.7 m, 12.7 m).

In addition, a set of discrete receptors was established about the perimeter of the NIBW Area 7 site spaced at approximately 20-meter intervals. A total of 30 receptors were used to encircle the entire site. Coordinate locations were assigned to each receptor consistent with the system set up for the receptor grid, stack location, and building coordinates. The location of the fenceline receptors is depicted on the simplified site map in Appendix II, as is a portion of the polar receptor grid near the stack.

All grid and fenceline receptors are located at ground level. Because the terrain elevations in the vicinity of the stack do not vary considerably over the area of interest, terrain elevations were not used in the model. Rather, all terrain elevations were assigned a datum height of zero.

6.0 MODELING RESULTS

6.1 Refined Modeling of Baseline Emission Impacts

Table 1 is a summary of the output from the refined ISCST3 model runs, under the baseline stack conditions (16 ft stack height, 11 inch stack diameter). For each of the five meteorological years evaluated, data are provided on the magnitude and location of maximum impacts, using 1-hour, 24-hour and annual averaging times. Data are reported for the highest off-site grid receptor or fenceline discrete receptor.

The maximum emission impacts generally occurred within 200 feet of the stack, although the direction of maximum impact varied with averaging time. One-hour maximum impacts occurred to the north of the stack along the 50-meter ring, while maximum 24-hour impacts were generally observed to the east and northeast. The maximum 1-hour average impact occurred in 1988, while the highest 24-hour average was predicted for 1991. Maximum annual impacts for each year studied occurred to the northeast of the stack, along the 50 meter ring. The maximum annual average impact occurred in 1989.

The modeled impacts reflect an assumed emission rate of 3 lb TCE per day (0.125 lb/hr). Under these conditions, all 1-hour and 24-hour modeled impacts were well below the respective Arizona Ambient Air Quality Guideline concentrations of 1100 ug/m^3 and 280 ug/m^3, respectively. The highest observed 1-hour average concentration impact beyond the property boundary was 23.8 ug/m^3, and the highest 24-hour average was 9.31 ug/m^3. However, off-site annual impacts exceeded the guideline concentration of 0.76 ug/m^3 in several cases (reaching a maximum of 1.53 ug/m^3), implying that a 3 lb/day emission rate may result in unacceptable long-term impacts beyond the property boundaries. Therefore, LFR also evaluated "allowable" emissions in lb/day required to maintain the annual average off-site impact below the guideline value. This emission rate is calculated based on the linear relationship between the single point source emission rate and the resulting maximum concentration impact. That is,

$$\frac{\text{Allowable lb/day}}{\text{Modeled lb/day}} = \frac{\text{Allowable concentration}}{\text{Modeled concentration}}$$

or

$$\frac{\text{Allowable lb/day}}{\text{3 lb/day}} = \frac{0.76\ \text{ug/m}^3}{\text{Modeled concentration}}$$

Therefore, the allowable daily TCE emission rate is related to the modeled maximum off-site concentration by the following equation.

$$(3\ \text{lb/day})\ (0.76\ \text{ug/m}^3)$$

$$\text{Allowable lb/day} = \frac{(3\ \text{lb/day})\ (0.76\ \text{ug/m}^3)}{\text{Modeled concentration}}$$

Therefore, given the maximum modeled TCE concentration, the allowable TCE emission rates (in lb/day) needed to remain at or below the annual guideline value is (3.0)(0.76)/(1.53), or 1.49 lb/day.

It should be noted that annual average impacts are typically correlated to chronic (i.e., carcinogenic) health effects, which are assumed to occur over a 70-year lifetime. Since the project duration is expected to be significantly less than 70 years, use of the annual average criterion adds a degree of conservatism to the overall model results. Nonetheless, we have elected to base the analysis on off-site impacts which do not exceed the state standard of 0.76 ug/m^3.

Hardcopy printouts of the baseline model runs, for all five meteorological years, are provided in Appendix IV.

6.2 Refined Modeling of Alternate Stack Parameters

LFR also conducted model runs to evaluate the effect of raising stack height from 16 to 18 feet above grade, and reducing stack diameter from 11 to 10 inches, holding all other parameters constant. Both of these measures serve to increase effective plume height, either by physically raising the stack discharge point or by increasing stack exit velocity. This in turn has the effect of lowering ground level concentrations. These runs were conducted using 1989 meteorological data, because this data set produced the highest annual average off-site impacts.

Results of these model runs are depicted in Table 2. Increasing the stack height from 16 to 18 feet resulted in a 13 percent decrease in maximum annual average off-site impacts, while a reduction in stack diameter reduced impacts 11 percent. Raising stack height and lowering stack diameter in tandem resulted in a reduction in maximum impact of approximately 21 percent from the annual baseline. Table 2 also includes the allowable emission limits to remain below the Arizona AAQG for TCE, calculated using the methodology described in Section 6.1.

Hardcopy printouts of the additional model runs are provided in Appendix V.

TABLE 1. SUMMARY OF ISCST3 BASELINE MODEL RUNS

Baseline Conditions: Stack Height = 16 Ft.

Stack Diameter = 11 Inches

	1988			1989			1990			1991			1992		
	1 hr	24 hr	Annual	1 hr	24 hr	Annual	1 hr	24 hr	Annual	1 hr	24 hr	Annual	1 hr	24 hr	Annual
Magnitude (ug/m^3)	23.75	6.58	1.22	23.73	5.88	1.53	23.37	5.97	1.43	23.41	8.31	1.44	23.16	9.00	1.22
Location (X,Y)(m)	8.75, 49.25	46.86, 17.10	46.98, 17.1	8.75, 49.25	38.37, 32.13	43.3, 25.0	8.75, 49.25	46.98,17.10	43.3, 25.0	8.75, 49.25	43.30, 25.00	43.3, 25.0	25.05, 43.29	-49.16, -8.67	48.98, 17.1

Arizona AAQG For TCE (ug/m3)

1hr	1100
24 hr	280
Annual	0.78

LEVINE.FRICKE.RECON

TABLE 2. SUMMARY OF ISCST3 MODEL RUNS FOR ALTERNATE STACK PARAMETERS

(All Runs Reflect 1989 Meterological Data)

Arizona Ambient Air Quality Guidlines For TCE (ug/m3) (ug/m3)		Model Results Based on 0.125 lb/hr of TCE Emission (ug/m^3)								Allowable Emissions Based on Model Results (lb/day)			
		16 ft. Stack ht. 11"stack diam.		16 ft. Stack ht. 10" stack diam.		18 ft. Stack ht. 11" diam.		18 ft. Stack ht. 10" stack diam.		16 ft. Stack ht. 11" stack diam.	16 ft. Stack ht. 10" stack diam.	18 ft. Stack ht. 11" stack diam.	18 ft. Stack ht. 10 " stack diam.
		conc	location	conc	location	conc	location	conc	location				
1hr	1100	30.30	-18.55,1.33	28.87	-18.55,1.33	25.8	1.45,40.34	23.75	1.45,40.34				
24 hr	280	6.66	-38.55,1.33	5.64	46.98,17.10	5.71	-38.55,1.33	4.89	-38.55,1.33				
Annual	0.76	1.53	43.3, 25.0	1.36	43.3,25.0	1.32	48.98,17.10	1.21	43.3,25.0	1.49	1.67	1.73	1.69

APPENDIX I

Arizona Ambient Air Quality Guidelines

ARIZONA AMBIENT AIR QUALITY GUIDELINES

dated 4/20/93 **Previous Update 8/10/92**

Name	CAS #	Formula	1 Hour	24 Hour	Annual
cetaldehyde	75-07-0	CH_3CHO	2,300	1,400	5.0 E-1
cetic Acid	64-19-7	CH_3COOH	562.5	187.5	
cetone	67-64-1	C_3H_6O	20,000	14,000	
cetonitrile	75-05-8	C_2H_3N	880	560	
cetophenone	98-86-2	C_8H_8O	150	40	
cetyl Acetone	123-54-6	$C_5H_8O_2$	*NO DATA*		
crolein	107-02-8	C_3H_4O	6.7	2	
crylamide	79-06-1	C_3H_5NO	5.0	2.4 E-1	1.3 E-3
crylic Acid	79-10-7	$C_3H_4O_2$	900	240	
crylonitrile	107-13-1	C_3H_3N	21	5.5	1.5 E-2
ldrin	309-00-2	$C_{12}H_8Cl_6$	3.8 E-1	1.0 E-1	2.8 E-4
phatic Naphtha	8030-30-6	—		2,600	
llyl Alcohol	107-18-6	C_3H_6O	83	40	
luminum - Total Dust	7429-90-5	Al	450	120	
luminum - Respirable Dust	7429-90-5	Al	150	40	
luminum - Pyro Powders	7429-90-5	Al	150	40	
luminum - Welding Fumes	7429-90-5	Al	150	40	
luminum - Soluble Salts	7429-90-5	Al	61	16	
luminum Nitride		AlN	*NO DATA*		
luminum Oxide	1344-28-1	Al_2O_3	450	15C	
mmonia	7664-41-7	NH_3		140	
m[illegible]um Nitrate			*NON-TOXIC*		
niline	62-53-3	C_6H_7N	170	66	1.8 E-1
ntimony	7440-36-0	Sb	15	4.0	
rsenic	7440-38-2	As	1.7 E-2	7.3 E-2	2.0 E-4
rsenic Pentoxide	1303-28-2	As_2O_5	1.7 E-2	7.3 E-2	2.0 E-4
rsenic Trioxide (Arsenous Oxide)	1327-53-3	As_2O_3	1.7 E-2	7.3 E-2	2.0 E-4
rsine	7784-42-1	AsH_3	1.7 E-2	7.3 E-2	2.0 E-4
zinphos (Ethyl Guthion)	2642-71-9		5.0	1.6	
arium	7440-39-3	Ba	15	4.0	
arium Oxide	1304-28-5	BaO	15	4.0	
arium Sulfate (Total Dust)	7727-43-7	$BaSO_4$	300	80	
arium Sulfate (Respirable Fraction)	7727-43-7	$BaSO_4$	150	40	
enzaldehyde	100-52-7	C_7H_6O	*NO DATA*		
enzene	71-43-2	C_6H_6	197.2 b	16.0 b	4.4 E-2 b
enzene	71-43-2	C_6H_6	630	51	1.4 E-1
enzidine	92-87-5	$C_{12}H_{12}N_2$	2.1 E-1	5.5 E-3	1.5 E-5
enz(a)anthracene	56-55-3	$C_{18}H_{12}$	7.9 E-1	2.1 E-1	5.7 E-4
enzo(a)Pyrene	50-32-8	$C_{20}H_{12}$	7.9 E-1	2.1 E-1	5.7 E-4
enzoic Acid	65-85-0	$C_7H_6O_2$	*NO DATA*		
enzyl Alcohol	100-51-6	C_7H_8O	*NO DATA*		
Be[illegible] Chloride	100-44-7	C_7H_7Cl		7.34 b	12
Be[illegible]m	7440-41-7	Be	6.0 E-2	1.6 E-2	5.0 E-4
is(2-chloroethyl) Ether	111-44-4	$C_4H_8Cl_2O$	38	1.6	4.3 E-3
is(chloromethyl) Ether	542-88-1	$C_2H_4Cl_2O$	5.3 E-4	1.4 E-4	3.8 E-7

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Substance Name	CAS #	Formula	1 Hour	24 Hour	Annual
Bis(2-ethylhexyl) Phthalate	117-81-7	$C_{24}H_{38}O_4$	83	4.0	3.4 E-1
Bismuth Oxide	1304-76-3	Bi_2O_3	150	40	
Borates	—	—	22.5	7.5	
Boron	7440-42-8	B	23	7.5	
Boron Nitride		BN	*NO DATA*		
Boron Oxide	1303-86-2	B_2O_3	170	80	
Boron Trichloride	10294-34-5	BCl_3		38	
Boron Trifluoride	7637-07-2	BF_3		23	
Bromodichloromethane	75-27-4	$CHBrCl_2$	36	9.5	2.6 E-2
Bromoform	75-25-2	$CHBr_3$	150	40	
Bromomethane	74-83-9	CH_3Br	500	160	
1,3-Butadiene	106-99-0	C_4H_6	7.2	1.9	6.7 E-2
Butanal	123-72-8	C_4H_8O	*NO DATA*		
n-Butanol	71-36-3	C_4H_9OH	3,800	2,400	
2-Butoxyethanol	111-76-2	$C_6H_{14}O_2$	720	190	
1-Butyl Acetate	123-86-4	$C_6H_{12}O_2$		5,300	
n-Butyric Acid	107-92-6	$C_4H_8O_2$	300	80	
Butyrolactone	96-48-0	$C_4H_6O_2$	*NO DATA*		
Cadmium	7440-43-9	Cd	1.7	1.1 E-1	2.9 E-4
Calcium Carbonate-Total Dust	1317-65-3	$CaCO_3$	450	120	
Calcium Carbonate-Respirable Fraction	1317-65-3	$CaCO_3$	150	40	
Calcium Fluoride	7789-74-5	CaF_2	76	20	
Calcium Nitrate	10124-37-5	$Ca(NO_3)_2$	*NON-TOXIC*		
Calcium Oxide	1305-78-3	CaO	150	40	
Caprolactam - Dust	105-60-2	$C_6H_{11}NO$	25	8.0	
Caprolactam - Vapor	105-60-2	$C_6H_{11}NO$	330	160	
Captan	133-06-2	$C_9H_8Cl_3NO_2S$	120	40	1.0
Carbon Black	13333-86-4	C		26	
Carbon Disulfide	75-15-0	CS_2	91	24	
Carbon Monoxide	630-08-0	CO	35 p F	8 hour std	9 p F
Carbon Monoxide	630-08-0	CO	40 E+3 F	8 hour std	10 E+3 F
Carbon Tetrachloride	56-23-5	CCl_4	49	13	3.6 E-2
Carbonyl Fluoride	353-50-4	CF_2O	120	40	
Carbonyl Sulfide	463-58-1	COS	120	40	
Cellulose Nitrate (Total Dust)	9004-70-0	$C_{12}H_{16}O_{18}N_4$	450	120	
Cellulose Nitrate (Respirable Fraction)	9004-70-0	$C_{12}H_{16}O_{18}N_4$	150	40	
Cellulose Tetranitrate	9004-70-0				*NO DATA*
Chlorine	7782-50-5	Cl_2	69	23	
Chlorobenzene	108-90-7	C_6H_5Cl		557.8 b	
Chlorobenzene	108-90-7	C_6H_5Cl		2,560	
2-Chloro-1,3-butadiene	9010-98-4	$(C_4H_5Cl)n$	1100	280	
Chlorodane	57-74-9	$C_{10}H_6Cl_8$	17	1.1	2.9 E-3
Chloroform	67-66-3	$CHCl_3$	60	16	4.3 E-2
Chloromethane	74-87-3	CH_3Cl	36	9.5	2.6 E-2
Chloromethyl Methyl Ether	107-30-2	C_2H_5ClO			*NO DATA*

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Substance Name	CAS #	Formula	1 Hour	24 Hour	Annual
3-C[illegible]ropropene	107-05-1	C_3H_5Cl		7.5 b	
3-Chloropropene	107-05-1	C_3H_5Cl		23.5	
Chlorothalonil	1897-45-6	$C_8Cl_4N_2$	60	16	4.3 E-2
Chromic Oxide	1333-82-0	Cr_2O_3	15	4.0	
Chromium	7440-47-3	Cr	11	3.8	
Chromium VI	7440-47-3	Cr (VI)	1.1 E-1	2.9 E-2	8.0 E-5
Cobalt Nitrate	10141-47-3	CoN_{20}	*NON-TOXIC*		
Cinnamaldehyde	104-55-2	C_9H_8O			
Copper (fume)	7440-50-8	Cu	2.3	7.5 E-1	
Cuprous Chloride	7758-89-6	Cu_2O	23	7.5	
Cuprous Oxide	1317-39-1	CuO	30	8	
Cote	—		*NON-TOXIC*		
Cresols	1319-77-3	C_7H_8O	640	170	
Cupric Chloride	1344-67-8	$CuCl_2$	23	7.5	
Cupric Oxide	1317-38-0	CuO	30	8	
Diacetone Alcohol	123-42-2	$C_6H_{12}O_2$	3,000	1,900	
DDT (Dichlorodiphenyltrichloroethane	50-29-3	$C_{14}H_9Cl_5$	25	5.1	1.4 E-2
DDD	72-54-8	$C_{14}H_{10}Cl_4$	25	5.1	1.4 E-2
DDE	72-55-9	$C_{14}H_8Cl_4$	25	5.1	1.4 E-2
Diazinon	333-41-5	$C_{12}H_{21}O_3PSN_2$	2.4	8.0 E-1	
Dibenzo(a,h)anthracene	53-70-3	$C_{22}H_{14}$	7.9 E-1	2.1 E-1	5.7 E-4
Di[illegible]ne	19287-45-7	B_2H_6		7.5 E-1	
Dibromochloromethane	124-48-1	$CHBr_2Cl$	36	9.5	2.6 E-2
1,2-Dibromo-3-chloropropane	96-12-8	$C_3H_5Br_2Cl$	3.0 E-1	7.9 E-2	4.0 E-3
1,2-Dibromoethane	75-34-3	$C_2H_4Cl_2$	9.1 E-2	2.4 E-2	6.7 E-5
1,2-Dichlorobenzene	95-50-1	$C_6H_4Cl_2$	9,100	2,400	
1,4-Dichlorobenzene	106-46-7	$C_6H_4Cl_2$	250	66	1.8 E-1
Dichlorodifluoromethane	75-71-8	CCl_2F_2	10,515 b	7,886 b	
Dichlorodifluoromethane	75-71-8	CCl_2F_2	52,000	39,000	
1,1-Dichloroethane	75-34-3	$C_2H_4Cl_2$	8,400	3,200	8.8
1,2-Dichloroethane	107-06-2	$C_2H_4Cl_2$	53	14	3.8 E-2
1,2-Dichloroethane	107-06-2	$C_2H_4Cl_2$	13.1 b	3.46 b	9.4 E-3 b
1,1-Dichloroethene	75-35-4	$C_2H_2Cl_2$	420	110	3.0
1,2-Dichloroethene	156-59-2	$C_2H_2Cl_2$	23,800	6,300	
Dichloromethane	75-09-2	CH_2Cl_2	7,600	2,000	5.6
Dichloromethane	75-09-2	CH_2Cl_2	2,187.8 b	575.7 b	1.66 b
1,2-Dichloropropane	78-87-5	$C_3H_6Cl_2$	4,300	2,800	
2,4-Dichlorophenol	120-83-2	$C_6H_4Cl_2O$	6.0	1.6	
Dichlorosilane	4109-96-0	$SiCl_2H_2$		5.3	
Dicofol	115-32-2		9.0	3.0 *	8.0 E-2
Dieldrin	60-57-1	$C_{12}H_8Cl_6O$	4.2 E-1	1.1 E-1	2.9 E-4

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Substance Name	CAS #	Formula	1-Hour	24-Hour	Annual
Diethylene Glycol Monobutylether Acetate	124-17-4	$C_{10}H_{20}O_4$	720	190	
Diethylene Glycol Monobutyl Ether (Butyl Carbitol)	112-34-5	$C_8H_{18}O_3$	490	130	
Diethylene Triamine	111-40-0	$C_4H_{13}N_3$	80	30	
Diethyl Phthalate	84-66-2	$C_{12}H_{14}O_4$	83	40	
Diethyl Telluride	627-54-3	$C_4H_{10}Te$		7.5 E-1	
Diethylstilbestrol	56-53-1	$C_{18}H_{20}O_2$			*NO DATA*
Dimethoate	60-51-5	$C_5H_{12}NO_3PS$	3.0 E-1	1.0 E-1	
2,5-Dimethyl Furan	625-86-5	C_6H_8O	*NO DATA*		
Dimethyl Disulfide	624-92-0	$(CH_3)_2S_2$	210	55	
Dimethylnitrosoamine	62-75-9	$C_2H_6N_2O$	2.5 E-1	6.6 E-2	1.8 E-4
Dimethyl Sulfate	77-78-1	$(CH_3)_2SO_4$	15	4	
Dimethyl Sulfide	75-18-3	$(CH_3)_2S$	420	110	
Di-n-butyl Phthalate	84-74-2	$C_{16}H_{22}O_4$	83	40	
Di-n-Octyl Phthalate	117-84-0	$C_{24}H_{38}O_4$	80	40	
2,4-Dinitrophenol	51-28-5	$C_6H_4N_2O_5$	6.0	1.6	
2,4-Dinitrotoluene	121-14-2	$C_7H_6N_2O_4$	42	5.5	1.5 E-
1,4-Dioxane	123-91-1	$C_4H_8O_2$	9,000	150	4.0 E-
Diphenylamine	122-39-4	$C_{12}H_{11}N$	170	79	
1,2-Diphenylhydrazine	122-66-7	$C_{12}H_{12}N_2$	9.1	2.4	6.7 E-3
N,N-Dipropyl-4-Trifluoromethyl-2,6-Dinitroaniline	1582-09-8	$C_{13}H_{16}F_3N_3O_4$	540	180	5.0 E-1 *
Dithane	8018-01-7	$C_4H_{12}N_4S_4MnZn$	240	80	
Endosulfan	115-29-7	$C_9H_6Cl_6O_3S$	2.4	8.0 E-1	
Endrin	72-20-8	$C_{12}H_8Cl_6O$	2.5	7.9 E-1	
Epichlorohydrin	106-89-8	C_3H_5ClO	170	63	4.7 E-1
Ethanol	64-17-5	C_2H_5OH		14,000	
2-Ethoxy Ethyl Acetate	111-15-9	$C_6H_{12}O_3$	790	210	
Ethyl Acetate	141-78-6	$C_4H_8O_2$	42,000	11,000	
Ethylbenzene	100-41-4	C_8H_{10}	4,500	3,500	
Ethylbenzene	100-41-4	C_8H_{10}	1,036.3 b	806 b	
Ethylene Glycol Dimethyl Ether	110-71-4	$C_4H_{10}O_2$	490	130	
Ethylene Glycol Monopropyl Ether	2807-30-9	$C_5H_{12}O_2$	720	190	
Ethyl-3-Ethoxy Propionate	763-69-9	$C_7H_{14}O_3$	380	240	
Ethylene Oxide	75-21-8	C_2H_4O	14	3.7	1.0 E-2
Ethyl Parathion	56-38-2	$C_{10}H_{14}NO_5PS$	2.5	8.0 E-1	
Fiberglass	—		91,000 f	24,000 f	
Fiberglass	—		150 g	40 g	
Fluorine	7782-41-4	F_2	6.0	1.6	
Formaldehyde	50-00-0	CH_2O	20	12	8.0 E-2
Formic Acid	64-18-6	CH_2O_2	270	71	
Glycerol	56-81-5	$C_3H_8O_3$	225	75	
Glycol Monobutylether Acetate	112-07-2	$C_{10}H_{18}O_3$	720	190	
Heptachlor	76-44-8	$C_{10}H_5Cl_7$	1.5	4.0 E-1	1.1 E-3

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Name	CAS #	Formula	1 Hour	24 Hour	Annual
Ieptachlor Epoxide	1024-57-3	$C_{10}H_5Cl_7O$	7.6 E-1	2.0 E-1	5.4 E-4
-Heptanone	110-43-0	$C_7H_{14}O$		3,500	
Ieptane	142-82-5	C_7H_{14}	17,000	11,000	
Iexachlorobenzene	118-74-1	C_6Cl_6	3.7	9.9 E-1	2.7 E-3
Iexachlorobutadiene	87-68-3	C_4Cl_6	7.2	1.9	6.7 E-2
-Hexachlorocyclohexane (lindane)	319-84-6	$C_6H_6Cl_6$	1.1	3.0 E-1	8.1 E-4
-Hexachlorocyclohexane (lindane)	319-85-7	$C_6H_6Cl_6$	1.1	3.0 E-1	8.1 E-4
-Hexachlorocyclohexane (lindane)	58-89-9	$C_6H_6Cl_6$	1.1	3.0 E-1	8.1 E-4
Iexachlorocyclohexane, Tech	608-73-1	$C_6H_6Cl_6$	1.1	3.0 E-1	8.1 E-4
Iexachlorocyclopentadiene	77-47-4	C_5Cl_6	2.5	7.9 E-1	
Iexachloroethane	67-72-1	C_2Cl_6	300	79	3.4 E-1
-Hexane	110-54-3	C_6H_6	5,300	1,400	
Iydrofluoric Acid	7664-39-3	HF	562.5	187.5	
Iydrogen Chloride	7647-01-0	HCl	210	56	r 7.0
Iydrogen Cyanide	74-90-8	HCN	40.0	40.0	
Iydrogen Sulfide	7783-06-4	H_2S	150		
l-Hydroxy-2-Propanone (Acetol)	116-09-6	$C_3H_6O_2$	150		
ron	7439-89-6	Fe			NON-TOXIC
ron (Soluble Compounds)	—	—	22.5	7.5	
ron (Insoluble compounds)	—	—	150	40	
Ir[illegible] Chloride	7758-94-3	$FeCl_2$	30	7.9	
Iron (III) Chloride	7705-08-0	$FeCl_3$	30	7.9	
Iron (III) Oxide	1309-37-1	Fe_2O_3	110	38	
Iron (II,III) Oxide	1317-61-9	Fe_3O_4	83	40	
Isobutyl Acetate	110-19-0	$C_6H_{12}O_2$		5,300	
Isobutyl Alcohol	78-83-1	$C_4H_{10}O$	1,900	1,200	
Isobutyl Isobutyrate	97-85-8	$C_8H_{16}O_2$		1,100	
Isopropanol	67-63-0	$CH_3CHOHCH_3$		7,400	
Isopropyl Acetate	108-21-4	$C_5H_{10}O_2$	9,900	7,500	
Lacquer Thinner	—	—		1,100	
Lactol Spirits	64742-89-8	—	11,000	14,000	
Lead	7439-92-1	Pb	1.5 per cal qtr P	0.09 r	
Lead (II) Oxide	1317-36-8	PbO	1.5 per cal qtr P	0.09 r	
Lead (III) Oxide		Pb_2O_3	1.5 per cal qtr P	0.09 r	
Lead Oxide	1314-41-6	Pb_3O_4	1.5 per cal qtr P	0.09 r	
Light Aromatic Solvent Naptha	64742-95-6	—		10,000	
Magnesium		Mg	NO DATA		
Magnesium Chloride			NON-TOXIC		
Magnesium Fluoride	7783-40-6	MgF_2	76	20	
Magnesium Nitride		Mg_3N_2	NO DATA		
Magnesium Oxide (Total Dust)	1309-48-4	MgO	300	80	
Magnesium Oxide (Respirable Fraction)	1309-48-4	MgO	150	40	
M[illegible]sium Silicate	1343-90-4	$MgSi_3O_8$	60	16	
Manganese (metal or fume)	7439-96-5	Mn	25	8.0	
Manganese Dioxide	1313-13-9	MnO_2	25	8.0	
Malathion	121-75-5	$C_{10}H_{19}O_6PS_2$	240	80	

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Substance Name	CAS #	Formula	1-Hour	24-Hour	Annual
Mercury	7439-97-6	Hg	1.5	4.0 E-1	
Metalaxyl	57837-19-1		240	80	
Methanol	67-56-1	CH_3OH	2,600	2,100	
Methomyl	16752-77-5	$C_5H_{10}N_2O_2S$	76	20	
Methoxychlor	72-43-5	$C_{16}H_{15}Cl_3O_2$	150	40	
1-Methoxy-2-Propanol Acetate	108-65-5		720	190	
a-Methylacrolein	78-85-3	C_4H_6O	*NO DATA*		
Methyl Bromide	74-83-9	CH_3Br	480	160	
3-Methylcholanthrene	56-49-5	$C_{21}H_{16}$	7.9 E-1	2.1 E-1	5.7 E-4
Methyl Cyclopropyl Ketone	765-43-5	C_5H_8O	*NO DATA*		
Methyl Ethyl Ketone	78-93-3	C_4H_8O	7,400	4,700	
4,4-Methylene-bis-2-chloroanaline	101-14-4	$C_{13}H_{12}Cl_2N_2$	6.4	1.7	
Methylhydrazine	60-34-4	CH_6N_2	3.0	8.0 E-1	2.2 E-3
Methyl Isocyanate	624-83-9	C_2H_3NO	1.5	4.0 E-1	
Methyl Mercaptan	74-93-4	CH_3SH	30	8	
2-Methylnaphthalene	91-57-6	$C_{11}H_{10}$	*NO DATA*		
Methyl N-Butyl Ketone	591-78-6	$C_6H_{12}O$	600	160	
Methyl Parathion	298-00-0	$C_8H_{10}NO_5PS$	4.8	1.6	
4-Methyl-2-Pentanone (Hexanone, MIBK)	108-10-1	$C_6H_{12}O$			*NO DATA*
2-Methyl-2-Propen-1-ol	513-42-8	C_4H_8O	*NO DATA*		
a-Methylstyrene	98-83-9	C_9H_{10}	4,000	1,900	
Methyl Vinyl Ketone	79-84-4	C_4H_6O	*NO DATA*		
Mineral Spirits	8032-32-4	—		2,600	
Mixed Alcohol Phthalates	—	—		38	
Mixed Paraffins (alkanes)	—	—		15	
Monoammonium Phosphate			*NON-TOXIC*		
Molybdenum Trioxide	1313-27-5	MoO_3	83	40	
Myclobutanil (Systhane)	88671-89-0		240	80	
Naphthalene	91-20-3	$C_{10}H_8$	630	400	
Nickel (metal or fume)	7440-02-0	Ni	5.7	1.5	4.0 E-3
Nickel Acetate	373-02-4	$C_4H_6O_4Ni$	2.25	7.5 E-1	
Nitric Acid	7697-37-2	HNO_3	112.5	37.5	
Nitrobenzene	98-95-3	$C_6H_5NO_2$	83	40	
Nitrogen Dioxide	10102-44-0	NO_2			53 b F
Nitrogen Dioxide	10102-44-0	NO_2			100 F
Nitrogen Oxide	10102-43-9	NO	690	230	
2-Nitropropane	79-46-9	$C_3H_7NO_2$	580	280	7.7 E-1
N-Nitrosodiethylamine	55-18-5	$C_4H_{10}N_2O$	1.5 E-1	4.0 E-2	1.1 E-4
N-Nitrosodimethylamine	62-75-9	$C_2H_6N_2O$	2.5 E-1	6.6 E-2	1.8 E-4
N-Nitrosopyrrolidine	930-55-2	$C_4H_8N_2O$	3.0	8.0 E-1	2.2 E-3
N-Nitroso-di-n-butylamine	924-16-3	$C_8H_{18}N_2O$	1.2	3.2 E-1	8.7 E-4
Octane	111-65-9	C_8H_{18}	11,000	2,900	
Oxoheptyl Acetate	90438-79-2		7,900	5,600	
Oxohexyl Acetate			720	190	

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ubstance Name	CAS #	Formula	1-Hour	24-Hour	Annual
zon	10028-15-6	O_3	120 b F		
zone	10028-15-6	O_3	235 F		
articulate Matter (PM_{10})	—	—		150 F	50 F
entachlorobenzene	608-93-5	C_6HCl_5	15	4.0	
entachlorophenol	87-86-5	C_6HCl_5O	13	4.0	
entachloronitrobenzene	82-68-8	$C_6Cl_5NO_2$	6.8	1.8	4.9 E-3
entanal	110-62-3	$C_5H_{10}O$	5,300	1,400	
entane	109-65-9	C_5H_{12}	13,000	3,500	
-Pentanone	107-87-9	$C_5H_{10}O$	7,300	4,200	
henol	108-95-2	C_6H_6O	320	150	
-Phenylenediamine	106-50-3	$C_6H_8N_2$	3.0	7.9 E-1	
henylmercuric Acetate	62-38-4	C_8H_8HgO	2.5 E-1	7.9 E-2	
hosgene	75-44-5	$COCl_2$	12	3.2	
hosmet	732-11-6	$C_{11}H_{12}NO_4PS_2$	240	80	
hosphamidon	13171-21-6		3.0 E-1	1.0 E-1	
hosphine	7803-51-2	PH_3		3.0	
hosphoric Acid	7664-38-2	PH_3O_4		7.5	
hosphorous Nitride		P_3N_5	*NO DATA*		
hosphorous Pentafluoride	7647-19-0	PF_5		7.5	
hosphorous Pentoxide	1314-56-3		24	7.9	
hosphorous Pentasulfide			24	7.5	
Pi[illegible] (2-Pinene)	80-56-8	$C_{10}H_{16}$	7,000	4,400	
Pin[illegible]	127-91-3	$C_{10}H_{16}$	7,000	4,400	
lyacrylamide			*NON-TOXIC*		
lychlorinatedbiphenyls (PCBs)	1336-36-3	—	3.0 E-1	7.9 E-2	6.1 E-4
tassium		K	*NO DATA*		
tassium Borate	See Borates	KBO_2	23	7.5	
tassium Carbonate	584-08-7	K_2CO_3	450	120	
tassium Chloride	7447-40-7	KCl			*NON-TOXIC*
tassium Fluoride	7789-23-3	KF	76	20	
tassium Hydroxide	1310-58-3	KOH	60	16	
tassium Oxide		K_2O			*NON-TOXIC*
tassium Sulfate	7778-80-5	K_2SO_4			*NON-TOXIC*
opanal	123-38-6	C_3H_6O	*NO DATA*		
opane (asphyxiant)	74-98-6	C_3H_8		14,000	
Propanol	71-23-8	C_3H_8O	5,200	4,000	
onamide	23950-58-5	$C_{12}H_{11}Cl_2NO$	19	5.1	1.4 E-2
opionic Acid	79-09-6	$C_3H_6O_2$	380	240	
Propyl Acetate	109-60-4	$C_5H_{10}O_2$	8,800	6,700	
opylene Glycol Monomethyl Ether	107-98-2	$C_4H_{10}O_2$	4,500	2,900	
opylene Oxide	75-56-9	CH_3CHOCH_2	1,500	400	2.0
ridine	110-86-1	C_5H_5N	250	120	
se[illegible]	55-55-5	$C_{21}H_{22}N_2O_2$			*NO DATA*
len[illegible]	7782-49-2	Se	6.0	1.6	
lenourea	630-10-4	CH_4N_2Se			*NO DATA*
vin Bait (Carbaryl)	63-25-2	$C_{12}H_{11}NO_2$	80	40	

Updated 4/20/93 Previous Update 8/10/92

Substance Name	CAS #	Formula	1-Hour	24-Hour	Annual
Silane	7803-62-5	SiH_4		5.3	
Silica (Amorphous Hydrated)	7631-86-9	SiO_2	180	48	
Silver	7440-22-4	Ag	3.0 E-1	7.9 E-2	
Sodium Aluminofluoride	15096-52-3	AlF_6*_3Na	60	20	
Sodium Carbonate	497-19-8	Na_2CO_3			*NON-TOXIC*
Sodium Chloride	7647-14-5	NaCl			*NON-TOXIC*
Sodium Dichromate (VI)	10588-01-9	$Cr_2H_4O_7 \cdot 2Na$	1.1	1.9 E-1	
Sodium Fluoride	7681-49-4	NaF	76	20	
Sodium Hydroxide	1310-73-2	NaOH	45	15	
Sodium Oxide		Na_2O	*NO DATA*		
Sodium Sulfate	7757-82-6	Na_2SO_4	150	50	
Strychnine	57-24-9	$C_{21}H_{22}N_2O_2$	3.8	1.2	
Styrene (includes dimers)	100-42-5	C_8H_8	821.6 b	399.1 b	
Styrene (includes dimers)	100-42-5	C_8H_8	3,500	1,700	
Sulfur		S	*NON-TOXIC*		
Sulfur Dioxide	7446-09-5	SO_2	*3-hr 1,300 F*	*365 F*	*80 F*
Sulfur Dioxide	7446-09-5	SO_2	3-hr 496 b F	139 b F	30.5 b F
Sulfur Trioxide	7446-11-9	SO_3	1,300	365	
Sulfuric Acid	7664-93-9	H_2SO_4	22.5	7.5	
Talc	14807-96-6	$H_2O_3Si¾Mg$		5 E+6	
1,2,4,5-Tetrachlorobenzene	95-94-3	$C_6H_2Cl_4$	15	9.0	
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	$C_{12}H_4Cl_4O_2$	4.2 E-2	1.1 E-2	3.0 E-5
1,1,2,2-Tetrachloroethane	79-39-5	$C_2H_2Cl_4$	33	8.8	2.4 E-2
Tetrachloroethene	127-18-4	C_2Cl_4	11,000	770	2.1
Tetrachloroethene	127-18-4	C_2Cl_4	1,621.8 b	113.5 b	1.27 E-2 b
2,3,4,6-Tetrachlorophenol (2,4,5,6)	58-90-2	$C_6H_2Cl_4O$			*NO DATA*
Tetraethyl Lead	78-00-2	$C_8H_{20}Pb$	2.5	5.9 E-1	
Tetrafluoromethane	75-73-0	CF_4		300	
Tetrahydrofuran	109-99-9	C_4H_8O	6,100	4,700	
Thallium	7440-28-0	Tl	3.0	7.9 E-1	
Thiourea	62-56-6	CH_4N_2S			*NO DATA*
Thorium 232	7440-29-1	Th	70 c	2.9 c	8.0 E-3 c
Titanium Dioxide (Total Dust)	13463-67-7	TiO_2	300	80	
Titanium Dioxide (Respirable Dust)	13463-67-7	TiO_2	150	40	
Toluene	108-88-3	C_7H_8	1,247.2 b	796.1 b	
Toluene	108-88-3	C_7H_8	4,700	3,000	
2,4-Toluene Diisocyanate	584-84-9	$C_9H_6N_2O_2$	1.2	3.2 E-1	
Toxaphene	8001-35-2	$C_{10}H_{10}Cl_8$	8.3	1.5	4.0 E-3
1,2,4-Trichlorobenzene	120-82-1	$C_6H_3Cl_3$	161.7 b	43.1 b	
1,2,4-Trichlorobenzene	120-82-1	$C_6H_3Cl_3$	1,200	320	
1,1,1-Trichloroethane	71-55-6	$C_2H_3Cl_3$	20,000	1,100	
1,1,2-Trichloroethane	79-00-1	$C_2H_3Cl_3$	750	30	8.2 E-2
Trichloroethene	79-01-6	C_2HCl_3	1,100	280	7.6 E-1
Trichlorofluoromethane	75-69-4	CCl_3F	39,757 b	10,501 b	

Updated 4/20/93 **Previous Update 8/10/92**

Substance Name	CAS #	Formula	1-Hour	24-Hour	Annual
Trichlorofluoromethane	75-69-4	CCl_3F	220,000	59,000	
2,4,5-Trichlorophenol	95-95-4	$C_6H_3Cl_3O$	13,000	3,500	
2,4,6-Trichlorophenol	88-06-2	$C_6H_3Cl_3O$	600	160	4.3 E-1
Trichlorotrifluoroethane	76-13-1	$C_2Cl_3F_3$	79,000	60,000	
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	$C_2Cl_3F_3$	10,308 b	7,829 b	
Triethylenetetramine	112-24-3	$C_6H_{18}N_2$	760	200	
1,2,4 Trimethylbenzene	95-63-6	C_9H_{12}		222.5 b	
1,2,4 Trimethylbenzene	95-63-6	C_9H_{12}		1,422	
1,3,5 Trimethylbenzene	108-67-8	C_9H_{12}		222.5 b	
2,2,4 Trimethyl-1,3-pentanediol Isobutyrate (Texanol)	25265-77-4	$C_{12}H_{24}O_3$	300	80	
Tungsten Trioxide	1314-35-8	WO_3	83	40	
Turpentine	8006-64-2	—	7,000	4,400	
Uranium 238 (Soluble)	7440-61-1	U	1.5	4.0 E-1	
Uranium 238 (Insoluble)	7440-61-1	U	7.5	2.0	
Urea			*NON-TOXIC*		
Vanadium	7440-62-2	V	1.5	0.4	
Vinyl Chloride	75-01-4	C_2H_3Cl	17	4.4	1.2 E-2
VM & P Naptha (Benzin)	8030-30-6	*MIXTURE*	15,000	11,000	
Xylenes,Mixed	1330-20-7	C_8H_{10}	5,500	3,500	
Xylene (meta)	108-38-3	C_8H_{10}	1,268.6 b	807.3 b	
Xylene (ortho)	95-47-6	C_8H_{10}	1,268.6 b	807.3 b	
Xylene (para)	106-42-3	C_8H_{10}	1,268.6 b	807.3 b	
Zinc Chloride	7646-85-7	$ZnCl_2$	17	8.0	
Zinc Oxide Fume	1314-13-2	ZnO	83	40	
Zinc Oxide Respirable Dust	1314-13-2	ZnO	150	40	
Zinc Oxide Total Dust	1314-13-2	ZnO	300	80	
Zinc Stearate	557-05-1	$Zn(C_{18}H_{35}O_2)$		350	
Zirconium	7440-67-7	Zr	110	38	
Zirconium Carbide	7440-67-7	ZrC	150	40	
Zirconium Oxide	1314-23-4	ZrO_2	110	38	

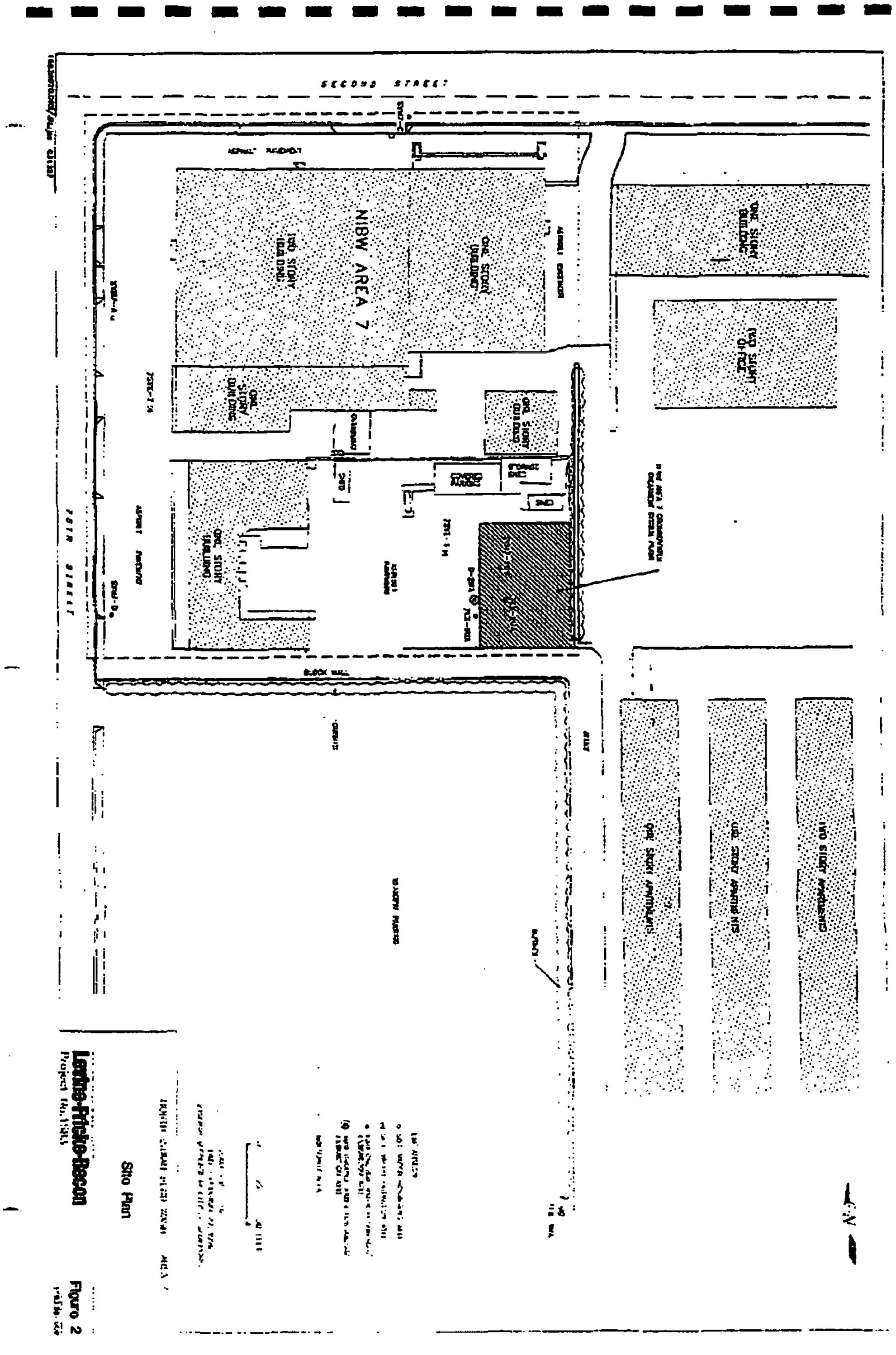
concentrations in µg/m³ unless otherwise noted.
Federal standard
Power of 10 exponential
parts-per-million
parts-per-billion
µC/m³ (microcuries per cubic meter)
fibers/m³ - for fibers <3 µm diameter and > or = 10 µm length.
Not to be used with air samples
Limited by assuming entire exposure in 24-hour period.
RAC - reference air concentration - Federal Register April 27, 1990

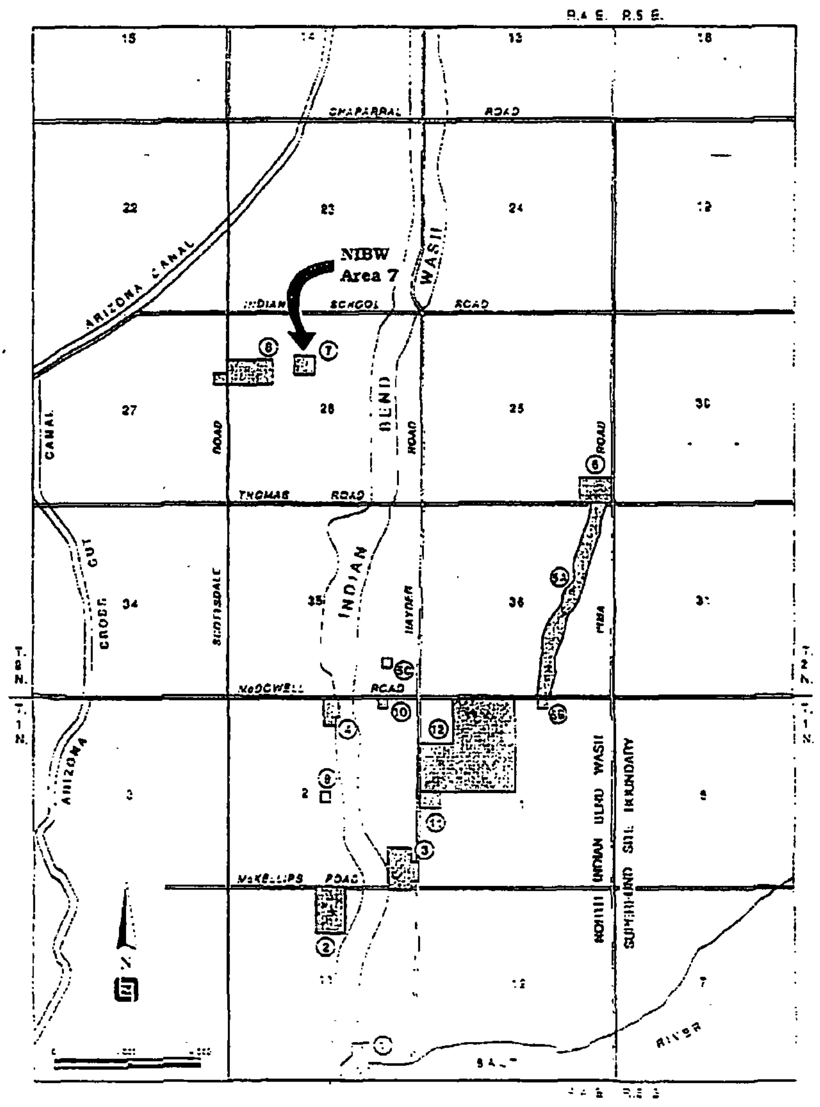
<u>G[illegible]ges:</u>
enit. all compounds

<u>AOG Additions:</u>
Aluminum - Total Dust, Respirable Dust, Pyro Powders, Welding Fumes, Soluble Salts
Aluminum Nitride
Boron Nitride
Caprolactam - Dust, Vapor
Dimethyl Disulfide
Dimethyl Sulfate
Dimethyl Sulfide
Magnesium
Magnesium Nitride
Methyl Isocyanate
Methyl Mercaptan
Phosgene
Phosphorus Nitride
Potassium
Sodium Oxide

APPENDIX II

Plot Plans And Area Maps


SECOND STREET
70TH STREET
NIBW AREA 7
TWO STORY BUILDING
ONE STORY BUILDING
ONE STORY BUILDING
ONE STORY BUILDING
ONE STORY BUILDING
ONE STORY BUILDING
TWO STORY OFFICE
ONE STORY APARTMENTS
ONE STORY APARTMENTS
TWO STORY APARTMENTS
ASPHALT PAVEMENT
ASPHALT PARKING
BLOCK WALL
N
Levine-Fricke-Recon
Project No. 1383
Site Plan
Figure 2



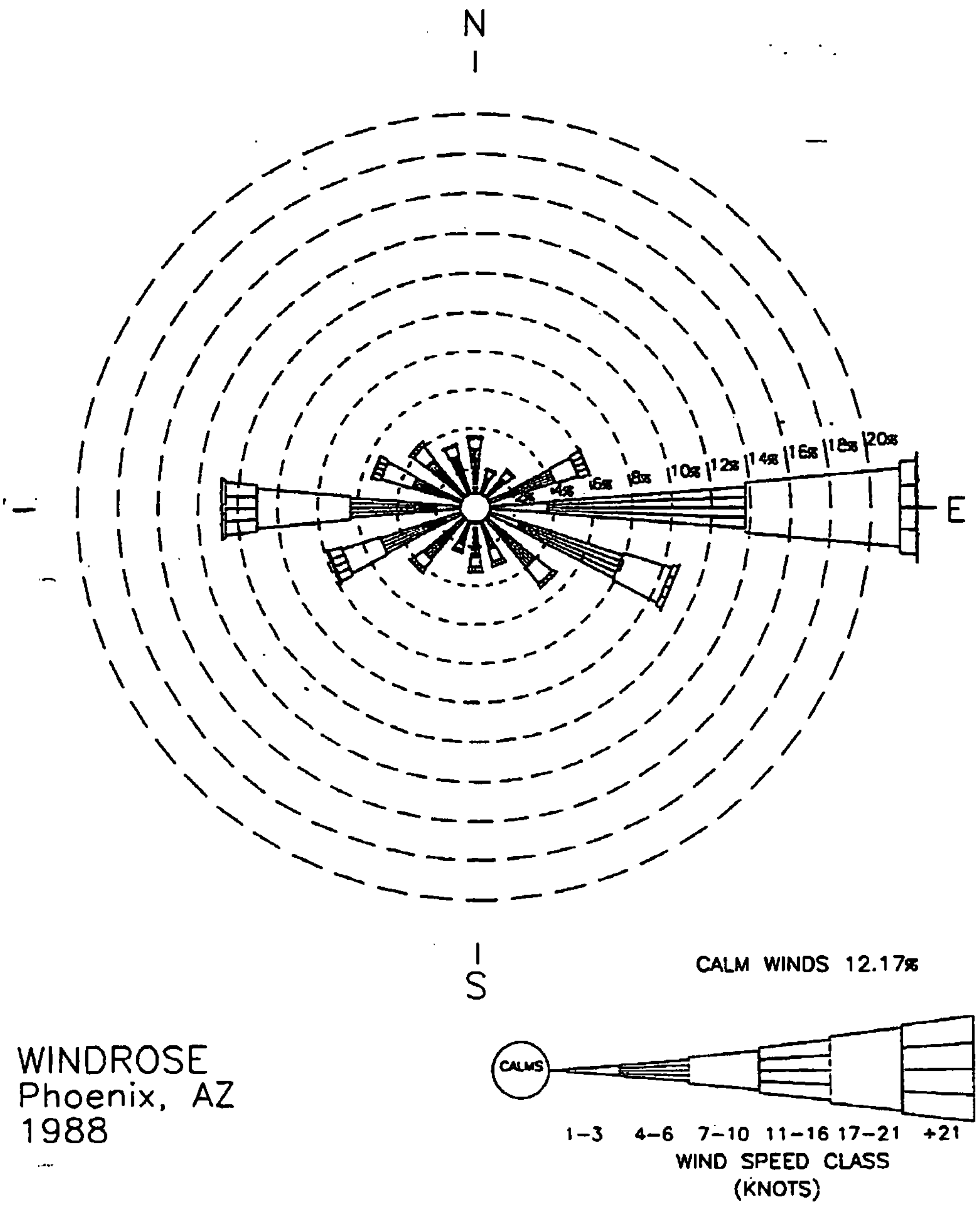
Site Vicinity Showing NIBW Areas

Levine-Fricke-Recon Figure 1

APPENDIX III

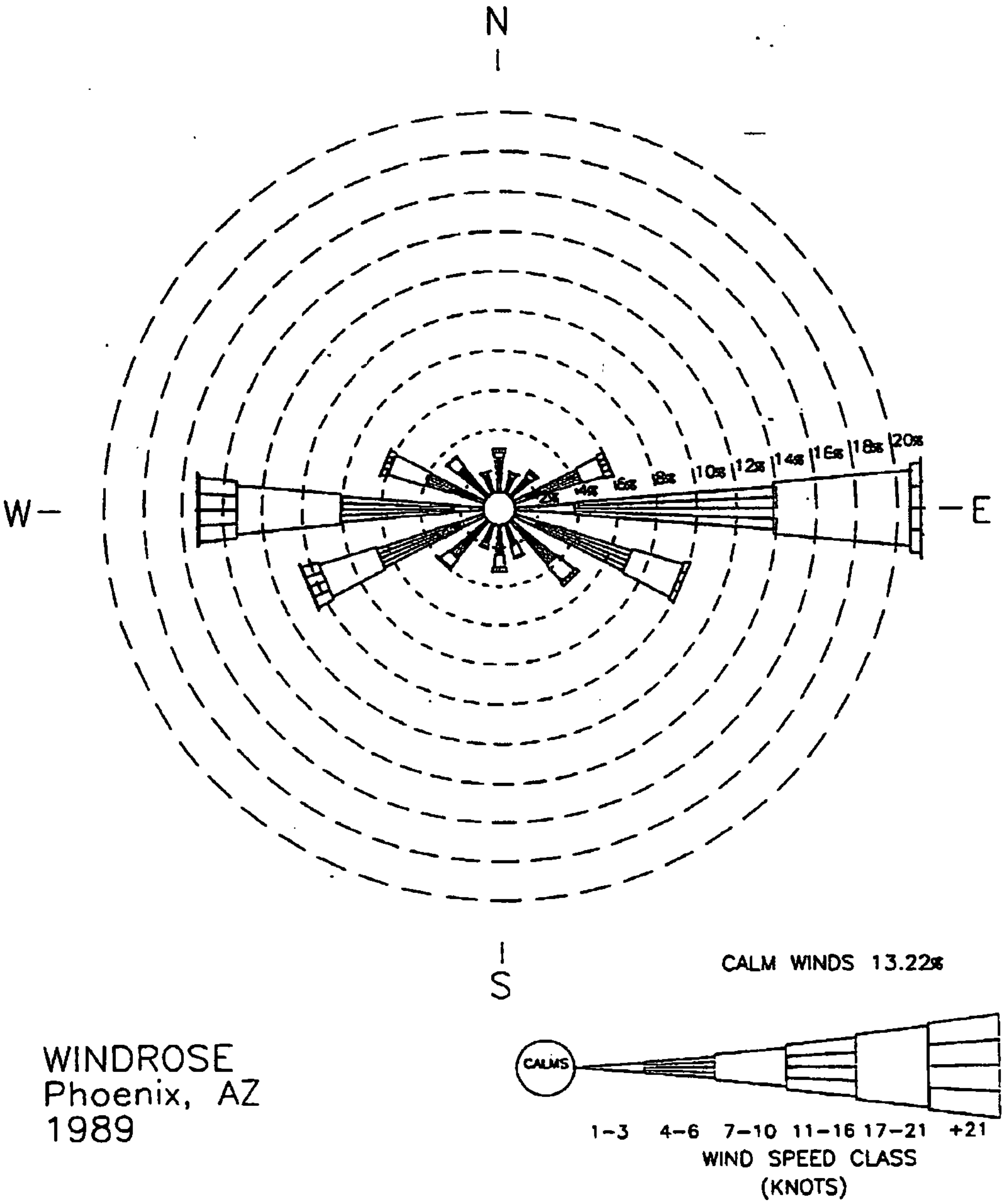
Windrose Plots Of Meteorological Data

FREQUENCY OF WIND SPEED AND DIRECTION



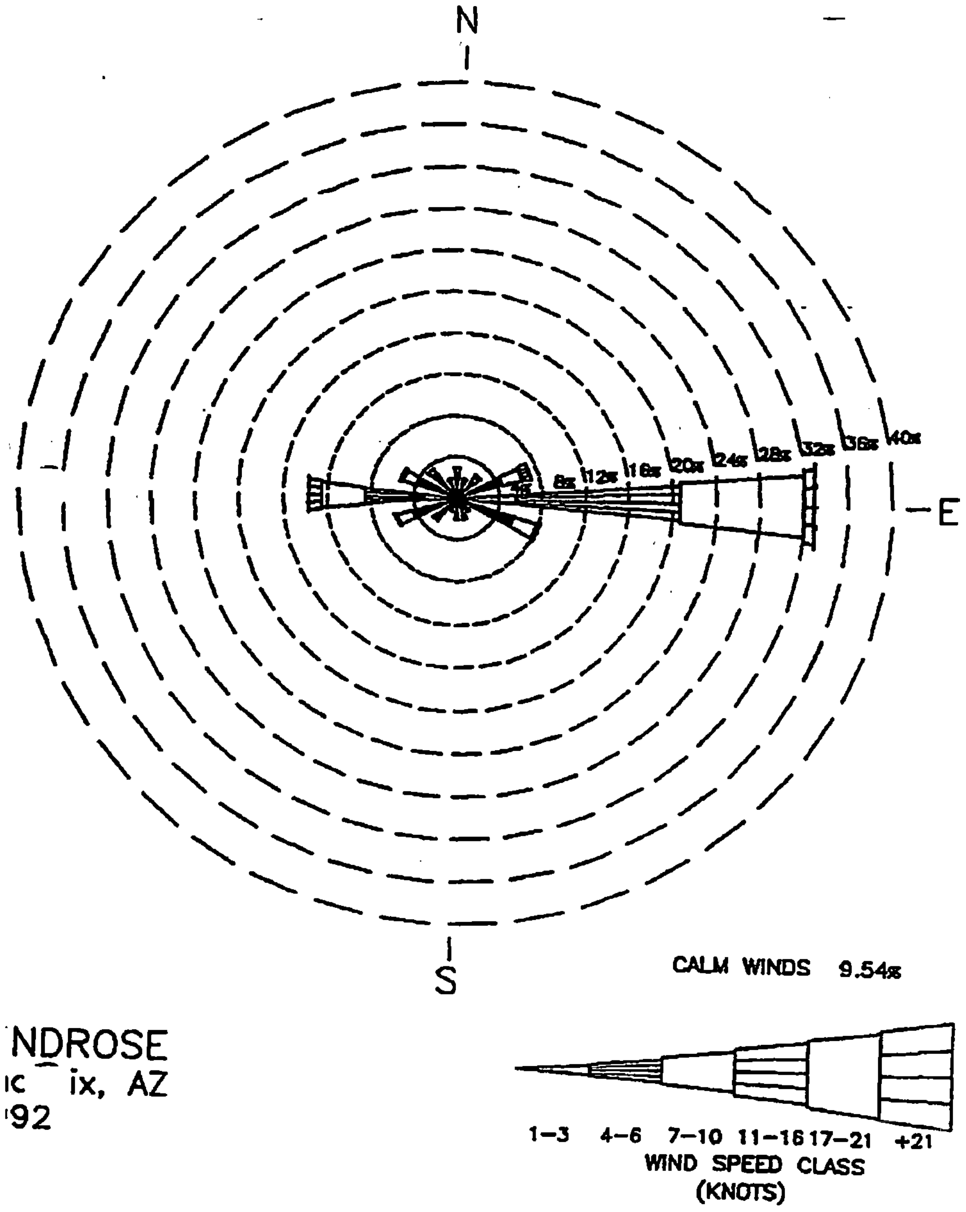
WINDROSE
Phoenix, AZ
1988

FREQUENCY OF WIND
SPEED AND DIRECTION

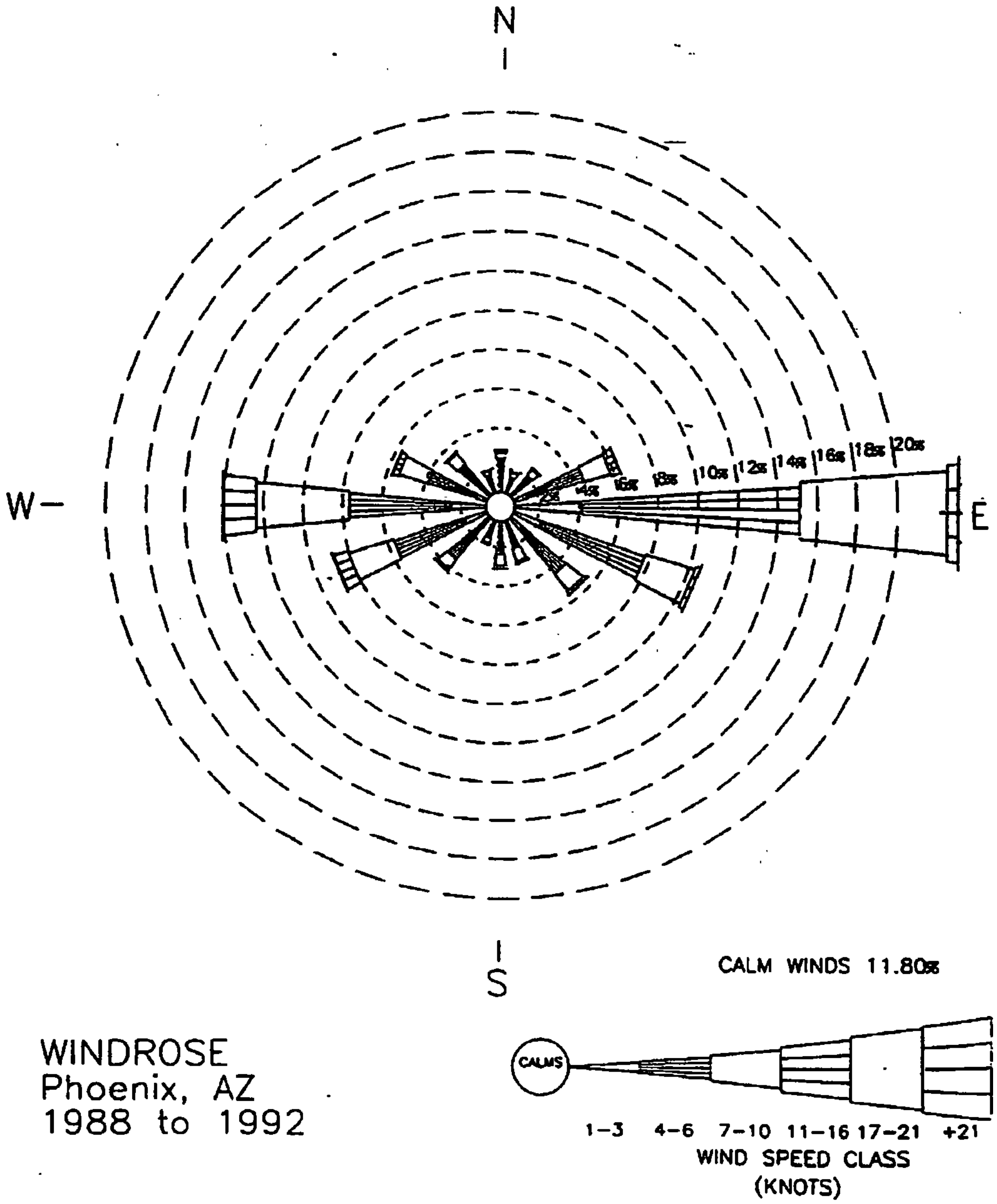


WINDROSE
Phoenix, AZ
1989

FREQUENCY OF WIND SPEED AND DIRECTION

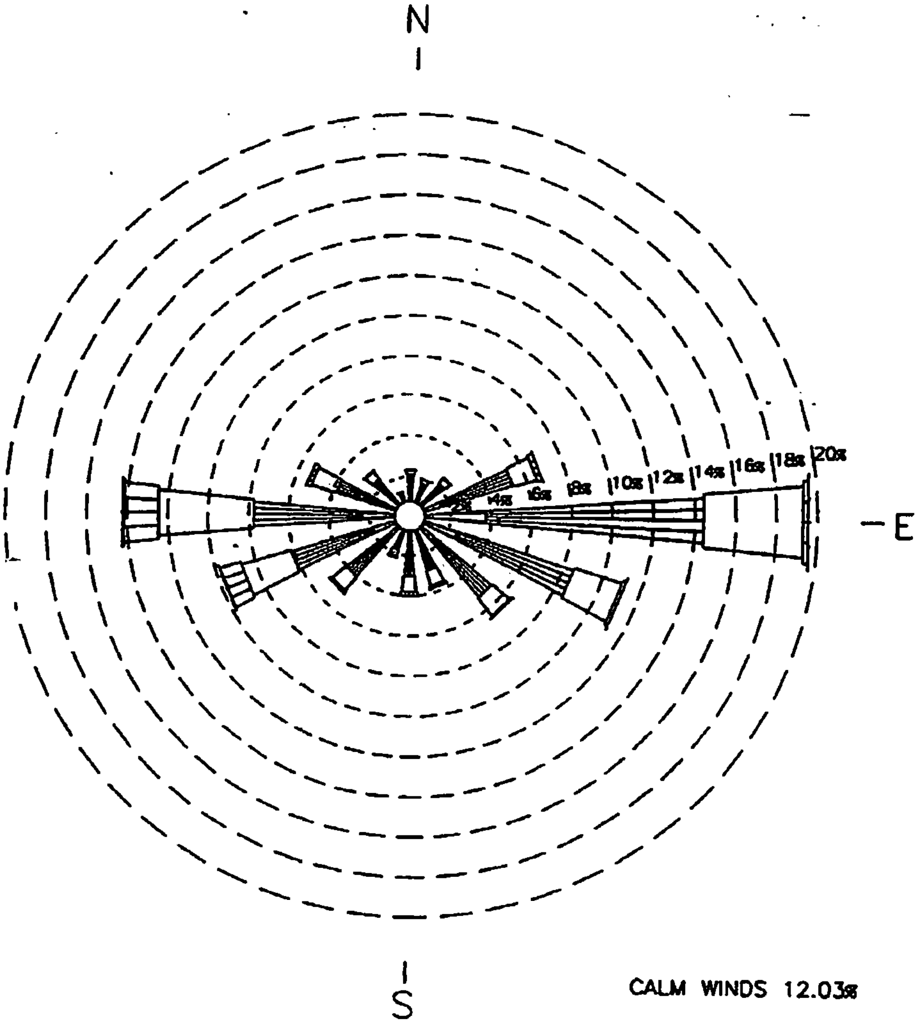


FREQUENCY OF WIND SPEED AND DIRECTION

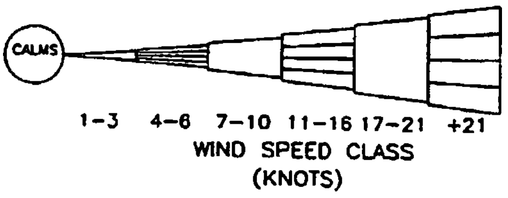


WINDROSE
Phoenix, AZ
1988 to 1992

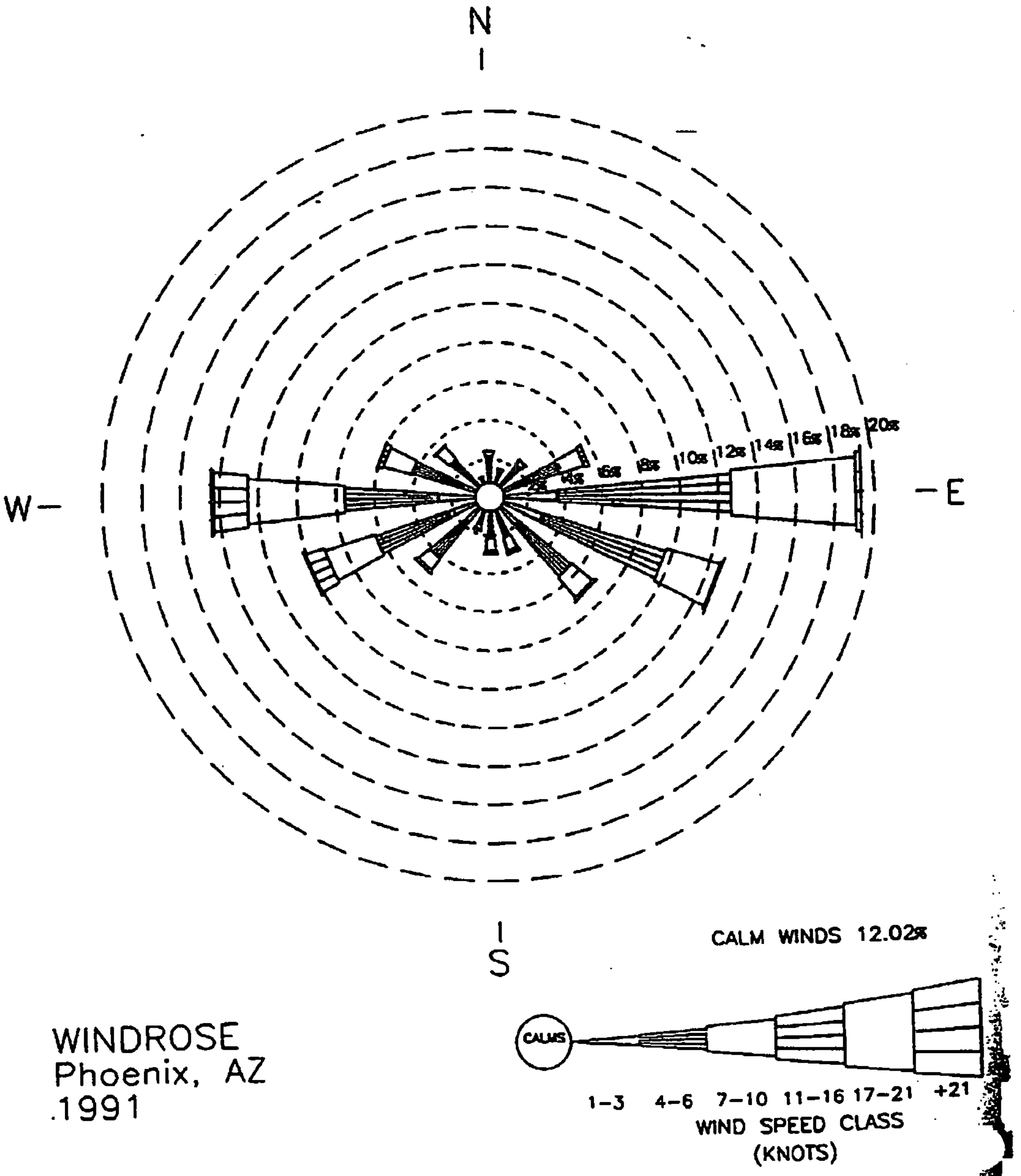
FREQUENCY OF WIND SPEED AND DIRECTION



INDROSE
ıoenix, AZ
990



FREQUENCY OF WIND
SPEED AND DIRECTION



WINDROSE
Phoenix, AZ
.1991

APPENDIX IV

ISC Model Output Files - Baseline Runs

APPENDIX J

PROCESS AND INSTRUMENTATION DIAGRAM

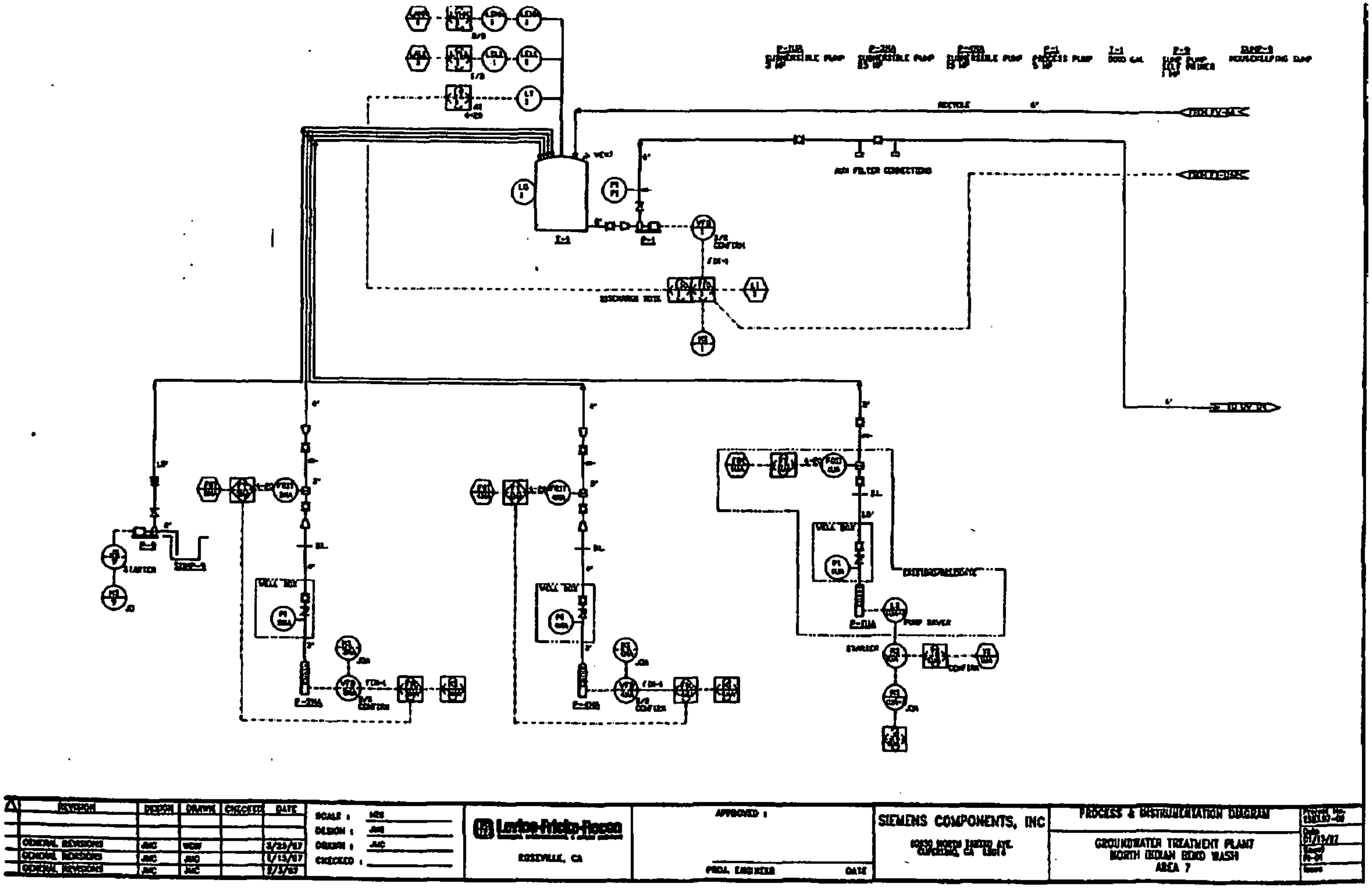
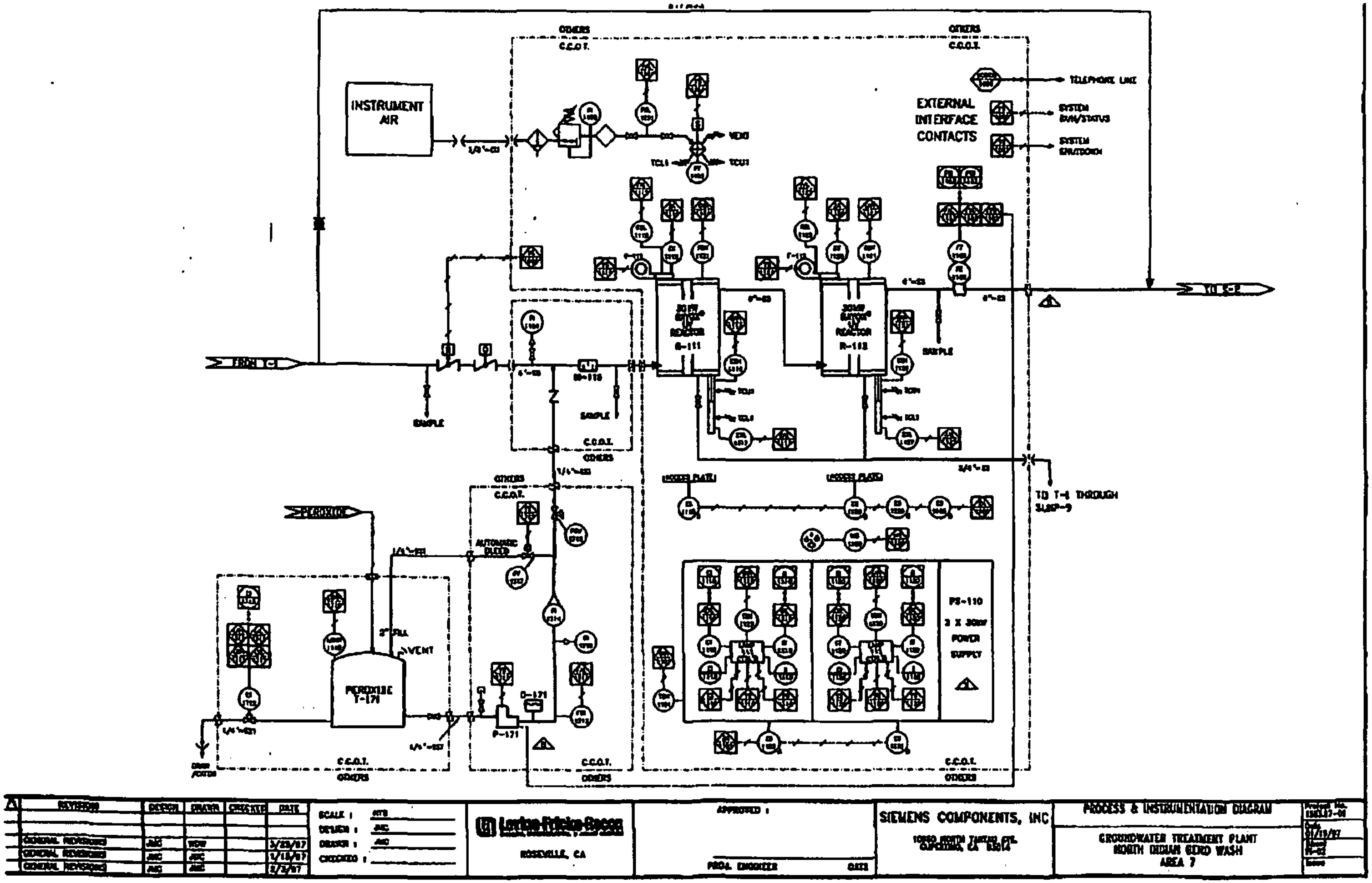


Exhibit A

Attachment 3



REVISIONS	DESIGN	DRAWN	CHECKED	DATE
GENERAL REVISIONS	JHC	VDW		3/25/97
GENERAL REVISIONS	JHC	JHC		1/15/97
GENERAL REVISIONS	JHC	JHC		2/3/97

SCALE : NTS
DESIGN : JHC
DRAWN : JHC
CHECKED :

Levine-Fricke-Recon
ROSEVILLE, CA

APPROVED :
PROJ. ENGINEER DATE

SIEMENS COMPONENTS, INC
10950 NORTH TANTAU AVE.
CUPERTINO, CA 95014

PROCESS & INSTRUMENTATION DIAGRAM
GROUNDWATER TREATMENT PLANT
NORTH INDIAN BEND WASH
AREA 7

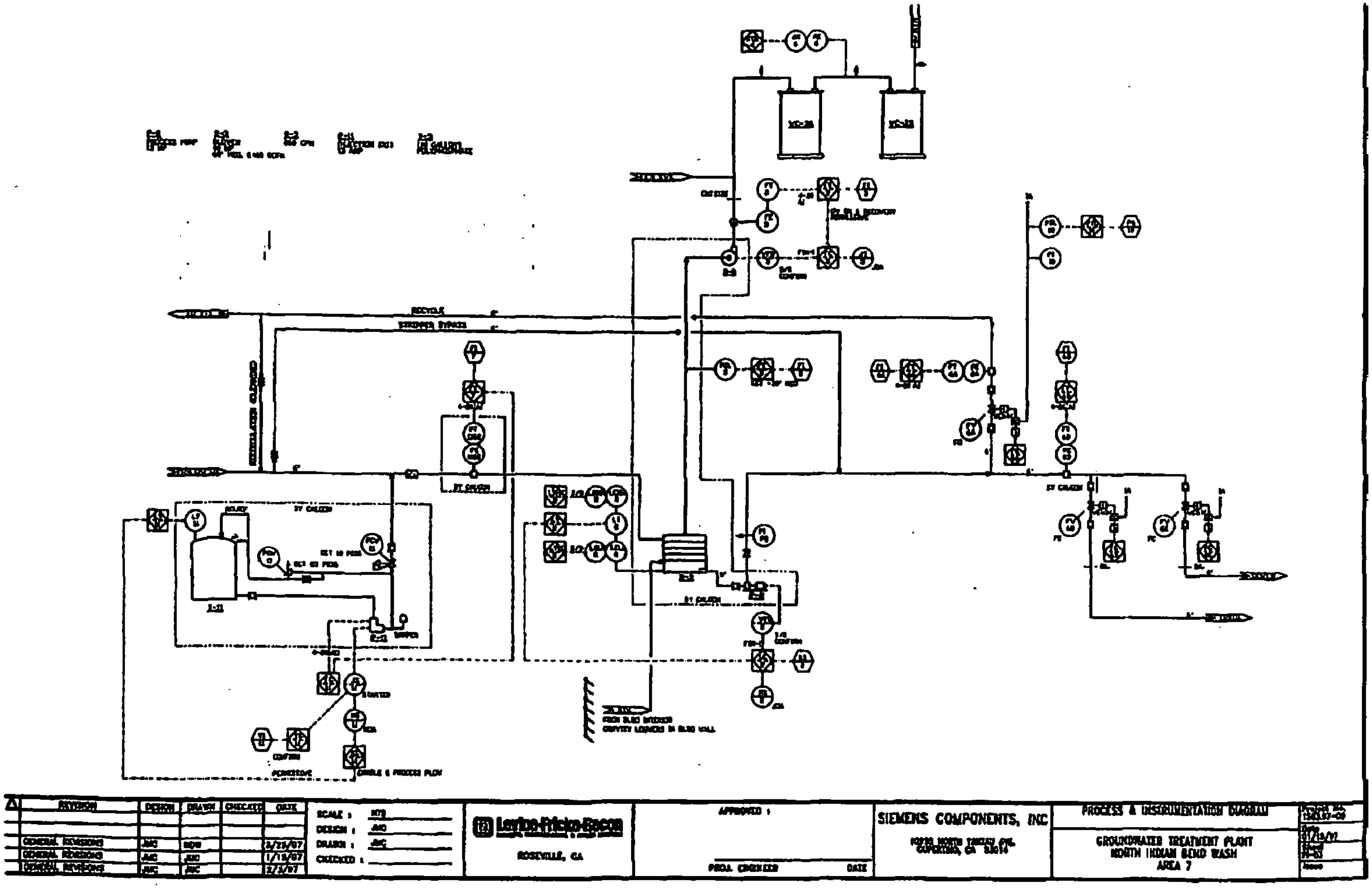


Exhibit A
Page **279** of **495**
Attachment 3

```
                       ISCST3 - (DATED 96113)

                    IBM-PC VERSION (3.05)      ISCST3R
      (C) COPYRIGHT 1992-1996, TRINITY CONSULTANTS, INC.

Run Began on  3/27/1997 at 14:43:08

** BREEZE AIR SUITE (ISCST3) - C:\TRINITY\SUITE\EM72096.DAT
** Trinity Consultants Incorporated, Dallas, TX

CO STARTING
CO TITLEONE  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S
CO TITLETWO  RUN3-1988MET DATA
CO MODELOPT  DFAULT  CONC  URBAN
CO AVERTIME  1  24  ANNUAL
CO POLLUTID  TCE
CO TERRHGTS  FLAT
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
SO ELEVUNIT  METERS
SO LOCATION  STACK1  POINT  -4.7  12.7  0
** SRCDESCR  AIR STRIPPER EXHAUST
SO SRCPARAM  STACK1  1.574974E-02  4.8768  299.82  18.208  0.280416
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  7.62  7.62  7.62  7.62  7.62  4.27
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  29.1  28.31  26.66  24.2  21.0  17.17
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  63.61  55.73  46.15  35.17  23.12  17.17
SO EMISUNIT  1.0E+06  GRAMS/SEC  MICROGRAMS/M**3
SO SRCGROUP  ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POLR1 STA
RE GRIDPOLR POLR1 ORIG  0  0
RE GRIDPOLR POLR1 DIST 50  100  150  200  250  300  400  500  600  800
RE GRIDPOLR POLR1 DIST 1000
RE GRIDPOLR POLR1 DDIR  0  10  20  30  40  50  60  70  80  90  100  110
RE GRIDPOLR POLR1 DDIR  120  130  140  150  160  170  180  190  200  210
RE GRIDPOLR POLR1 DDIR  220  230  240  250  260  270  280  290  300  310
RE GRIDPOLR POLR1 DDIR  320  330  340  350
```

```
RE GRIDPOLR POLR1 END
** BOUNDARY
RE DISCCART  -18.55  1.33
RE DISCCART  -38.55  1.33
RE DISCCART  -58.55  1.33
RE DISCCART  -78.55  1.33
RE DISCCART  -89.33  1.33
RE DISCCART  -89.33  21.33
RE DISCCART  -89.33  41.33
RE DISCCART  -89.33  61.33
RE DISCCART  -89.33  81.33
RE DISCCART  -89.33  100.4
RE DISCCART  -69.33  100.34
RE DISCCART  -49.33  100.34
RE DISCCART  -29.33  100.34
RE DISCCART  -9.33  100.34
RE DISCCART  1.45  100.4
RE DISCCART  1.45  80.34
RE DISCCART  1.45  60.34
RE DISCCART  1.45  40.34
RE DISCCART  1.45  20.34
RE DISCCART  1.45  1.33
RE FINISHED

ME STARTING
ME INPUTFIL  C:\TRINITY\SUITE\MET\PHXTUS88.BIN  UNFORM
ME ANEMHGHT  10.0  METERS
ME SURFDATA  23183  1988
ME UAIRDATA  23160  1988
ME STARTEND  88  01  01  1  88  12  31  24
ME FINISHED

OU STARTING
OU RECTABLE  1  FIRST
OU RECTABLE  ALLAVE  FIRST
OU FINISHED

************************************
*** SETUP Finishes Successfully ***
************************************

 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                   ***  RUN3-1988MET DATA                                                   ***       14:43:09
                                                                                                                      PAGE   1
**MODELOPTs: CONC                            URBAN  FLAT          DEFAULT

                                          ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected
```

```
**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE = F
**Model Uses NO WET DEPLETION.  WDPLETE = F
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR
    and Calculates ANNUAL Averages

**This Run Includes:    1 Source(s);      1 Source Group(s); and    416 Receptor(s)

**The Model Assumes A Pollutant Type of:  TCE

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    .0000     ;    Rot. Angle =      .0
                 Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =    .10000E+07
                 Output Units   = MICROGRAMS/M**3

**Input Runstream File: C:\TRINITY\SUITE\EM72096.DAT          ;  **Output Print File: C:\TRINITY\SUITE\EM72096.LST
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1908MET DATA                                                  ***        14:43:09
```

```
                                                                                                               PAGE    2
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT


                                                 *** POINT SOURCE DATA ***

            NUMBER EMISSION RATE                        BASE      STACK   STACK     STACK      STACK    BUILDING EMISSION RATE
  SOURCE     PART. (USER UNITS)     X          Y        ELEV.     HEIGHT  TEMP.   EXIT VEL.  DIAMETER    EXISTS   SCALAR VARY
    ID       CATS.               (METERS)  (METERS)   (METERS)  (METERS) (DEG.K)   (M/SEC)   (METERS)                  BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  STACK1       0    .15750E-01      -4.7      12.7        .0      4.88   299.82     18.29        .28       YES
 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                   ***  RUN3-1988MET DATA                                                  ***        14:43:09
                                                                                                               PAGE    3
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT



                                           *** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID                                                SOURCE IDs



 ALL        STACK1   ,
 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                   ***  RUN3-1988MET DATA                                                  ***        14:43:09
                                                                                                               PAGE    4
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT
                                          *** DIRECTION SPECIFIC BUILDING DIMENSIONS ***


SOURCE ID: STACK1
 IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK
   1   4.3,   20.9, 0      2   4.3,   24.1, 0      3   4.3,   26.6, 0      4   4.3,   28.2, 0      5   4.3,   29.0, 0      6   4.3,   28.9, 0
   7   4.3,   28.0, 0      8   4.3,   26.2, 0      9   4.3,   23.6, 0     10   4.3,   26.2, 0     11   4.3,   28.0, 0     12   4.3,   29.0, 0
  13   4.3,   29.1, 0     14   4.3,   28.3, 0     15   4.3,   26.7, 0     16   4.3,   24.2, 0     17   4.3,   21.0, 0     18   4.3,   17.2, 0
  19   4.3,   20.9, 0     20   4.3,   24.1, 0     21   4.3,   26.6, 0     22   4.3,   28.2, 0     23   4.3,   29.0, 0     24   4.3,   28.9, 0
  25   4.3,   28.0, 0     26   4.3,   26.2, 0     27   4.3,   23.6, 0     28   4.3,   26.2, 0     29   4.3,   28.0, 0     30   4.3,   29.0, 0
  31   7.6,   63.6, 0     32   7.6,   55.7, 0     33   7.6,   46.1, 0     34   7.6,   35.2, 0     35   7.6,   23.1, 0     36   4.3,   17.2, 0

 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                   ***  RUN3-1988MET DATA                                                  ***        14:43:09
                                                                                                               PAGE    5
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT
```

```
                              *** GRIDDED RECEPTOR NETWORK SUMMARY ***

                        *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                *** ORIGIN FOR POLAR NETWORK ***
                      X-ORIG =       .00 ;   Y-ORIG =        .00  (METERS)

                                *** DISTANCE RANGES OF NETWORK ***
                                             (METERS)

        50.0,     100.0,     150.0,     200.0,     250.0,     300.0,     400.0,     500.0,     600.0,     800.0,
      1000.0,

                                *** DIRECTION RADIALS OF NETWORK ***
                                             (DEGREES)

       360.0,      10.0,      20.0,      30.0,      40.0,      50.0,      60.0,      70.0,      80.0,      90.0,
       100.0,     110.0,     120.0,     130.0,     140.0,     150.0,     160.0,     170.0,     180.0,     190.0,
       200.0,     210.0,     220.0,     230.0,     240.0,     250.0,     260.0,     270.0,     280.0,     290.0,
       300.0,     310.0,     320.0,     330.0,     340.0,     350.0,
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1988MET DATA                                                    ***       14:43:09
                                                                                                                        PAGE   6
 **MODELOPTs: CONC                       URBAN  FLAT          DFAULT


                                   *** DISCRETE CARTESIAN RECEPTORS ***
                                    (X-COORD, Y-COORD, ZELEV, ZFLAG)
                                                (METERS)

    (    -18.5,        1.3,         .0,        .0);        (    -38.5,        1.3,         .0,        .0);
    (    -58.5,        1.3,         .0,        .0);        (    -78.6,        1.3,         .0,        .0);
    (    -89.3,        1.3,         .0,        .0);        (    -89.3,       21.3,         .0,        .0);
    (    -89.3,       41.3,         .0,        .0);        (    -89.3,       61.3,         .0,        .0);
    (    -89.3,       81.3,         .0,        .0);        (    -89.3,      100.4,         .0,        .0);
    (    -69.3,      100.3,         .0,        .0);        (    -49.3,      100.3,         .0,        .0);
    (    -29.3,      100.3,         .0,        .0);        (     -9.3,      100.3,         .0,        .0);
    (      1.4,      100.4,         .0,        .0);        (      1.4,       80.3,         .0,        .0);
    (      1.4,       60.3,         .0,        .0);        (      1.4,       40.3,         .0,        .0);
    (      1.4,       20.3,         .0,        .0);        (      1.4,        1.3,         .0,        .0);
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1988MET DATA                                                    ***       14:43:09
                                                                                                                        PAGE   7
 **MODELOPTs: CONC                       URBAN  FLAT          DFAULT

                     * SOURCE-RECEPTOR COMBINATIONS FOR WHICH CALCULATIONS MAY NOT BE PERFORMED *
                        LESS THAN 1.0 METER OR 3*ZLB IN DISTANCE, OR WITHIN OPEN PIT SOURCE
```

```
                    SOURCE          - - RECEPTOR LOCATION - -          DISTANCE
                      ID          XR (METERS)   YR (METERS)           (METERS)
                   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

                    STACK1                1.4          20.3              9.81
 *** ISCST3 - VERSION 96113 ***     ***  NIBM REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***         03/27/97
                                    ***  RUN3-1988MET DATA                                                    ***         14:43:09
                                                                                                                          PAGE   8
**MODELOPTs: CONC                          URBAN  FLAT          DFAULT

                                         *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                          (1=YES; 0=NO)

            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1

                METEOROLOGICAL DATA PROCESSED BETWEEN START DATE:  80  1  1  1
                                                    AND END DATE:  88 12 31 24

           NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                                 *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                          (METERS/SEC)

                                              1.54,    3.09,    5.14,    8.23,   10.80,


                                                  *** WIND PROFILE EXPONENTS ***

           STABILITY                                  WIND SPEED CATEGORY
           CATEGORY        1              2              3              4              5              6
               A       .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00
               B       .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00
               C       .20000E+00     .20000E+00     .20000E+00     .20000E+00     .20000E+00     .20000E+00
               D       .25000E+00     .25000E+00     .25000E+00     .25000E+00     .25000E+00     .25000E+00
               E       .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00
               F       .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00
```

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                         *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                                   (DEGREES KELVIN PER METER)

           STABILITY                            WIND SPEED CATEGORY
           CATEGORY        1              2              3              4              5              6
              A       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
              B       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
              C       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
              D       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
              E       .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01
              F       .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1988MET DATA                                                ***        14:43:09
                                                                                                                     PAGE   9
 **MODELOPTs: CONC                         URBAN  FLAT          DFAULT


                   *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

         FILE: C:\TRINITY\SUITE\MET\PHXTUS88.BIN        FORMAT: UNFORM
         SURFACE STATION NO.:  23183                    UPPER AIR STATION NO.:  23160
                        NAME: UNKNOWN                                      NAME: UNKNOWN
                        YEAR:    1988                                      YEAR:    1988

                                      FLOW    SPEED   TEMP     STAB   MIXING HEIGHT (M)    USTAR  M-O LENGTH    Z-0 IPCODE PRATE
         YEAR  MONTH  DAY  HOUR     VECTOR    (M/S)    (K)     CLASS   RURAL    URBAN     (M/S)      (M)       (M)        (mm/HR)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 - - - - - - -

          88     1     1     1       21.0    2.06   278.7      5     1489.3    274.0     .0000        .0   .0000   0     .00
          88     1     1     2       58.0    2.57   278.7      5     1494.9    274.0     .0000        .0   .0000   0     .00
          88     1     1     3       44.0    2.06   278.2      5     1500.5    274.0     .0000        .0   .0000   0     .00
          88     1     1     4       93.0    2.06   279.3      5     1506.1    274.0     .0000        .0   .0000   0     .00
          88     1     1     5       73.0    2.06   279.3      5     1511.7    274.0     .0000        .0   .0000   0     .00
          88     1     1     6       42.0    2.06   279.3      5     1517.3    274.0     .0000        .0   .0000   0     .00
          88     1     1     7       75.0    2.06   279.3      5     1522.9    274.0     .0000        .0   .0000   0     .00
          88     1     1     8       73.0    1.00   279.3      4       94.5    352.0     .0000        .0   .0000   0     .00
          88     1     1     9       37.0    1.54   279.8      3      339.1    553.6     .0000        .0   .0000   0     .00
          88     1     1    10       91.0    2.06   282.6      3      583.7    755.3     .0000        .0   .0000   0     .00
          88     1     1    11       94.0    1.00   285.4      2      828.3    957.0     .0000        .0   .0000   0     .00
          88     1     1    12      276.0    1.54   287.0      2     1072.8   1158.7     .0000        .0   .0000   0     .00
          88     1     1    13      233.0    3.60   289.3      3     1317.4   1360.3     .0000        .0   .0000   0     .00
          88     1     1    14      229.0    3.60   289.8      3     1562.0   1562.0     .0000        .0   .0000   0     .00
          88     1     1    15      212.0    2.06   290.4      3     1562.0   1562.0     .0000        .0   .0000   0     .00
          88     1     1    16      244.0    1.54   290.4      3     1562.0   1562.0     .0000        .0   .0000   0     .00
          88     1     1    17      221.0    2.06   289.8      4     1562.0   1562.0     .0000        .0   .0000   0     .00
          88     1     1    18      217.0    1.00   287.6      5     1546.6   1438.3     .0000        .0   .0000   0     .00
          88     1     1    19      114.0    1.54   285.4      6     1519.2   1219.2     .0000        .0   .0000   0     .00
          88     1     1    20       17.0    1.54   284.3      6     1491.9   1000.2     .0000        .0   .0000   0     .00
```

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     88       1       1      21         20.0    1.00   283.7       6         1464.6     781.1       .0000          .0   .0000   0      .00
     88       1       1      22         22.0    1.00   282.0       7         1437.3     562.1       .0000          .0   .0000   0      .00
     88       1       1      23         70.0    2.57   281.5       6         1409.9     343.0       .0000          .0   .0000   0      .00
     88       1       1      24         40.0    2.57   279.8       5         1302.6     124.0       .0000          .0   .0000   0      .00


*** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
            FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.
 *** ISCST3 - VERSION 96113 ***      ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1988MET DATA                                                  ***        14:43:09
                                                                                                                        PAGE  10
**MODELOPTs: CONC                             URBAN   FLAT          DFAULT

                              *** THE ANNUAL (  8784 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL        ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                 *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                     ** CONC OF TCE       IN MICROGRAMS/M**3                          **

 DIRECTION |                                        DISTANCE (METERS)
 (DEGREES) |        50.00        100.00        150.00       200.00       250.00       300.00       400.00       500.00       600.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     360.00 |       .48341       .18214       .10186       .06517       .04493       .03275       .01962       .01312       .00944
      10.00 |       .45016       .15829       .08583       .05403       .03691       .02672       .01583       .01048       .00747
      20.00 |       .50815       .18770       .10164       .06389       .04355       .03147       .01860       .01231       .00878
      30.00 |       .64341       .25065       .13757       .08728       .05995       .04357       .02598       .01731       .01242
      40.00 |       .83506       .33956       .18330       .11537       .07914       .05753       .03437       .02295       .01650
      50.00 |      1.01641       .45917       .25103       .15700       .10714       .07763       .04621       .03080       .02211
      60.00 |      1.17009       .54239       .30441       .19385       .13385       .09783       .05896       .03964       .02865
      70.00 |      1.21586       .57969       .32661       .20998       .14610       .10751       .06544       .04429       .03216
      80.00 |      1.08150       .55623       .31766       .20414       .14186       .10435       .06352       .04300       .03122
      90.00 |       .91625       .47017       .27130       .17576       .12289       .09076       .05556       .03775       .02748
     100.00 |       .76516       .40148       .23151       .14919       .10395       .07654       .04664       .03156       .02289
     110.00 |       .64242       .32634       .19011       .12335       .08636       .06386       .03914       .02659       .01934
     120.00 |       .56401       .29350       .17100       .11065       .07712       .05679       .03456       .02334       .01690
     130.00 |       .48853       .26405       .16044       .10655       .07547       .05617       .03468       .02366       .01727
     140.00 |       .44330       .24267       .15011       .10085       .07191       /05375       .03334       .02280       .01666
     150.00 |       .39669       .22147       .13879       .09432       .06780       .05099       .03190       .02195       .01611
     160.00 |       .34408       .18039       .10985       .07348       .05234       .03911       .02424       .01656       .01209
     170.00 |       .30399       .15503       .09337       .06205       .04402       .03282       .02029       .01384       .01010
     180.00 |       .28242       .14644       .08834       .05875       .04166       .03103       .01916       .01306       .00952
     190.00 |       .27383       .14499       .09000       .06090       .04367       .03270       .02046       .01406       .01031
     200.00 |       .26710       .14868       .09381       .06354       .04541       .03397       .02109       .01443       .01055
     210.00 |       .26062       .14319       .08886       .05969       .04244       .03163       .01953       .01332       .00971
     220.00 |       .27510       .15094       .09250       .06176       .04377       .03257       .02006       .01365       .00994
     230.00 |       .31017       .16524       .10130       .06857       .04926       .03703       .02312       .01585       .01159
     240.00 |       .37669       .23194       .15229       .10536       .07638       .05767       .03615       .02485       .01821
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      250.00 |        .54127       .35775       .22841       .15621       .11290       .08520       .05345       .03676       .02694
      260.00 |        .85225       .62466       .40663       .27880       .20145       .15192       .09536       .06574       .04834
      270.00 |       1.44531      1.01376       .59777       .38755       .27070       .19972       .12206       .08280       .06023
      280.00 |       2.03859      1.16047       .62961       .39248       .26850       .19547       .11748       .07887       .05697
      290.00 |       2.17392      1.03772       .54202       .33555       .22946       .16694       .10016       .06714       .04842
      300.00 |       1.84871       .85613       .46628       .29418       .20234       .14749       .08855       .05939       .04288
      310.00 |       1.55544       .66179       .33675       .20261       .13486       .09608       .05593       .03673       .02600
      320.00 |       1.63039       .54638       .26669       .15751       .10397       .07390       .04312       .02848       .02036
      330.00 |       1.36650       .40061       .18904       .10964       .07149       .05035       .02897       .01893       .01340
      340.00 |        .92276       .29323       .14254       .08373       .05494       .03884       .02246       .01471       .01044
      350.00 |        .64999       .23762       .12341       .07509       .05023       .03593       .02105       .01389       .00990
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***         03/27/97
                                    ***  RUN3-1988MET DATA                                                   ***         14:43:09
                                                                                                                         PAGE  11
**MODELOPTs: CONC                             URBAN   FLAT          DFAULT

                             *** THE ANNUAL (  8784 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                                 INCLUDING SOURCE(S):       STACK1   ,

                                  *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                       ** CONC OF TCE      IN MICROGRAMS/M**3                          **

  DIRECTION |                                        DISTANCE (METERS)
  (DEGREES) |       800.00       1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

      360.00 |        .00564       .00380
       10.00 |        .00438       .00290
       20.00 |        .00517       .00344
       30.00 |        .00738       .00495
       40.00 |        .00983       .00661
       50.00 |        .01316       .00883
       60.00 |        .01721       .01164
       70.00 |        .01945       .01322
       80.00 |        .01886       .01280
       90.00 |        .01666       .01133
      100.00 |        .01379       .00933
      110.00 |        .01170       .00794
      120.00 |        .01015       .00684
      130.00 |        .01050       .00715
      140.00 |        .01013       .00689
      150.00 |        .00988       .00676
      160.00 |        .00734       .00498
      170.00 |        .00613       .00417
      180.00 |        .00577       .00392
      190.00 |        .00631       .00432
      200.00 |        .00643       .00438
      210.00 |        .00588       .00400
      220.00 |        .00602       .00408
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         230.00 |          .00703       .00477
         240.00 |          .01112       .00759
         250.00 |          .01643       .01118
         260.00 |          .02972       .02042
         270.00 |          .03652       .02486
         280.00 |          .03422       .02316
         290.00 |          .02900       .01957
         300.00 |          .02577       .01747
         310.00 |          .01526       .01012
         320.00 |          .01208       .00812
         330.00 |          .00782       .00518
         340.00 |          .00611       .00405
         350.00 |          .00583       .00388
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***      03/27/97
                                    ***  RUN3-1988MET DATA                                                    ***      14:43:09
                                                                                                                        PAGE  12
**MODELOPTs: CONC                        URBAN  FLAT          DFAULT

                                  *** THE ANNUAL (  8784 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL      ***
                                      INCLUDING SOURCE(S):      STACK1  ,

                                                *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                            ** CONC OF TCE      IN MICROGRAMS/M**3                        **

      X-COORD (M)  Y-COORD (M)        CONC                        X-COORD (M)  Y-COORD (M)        CONC
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
          -18.55          1.33        .78616                          -38.55         1.33       1.52788
          -58.55          1.33       1.52493                          -78.55         1.33       1.31932
          -89.33          1.33       1.17146                          -89.33        21.33       1.28822
          -89.33         41.33        .96419                          -89.33        61.33        .69261
          -89.33         81.33        .45141                          -89.33       100.40        .33288
          -69.33        100.34        .33744                          -49.33       100.34        .27896
          -29.33        100.34        .25571                           -9.33       100.34        .20664
            1.45        100.40        .17732                            1.45        80.34        .24146
            1.45         60.34        .35861                            1.45        40.34        .61071
            1.45         20.34        .00000                            1.45         1.33        .45866
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***      03/27/97
                                    ***  RUN3-1988MET DATA                                                    ***      14:43:09
                                                                                                                        PAGE  13
**MODELOPTs: CONC                        URBAN  FLAT          DFAULT

                                  *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                      INCLUDING SOURCE(S):      STACK1  ,

                                       *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                            ** CONC OF TCE      IN MICROGRAMS/M**3                        **

DIRECTION |                                               DISTANCE (METERS)
```

```
(DEGREES) |         50.00                    100.00                   150.00                   200.00                   250.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |     24.02921 (88122014)     14.42179 (88081902)     10.06296 (88121619)      7.90865 (88012618)      5.96254 (88012618)
    10.0 |     23.75259 (88112716)     14.43404 (88032423)      9.83544 (88072421)      7.37347 (88040607)      5.68277 (88040607)
    20.0 |     23.34598 (88050419)     13.84187 (88053120)     10.00136 (88070503)      7.78248 (88041202)      5.88666 (88041202)
    30.0 |     22.88978 (88040118)     13.99043 (88032424)      9.96981 (88022422)      7.58701 (88041121)      5.79702 (88041121)
    40.0 |     22.18618 (88041415)     13.65093 (88022723)      9.81535 (88082524)      7.60598 (88092724)      5.74849 (88092724)
    50.0 |     21.69056 (88020411)     13.31545 (88091222)      9.78839 (88100623)      7.52400 (88032320)      5.60965 (88092824)
    60.0 |     20.49138 (88061810)     13.01513 (88110121)      9.68791 (88102618)      7.43006 (88052221)      5.54767 (88052221)
    70.0 |     20.60634 (88020410)     12.75622 (88092203)      9.58693 (88100922)      7.33054 (88060823)      5.55095 (88032121)
    00.0 |     20.02653 (88010717)     12.41136 (88062824)     10.73965 (88110920)      7.66563 (88110920)      5.42018 (88110920)
    90.0 |     19.44991 (88121901)     12.22960 (88062003)      9.34638 (88053123)      7.13147 (88053123)      5.44950 (88110920)
   100.0 |     18.79796 (88110911)     11.96457 (88101904)      9.22925 (88100919)      6.91533 (88110118)      5.31831 (88110118)
   110.0 |     18.52925 (88012018)     11.83102 (88052823)      9.14884 (88082424)      6.98167 (88082424)      5.25532 (88082424)
   120.0 |     17.89176 (88071317)     11.74279 (88052224)      8.66479 (88012923)      6.50102 (88012923)      4.88612 (88011022)
   130.0 |     18.26581 (88031621)     11.68161 (88091019)      9.06561 (88051222)      6.86808 (88051222)      5.19619 (88063005)
   140.0 |     18.30835 (88050123)     11.64458 (88061801)      8.80976 (88052602)      6.55183 (88052602)      5.02411 (88021623)
   150.0 |     17.81703 (88080904)     11.66303 (88030619)      8.93829 (88073104)      6.77872 (88073104)      5.15302 (88073104)
   160.0 |     18.18239 (88033105)     11.61861 (88092420)      9.01620 (88101902)      6.81069 (88101902)      5.16788 (88101902)
   170.0 |     17.26113 (88042214)     11.62251 (88051221)      8.49724 (88110621)      6.35258 (88031623)      4.86339 (88031623)
   180.0 |     17.78697 (88031701)     11.60556 (88060921)      9.02798 (88092722)      6.78729 (88092722)      5.12013 (88092722)
   190.0 |     17.93948 (88031703)     11.68392 (88041021)      9.11077 (88102802)      6.89363 (88102802)      5.20698 (88102802)
   200.0 |     17.90848 (88110718)     11.77394 (88060624)      8.99142 (88052703)      6.91112 (88052703)      5.24955 (88052703)
   210.0 |     17.79956 (88012201)     11.87143 (08111319)      9.19010 (88120418)      7.00687 (88120418)      5.29231 (88040724)
   220.0 |     18.80460 (88120417)     11.97030 (88100302)      9.38046 (88110906)      7.05267 (88110906)      5.33093 (88032222)
   230.0 |     19.32963 (88021118)     12.04614 (88091103)      9.19160 (88110619)      6.91638 (88081322)      5.92518 (88111802)
   240.0 |     19.62321 (88091708)     12.17853 (88101707)      9.49425 (88070222)      7.25785 (88060704)      5.48466 (88061305)
   250.0 |     20.35060 (88011217)     12.27932 (88032323)      9.66706 (88032224)      7.24826 (88032224)      5.45342 (88071301)
   260.0 |     21.39161 (88112524)     13.11040 (88110205)      9.70070 (88042922)      7.43611 (88062904)      5.55148 (88062904)
   270.0 |     21.85523 (88122510)     13.39769 (88040224)      9.88192 (88030623)      7.56905 (88031923)      5.68680 (88051224)
   200.0 |     22.32139 (88121617)     13.70356 (88102623)      9.82493 (88081303)      7.61665 (88061005)      5.75357 (88061005)
   290.0 |     23.46755 (88112522)     13.98990 (08032223)      9.77936 (88090624)      7.71911 (88090624)      5.81198 (88092224)
   300.0 |     23.77303 (88121508)     14.26885 (88102605)     10.09219 (88032301)      7.82792 (88032301)      5.90025 (88111124)
   310.0 |     32.05835 (88032406)     23.78502 (88082122)     15.11415 (88020619)      9.96071 (88020619)      6.90911 (88020619)
   320.0 |     50.92169 (08092103)     24.23205 (88041024)     15.09313 (88092805)      9.78352 (88041103)      6.85597 (88041103)
   330.0 |     52.39805 (88100621)     24.46601 (88050904)     15.45138 (88040121)     10.07604 (88040121)      6.97851 (88040121)
   340.0 |     52.34721 (88101720)     24.20963 (88090205)     15.42114 (88102901)     10.08249 (88102901)      6.99693 (88102901)
   350.0 |     50.01933 (88112902)     24.38129 (88103123)     15.12319 (08080203)      9.96799 (88080203)      6.94355 (88080203)
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1988MET DATA                                                   ***        14:43:09
                                                                                                                         PAGE  14
**MODELOPTs: CONC                             URBAN   FLAT          DFAULT

                                 *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                     INCLUDING SOURCE(S):        STACK1  ,

                                   *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                       ** CONC OF TCE       IN MICROGRAMS/M**3                            **
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DIRECTION |                                               DISTANCE (METERS)
(DEGREES) |          300.00                   400.00                   500.00                   600.00                   000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |      4.57704 (88012618)       2.92227 (88012618)       2.04040 (88012618)       1.51984 (88012618)        .95957 (88012618)
    10.0 |      4.42032 (88040607)       2.86476 (88040607)       2.01681 (88040607)       1.51021 (88040607)        .95974 (88040607)
    20.0 |      4.51945 (88041202)       2.87804 (88041202)       2.00267 (88041202)       1.48678 (88041202)        .93313 (88041202)
    30.0 |      4.47587 (88041121)       2.86657 (88041121)       1.99992 (88041121)       1.48679 (88041121)        .94774 (88120320)
    40.0 |      4.40280 (88092724)       2.78698 (88092724)       1.96550 (88010719)       1.48064 (88010719)        .94590 (88010719)
    50.0 |      4.37129 (88092824)       2.82847 (88092824)       1.98375 (88092824)       1.47929 (88092824)        .93785 (88103002)
    60.0 |      4.31617 (88082402)       2.80395 (88082402)       1.97121 (88082402)       1.48217 (88080102)        .94644 (88080102)
    70.0 |      4.20222 (88032121)       2.77857 (88102821)       1.95706 (88102821)       1.47288 (88061003)        .94215 (88061003)
    80.0 |      4.11103 (88051123)       2.72215 (88062022)       1.94080 (88062022)       1.46423 (88062022)        .93788 (88062022)
    90.0 |      4.54514 (88110920)       3.20763 (88110920)       2.37024 (88110920)       1.82965 (88110920)       1.20384 (88110920)
   100.0 |      4.14820 (88110118)       2.70341 (88110118)       1.92030 (88041923)       1.44960 (88041923)        .92984 (88041923)
   110.0 |      4.06538 (88051604)       2.68121 (88051604)       1.91034 (88051604)       1.44220 (88051604)        .92557 (88051604)
   120.0 |      3.86291 (88011022)       2.56158 (88011022)       1.82813 (88011022)       1.39019 (88120606)        .90473 (88120606)
   130.0 |      4.05374 (88063005)       2.65921 (88063005)       1.89213 (88063005)       1.42827 (88063005)        .91813 (88101903)
   140.0 |      3.94305 (88021623)       2.60763 (88021019)       1.86737 (88021019)       1.41594 (88021019)        .91486 (88021019)
   150.0 |      4.01802 (88073104)       2.64026 (88073104)       1.88312 (88073104)       1.42465 (88073104)        .91833 (88073104)
   160.0 |      4.02568 (88101902)       2.64282 (88101902)       1.88416 (88101902)       1.42513 (88101902)        .91846 (88101902)
   170.0 |      3.80376 (88031623)       2.50308 (88031623)       1.78376 (88031623)       1.34755 (88011618)        .87890 (88011618)
   180.0 |      3.99805 (88061421)       2.63408 (88061421)       1.88083 (88061421)       1.42371 (88061421)        .91818 (88061421)
   190.0 |      4.05444 (88051520)       2.66000 (88051520)       1.89274 (88051520)       1.42872 (88051520)        .91806 (88051401)
   200.0 |      4.07519 (88052703)       2.65026 (88052703)       1.87297 (88052703)       1.40610 (88052703)        .90493 (88010801)
   210.0 |      4.11724 (88040724)       2.68370 (88022720)       1.91181 (88022720)       1.44315 (88022720)        .92605 (88022720)
   220.0 |      4.15649 (88032222)       2.70749 (88032222)       1.91149 (88032222)       1.43525 (88011619)        .92387 (88011619)
   230.0 |      4.94259 (88111802)       3.45157 (88111802)       2.51661 (88111802)       1.94909 (88011119)       1.29944 (88011119)
   240.0 |      4.23620 (88110904)       2.75980 (88110904)       1.94528 (88110904)       1.46585 (88101605)        .93860 (88101605)
   250.0 |      4.26863 (88071301)       2.78014 (88071301)       1.95796 (88071301)       1.47418 (88092804)        .94273 (88092804)
   260.0 |      4.33130 (88110303)       2.81026 (88110303)       1.97437 (88110303)       1.48276 (88102521)        .94670 (88102521)
   270.0 |      4.37562 (88051304)       2.83026 (88051304)       1.98697 (88051107)       1.49272 (88051107)        .95098 (88051107)
   280.0 |      4.44428 (88041902)       2.85704 (88041902)       2.00283 (88110420)       1.50170 (88110420)        .95459 (88110420)
   290.0 |      4.48395 (88092224)       2.86946 (88092224)       2.00117 (88092224)       1.48741 (88092224)        .94984 (88090102)
   300.0 |      4.52647 (88111124)       2.89344 (88090701)       2.02995 (88090701)       1.51596 (88090701)        .95954 (88090701)
   310.0 |      5.08170 (88110301)       3.11874 (88110301)       2.13643 (88110301)       1.57416 (88110301)        .98241 (88110301)
   320.0 |      5.06283 (88041103)       3.11260 (88041103)       2.13635 (88041103)       1.57683 (88041103)        .98691 (88041103)
   330.0 |      5.11739 (88040121)       3.12128 (88040121)       2.13281 (88040121)       1.56964 (88040121)        .98304 (88030301)
   340.0 |      5.13888 (88102901)       3.14158 (88102901)       2.15026 (88102901) ,     1.58456 (88102901)        .99004 (88102901)
   350.0 |      5.11030 (88080203)       3.13079 (88080203)       2.14511 (88080203)       1.58171 (88080203)        .98889 (88080203)
 *** ISCST3 - VERSION 96113 ***      ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1988MET DATA                                                   ***        14:43:09
                                                                                                                          PAGE  15
**MODELOPTs: CONC                              URBAN  FLAT            DFAULT

                                 *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                     INCLUDING SOURCE(S):        STACK1   ,

                                      *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***
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```
                                          ** CONC OF TCE      IN MICROGRAMS/M**3                        **

DIRECTION |                                                     DISTANCE (METERS)
(DEGREES) |          1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |        .67684 (88012618)
    10.0 |        .67973 (88040607)
    20.0 |        .65481 (88041202)
    30.0 |        .67350 (88120320)
    40.0 |        .67108 (88010719)
    50.0 |        .66823 (88103002)
    60.0 |        .67143 (88080102)
    70.0 |        .66908 (88061003)
    80.0 |        .66664 (88062022)
    90.0 |        .86820 (88110920)
   100.0 |        .66172 (88041923)
   110.0 |        .65903 (88051604)
   120.0 |        .64961 (88120606)
   130.0 |        .65645 (88101903)
   140.0 |        .65460 (88021019)
   150.0 |        .65633 (88073104)
   160.0 |        .65638 (88101902)
   170.0 |        .63174 (88011618)
   180.0 |        .65634 (88061421)
   190.0 |        .65641 (88051401)
   200.0 |        .64779 (88010801)
   210.0 |        .65931 (88022720)
   220.0 |        .65865 (88011619)
   230.0 |        .94316 (88011119)
   240.0 |        .66703 (88101605)
   250.0 |        .66939 (88092804)
   260.0 |        .67157 (88102521)
   270.0 |        .67378 (88051107)
   280.0 |        .67554 (88110420)
   290.0 |        .67459 (88090102)
   300.0 |        .67758 (88090701)
   310.0 |        .68086 (88110301)
   320.0 |        .69360 (88041103)
   330.0 |        .69164 (88030301)
   340.0 |        .69519 (88102901)
   350.0 |        .69461 (88080203)
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***     03/27/97
                                    ***  RUN3-1988MET DATA                                                 ***     14:43:09
                                                                                                                   PAGE  16
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                                *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                    INCLUDING SOURCE(S):      STACK1  ,
```

```
                                    *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                 ** CONC OF TCE      IN MICROGRAMS/M**3                        **

    X-COORD (M)  Y-COORD (M)         CONC    (YYMMDDHH)             X-COORD (M)  Y-COORD (M)        CONC    (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        -18.55         1.33       30.21175  (88010114)                 -38.55         1.33       25.15291  (88012910)
        -58.55         1.33       19.73000  (88032408)                 -78.55         1.33       16.57790  (88111404)
        -89.33         1.33       14.91002  (88040224)                 -89.33        21.33       15.00839  (88092407)
        -89.33        41.33       14.41516  (88041824)                 -89.33        61.33       13.22653  (88102505)
        -89.33        81.33       19.63195  (88110301)                 -89.33       100.40       17.35924  (88092805)
        -69.33       100.34       19.42877  (88061404)                 -49.33       100.34       20.89978  (88102903)
        -29.33       100.34       22.30281  (88021620)                  -9.33       100.34       21.47520  (88100824)
          1.45       100.40       14.51208  (88081902)                   1.45        80.34       17.16325  (88090520)
          1.45        60.34       20.86886  (88010508)                   1.45        40.34       29.39756  (88121516)
          1.45        20.34         .00002  (88110920)                   1.45         1.33       27.01321  (88030113)
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1988MET DATA                                                  ***       14:43:09
                                                                                                                      PAGE  17
 **MODELOPTs: CONC                              URBAN  FLAT           DFAULT

                            *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                INCLUDING SOURCE(S):      STACK1  ,

                                  *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                 ** CONC OF TCE      IN MICROGRAMS/M**3                        **

 DIRECTION |                                          DISTANCE (METERS)
 (DEGREES) |          50.00                  100.00                  150.00                  200.00                  250.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.0 |      3.19640c(88062024)     1.37338c(88103024)      .86845c(88122724)      .71101c(08122724)      .55694c(08122724)
     10.0 |      3.07767 (88092024)     1.27476c(88103024)      .74107c(88103024)      .58217c(88122724)      .47153c(88122724)
     20.0 |      3.16176 (88092024)     1.33820 (88092024)      .79703c(88041124)      .60097c(88061624)      .45097c(88061624)
     30.0 |      4.27566 (88031524)     1.64189 (88031124)     1.13834c(88041124)      .85347c(88041124)      .63646c(88041124)
     40.0 |      4.72502 (88042024)     1.86604 (88031524)     1.40715c(88092724)     1.08587c(88092724)      .81275c(88092724)
     50.0 |      4.95826 (88050724)     2.76981c(88121824)     1.47271c(88052724)      .98795c(88102124)      .69243c(88102124)
     60.0 |      5.02116c(88122924)     2.78775c(88091324)     1.78841c(88121824)     1.27460c(88121824)      .95075c(88121824)
     70.0 |      6.58028c(88062124)     3.38853c(88100824)     2.22110c(88100824)     1.44183c(88100824)      .99180c(88100824)
     80.0 |      4.74718c(88070624)     3.12103c(88061724)     1.76001c(88061724)     1.20165c(88100824)      .90743c(88100824)
     90.0 |      4.27195c(88072724)     2.23591c(88070624)     1.39850c(88070624)      .93725c(88070624)      .66930c(88070624)
    100.0 |      3.47486c(88121924)     1.71341c(88072724)     1.10921c(88112624)      .86285c(88112624)      .66006c(88112624)
    110.0 |      2.86192c(88070624)     1.43061c(88050824)      .93519c(88050824)      .63996c(88051124)      .46853c(88051124)
    120.0 |      2.89113c(88020324)     1.65710c(88020324)     1.01340c(88020324)      .68540c(88120424)      .52587c(88120424)
    130.0 |      3.19013 (88031624)     1.51003c(88051524)      .92066c(88051524)      .64886c(88011424)      .48260c(88011424)
    140.0 |      3.77369 (88031024)     1.58420 (88031024)     1.07624c(88011424)      .78506c(88011424)      .58566c(88011424)
    150.0 |      2.64670c(88022424)     1.54706c(88080924)     1.05704c(88080924)      .77077c(88021824)      .57761c(88021824)
    160.0 |      2.55152 (88033124)     1.59486 (88033124)     1.04183 (88033124)      .74671 (08033124)      .55843 (88033124)
```

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   170.0 |       2.23216c(88021824)       1.62707 (88021924)       1.22445 (88021924)        .93339 (88021924)        .71265 (88021924)
   180.0 |       2.21305 (88032824)       1.29696c(88031724)        .80674 (88051824)        .53861 (88051824)        .39139 (88033124)
   190.0 |       3.23354c(88031724)       1.43959c(88031724)        .74121c(88031724)        .52618c(88011424)        .41786c(88011424)
   200.0 |       2.01210c(88102024)       1.21067c(88032924)        .84287c(88032924)        .58921c(88032924)        .42764c(88032924)
   210.0 |       2.99832c(88012224)       1.34709c(88012224)        .84060c(88032524)        .57965c(88032524)        .41312c(88032524)
   220.0 |       3.72424c(88012224)       1.54585c(88110924)       1.10870c(88110924)        .80260c(88110924)        .58682c(88110924)
   230.0 |       2.80731c(88012224)       1.23272c(88012424)        .79581c(88120724)        .56631c(88120724)        .43298c(88011124)
   240.0 |       3.06984c(88021124)       1.87522c(88031924)       1.25599c(88031924)        .86991c(88031924)        .63274c(88031924)
   250.0 |       4.22665c(88031924)       2.07202c(88120824)       1.26300c(88103124)        .87857c(88100424)        .63382c(88100424)
   260.0 |       5.59139c(88120124)       3.29558c(88120124)       1.67440c(88120124)       1.00433c(88120124)        .73784c(88122224)
   270.0 |       7.99230 (88012724)       4.03215c(88101124)       2.20004c(88102324)       1.48036c(88102324)       1.04435c(88102324)
   280.0 |       9.69377 (88012724)       3.89105c(88110424)       2.41596c(88110424)       1.60692c(88110424)       1.14930c(88110424)
   290.0 |       6.29462c(88102424)       3.92999c(88022324)       2.15850c(88111324)       1.50066c(88092724)       1.15189c(88092724)
   300.0 |       7.62010c(88011124)       3.65124c(88111324)       1.90784c(88111224)       1.55036c(88010924)       1.20509c(88010924)
   310.0 |       5.86356c(88071324)       3.05269c(88110524)       1.58479c(88012824)       1.02760c(88120224)        .73446c(88120224)
   320.0 |       9.57779 (88041624)       2.94756c(88050924)       1.43205c(88121424)        .93970c(88032024)        .66444c(88032024)
   330.0 |       7.34079 (88041624)       2.24225c(88121324)       1.12867c(88121424)        .70825c(88012024)        .48975c(88012024)
   340.0 |       8.04857c(88102024)       2.68569c(88082124)       1.31226c(88082124)        .78374c(88102924)        .53950c(88102924)
   350.0 |       3.90224c(88080324)       1.72118 (88092124)       1.10434c(88021224)        .76804c(88020524)        .55337c(88020524)
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                  ***  RUN3-1988MET DATA                                                   ***        14:43:09
                                                                                                                      PAGE  18
**MODELOPTs: CONC                      URBAN  FLAT          DFAULT

                              *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                    *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                        ** CONC OF TCE       IN MICROGRAMS/M**3                          **

DIRECTION |                                                  DISTANCE (METERS)
(DEGREES) |          300.00                   400.00                   500.00                   600.00                   800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |        .43702c(88122724)        .28370c(88122724)        .19819c(88122724)        .14678c(88122724)        .09099c(88122724)
    10.0 |        .37848c(88122724)        .25274c(88122724)        .17934c(88122724)        .13397c(88122724)        .08357c(88122724)
    20.0 |        .34445c(88061624)        .22782c(88010124)        .16367c(88010124)        .12383c(88010124)        .07932c(88010124)
    30.0 |        .48662c(88041124)        .30926c(88041124)        .21500c(88041124)        .15944c(88041124)        .09979c(88041124)
    40.0 |        .62082c(88092724)        .39304c(88092724)        .27232c(88092724)        .20138c(88092724)        .12547c(88092724)
    50.0 |        .50647c(88102124)        .30356c(88102124)        .20323c(88102124)        .14667c(88102124)        .08829c(88102124)
    60.0 |        .73336c(88121824)        .47188c(88121824)        .33087c(88121824)        .24660c(88121824)        .15506c(88121824)
    70.0 |        .72061c(88100824)        .43015c(88100824)        .28732c(88100824)        .20671c(88100824)        .12351c(88091324)
    80.0 |        .70416c(88100824)        .45877c(88100824)        .32460c(88100824)        .24372c(88100824)        .15492c(88100824)
    90.0 |        .50216c(88070624)        .31489c(88070624)        .21812c(88070624)        .16154c(88070624)        .10092c(88070624)
   100.0 |        .51340c(88112624)        .33274c(88112624)        .23350c(88112624)        .17391c(88112624)        .10906c(88112624)
   110.0 |        .35636c(88051124)        .22653c(88051124)        .15787c(88051124)        .11727c(88051124)        .07343c(88051124)
   120.0 |        .40957c(88120424)        .26617c(88120424)        .18737c(88120424)        .13999c(88120424)        .08825c(88120424)
   130.0 |        .37098c(88011424)        .23829c(88011424)        .16657c(88011424)        .12372c(88011424)        .07719c(88011424)
   140.0 |        .45078c(88011424)        .29026c(80011424)        .20345c(88011424)        .15148c(88011424)        .09484c(88011424)
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   150.0 |      .44590c(88021824)      .28825c(88021824)      .20260c(88021824)      .15117c(88021824)      .09496c(88021824)
   160.0 |      .43078 (88033124)      .27882 (88033124)      .19655 (88033124)      .14721 (88033124)      .09325 (88033124)
   170.0 |      .55675 (88021924)      .36590 (88021924)      .26045 (88021924)      .19648 (88021924)      .12585 (88021924)
   180.0 |      .29834 (88033124)      .18995 (88033124)      .13239 (88033124)      .09828 (88033124)      .06141 (88033124)
   190.0 |      .33423c(88011424)      .22542c(88011424)      .16262c(88011424)      .12365c(88011424)      .07986c(88011424)
   200.0 |      .33023c(88032524)      .21457c(88032524)      .15117c(88032524)      .11294c(88032524)      .07104c(88032524)
   210.0 |      .31299c(88012524)      .19849c(88012524)      .14086c(88100324)      .10604c(88100324)      .06774c(88100324)
   220.0 |      .44279c(88110924)      .27640c(88110924)      .19509c(88022024)      .14749c(88022024)      .09444c(88022024)
   230.0 |      .36071c(88011124)      .25384c(88011124)      .18677c(88011124)      .14351c(88011124)      .09364c(88011124)
   240.0 |      .47850c(88031924)      .30133c(88031924)      .20854c(88031924)      .15408c(88031924)      .09575c(88031924)
   250.0 |      .47415c(88100424)      .29347c(88100424)      .20087c(88100424)      .14740c(88100424)      .09096c(88100424)
   260.0 |      .57413c(88122224)      .36948c(88122224)      .25726c(88122224)      .19036c(88122224)      .11819c(88122224)
   270.0 |      .77191c(88102324)      .47247c(88102324)      .32395c(88020724)      .24171c(88020724)      .15197c(88020724)
   280.0 |      .85727c(88110424)      .53034c(88110424)      .36323c(88110424)      .26663c(88110424)      .16453c(88110424)
   290.0 |      .89552c(88092724)      .58041c(08092724)      .40828c(88092724)      .30520c(88092724)      .19296c(88092724)
   300.0 |      .94105c(88010924)      .60932c(88010924)      .42661c(88010924)      .31720c(88010924)      .19850c(88010924)
   310.0 |      .54407c(88120224)      .33112c(88120224)      .22357c(88120224)      .16214c(88120224)      .09804c(88120224)
   320.0 |      .49239c(88032024)      .30295c(88032024)      .20743c(88032024)      .15255c(88032024)      .09467c(88032024)
   330.0 |      .35749c(88012024)      .21553c(88120224)      .14635c(88120224)      .10689c(88120224)      .06554c(88120224)
   340.0 |      .39412c(88102924)      .23899c(88102924)      .16244c(88102924)      .11891c(88102924)      .07336c(88102924)
   350.0 |      .41490c(88020524)      .25905c(88020524)      .17911c(88020524)      .13274c(88020524)      .08341c(88020524)
 *** ISCST3 - VERSION 96113 ***      ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1988MET DATA                                                   ***        14:43:09
                                                                                                                         PAGE  19
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                                *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                    INCLUDING SOURCE(S):       STACK1   ,

                                      *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                        ** CONC OF TCE       IN MICROGRAMS/M**3                                 **

DIRECTION |                                             DISTANCE (METERS)
(DEGREES) |         1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |      .06286c(88122724)
    10.0 |      .05764c(88122724)
    20.0 |      .05622c(88010124)
    30.0 |      .06982c(88041124)
    40.0 |      .08743c(88092724)
    50.0 |      .06000c(88102124)
    60.0 |      .10862c(88121824)
    70.0 |      .08654c(88091324)
    80.0 |      .10931c(88100824)
    90.0 |      .07045c(88070624)
   100.0 |      .07615c(88112624)
   110.0 |      .05195c(88051624)
   120.0 |      .06187c(88120424)
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   130.0 |       .05432c(88102024)
   140.0 |       .06603c(88011424)
   150.0 |       .06642c(88032524)
   160.0 |       .06564 (88033124)
   170.0 |       .08937 (88021924)
   180.0 |       .04300c(88031724)
   190.0 |       .05694c(88011424)
   200.0 |       .04960c(88032524)
   210.0 |       .04802c(88100324)
   220.0 |       .06690c(88022024)
   230.0 |       .06709c(88011124)
   240.0 |       .06651c(88031924)
   250.0 |       .06301c(88100424)
   260.0 |       .08196c(88041824)
   270.0 |       .10631c(88020724)
   280.0 |       .11392c(88110424)
   290.0 |       .13579c(88092724)
   300.0 |       .13843c(88010924)
   310.0 |       .06670c(88120224)
   320.0 |       .06594c(88032024)
   330.0 |       .04514c(88120224)
   340.0 |       .05089c(88102924)
   350.0 |       .05872c(88020524)
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***          03/27/97
                                    ***  RUN3-1988MET DATA                                                    ***          14:43:09
                                                                                                                           PAGE  20
 **MODELOPTs: CONC                                   URBAN  FLAT          DFAULT

                                  *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                      INCLUDING SOURCE(S):       STACK1   ,

                                                     *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                               ** CONC OF TCE       IN MICROGRAMS/M**3                          **

    X-COORD (M)  Y-COORD (M)         CONC      (YYMMDDHH)               X-COORD (M)  Y-COORD (M)        CONC      (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        -10.55         1.33         6.78194c (88021124)                 -38.55         1.33         9.44195c (88120124)
        -58.55         1.33         7.20558  (88012724)                 -78.55         1.33         5.04400c (88101124)
        -89.33         1.33         4.58793c (88101124)                 -89.33        21.33         4.57534c (88110424)
        -09.33        41.33         4.65483c (88111324)                 -89.33        61.33         3.20397c (88110524)
        -89.33        81.33         2.23574c (88012824)                 -89.33       100.40         1.75418c (88050924)
        -69.33       100.34         1.69162c (88110524)                 -49.33       100.34         2.05273c (88082124)
        -29.33       100.34         2.28036c (88102024)                  -9.33       100.34         1.72222c (88100824)
          1.45       100.40         1.36054c (88103024)                   1.45        80.34         1.89524c (88101024)
          1.45        60.34         2.49815c (88103024)                   1.45        40.34         3.91145c (88062024)
          1.45        20.34          .00000c (88110924)                   1.45         1.33         3.90823  (88032824)
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***          03/27/97
                                    ***  RUN3-1988MET DATA                                                    ***          14:43:09
                                                                                                                           PAGE  21
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**MODELOPTs: CONC                          URBAN  FLAT           DFAULT

                                            *** THE SUMMARY OF MAXIMUM PERIOD (  8784 HRS) RESULTS ***


                                          ** CONC OF TCE       IN MICROGRAMS/M**3                          **

                                                                                                           NETWORK
GROUP ID                      AVERAGE CONC               RECEPTOR  (XR, YR, ZELEV, ZFLAG)   OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      1ST HIGHEST VALUE IS       2.17392 AT (     -46.98,        17.10,        .00,        .00)  GP    POLR1
         2ND HIGHEST VALUE IS       2.03859 AT (     -49.24,         8.68,        .00,        .00)  GP    POLR1


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                   ***  RUN3-1988MET DATA                                                  ***        14:43:09
                                                                                                                      PAGE  22
**MODELOPTs: CONC                          URBAN  FLAT           DFAULT

                                                *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***


                                          ** CONC OF TCE       IN MICROGRAMS/M**3                          **

                                                         DATE                                                          NETWORK
GROUP ID                          AVERAGE CONC      (YYMMDDHH)               RECEPTOR  (XR, YR, ZELEV, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       HIGH  1ST HIGH VALUE IS       52.39805  ON 88100621: AT (    -25.00,        43.30,        .00,        .00)  GP    POLR1


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                   ***  RUN3-1988MET DATA                                                  ***        14:43:09
                                                                                                                      PAGE  23
**MODELOPTs: CONC                          URBAN  FLAT           DFAULT

                                                *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***
```

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                                 ** CONC OF TCE      IN MICROGRAMS/M**3                          **

                                                      DATE                                                             NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)              RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS       9.69377  ON 88012724: AT (     -49.24,        8.68,       .00,       .00) GP   POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***          03/27/97
                                    ***  RUN3-1988MET DATA                                                   ***          14:43:09
                                                                                                                          PAGE  24
**MODELOPTs: CONC                         URBAN  FLAT          DEFAULT

*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of          0 Fatal Error Message(s)
A Total of          0 Warning Message(s)
A Total of       1069 Informational Message(s)

A Total of       1069 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
              ***  NONE  ***

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

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                         ISCST3 - (DATED 96113)

                     IBM-PC VERSION (3.05)      ISCST3R
           (C) COPYRIGHT 1992-1996, TRINITY CONSULTANTS, INC.

Run Began on  3/26/1997 at  8:52:55

** BREEZE AIR SUITE (ISCST3) - C:\TRINITY\SUITE\EM72096.DAT
** Trinity Consultants Incorporated, Dallas, TX

CO STARTING
CO TITLEONE  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH ST
CO TITLETWO  RUN3-1989MET DATA
CO MODELOPT  DFAULT  CONC  URBAN
CO AVERTIME  1  24  ANNUAL
CO POLLUTID  TCE
CO TERRHGTS  FLAT
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
SO ELEVUNIT  METERS
SO LOCATION  STACK1  POINT  -4.66  12.7  0
** SRCDESCR  AIR STRIPPER EXHAUST
SO SRCPARAM  STACK1  1.574974E-02  4.876001  299.82  18.29  0.28
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  7.62  7.62  7.62  7.62  7.62  4.27
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  29.1  28.31  26.66  24.2  21.0  17.17
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  63.61  55.73  46.15  35.17  23.12  17.17
SO EMISUNIT  1.0E+06  GRAMS/SEC  MICROGRAMS/M**3
SO SRCGROUP  ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POLR1 STA
RE GRIDPOLR POLR1 ORIG  0  0
RE GRIDPOLR POLR1 DIST 50  150  200  250  300  400  500  600  800  1000
RE GRIDPOLR POLR1 DDIR  0  10  20  30  40  50  60  70  80  90  100  110
RE GRIDPOLR POLR1 DDIR  120  130  140  150  160  170  180  190  200  210
RE GRIDPOLR POLR1 DDIR  220  230  240  250  260  270  280  290  300  310
RE GRIDPOLR POLR1 DDIR  320  330  340  350  0
RE GRIDPOLR POLR1 END
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```
** BOUNDARY
RE DISCCART  -18.55  1.33
RE DISCCART  -38.55  1.33
RE DISCCART  -50.55  1.33
RE DISCCART  -78.55  1.33
RE DISCCART  -89.33  1.33
RE DISCCART  -89.33  21.33
RE DISCCART  -89.33  41.33
RE DISCCART  -89.33  61.33
RE DISCCART  -89.33  81.33
RE DISCCART  -89.33  100.4
RE DISCCART  -69.33  100.34
RE DISCCART  -49.33  100.34
RE DISCCART  -29.33  100.34
RE DISCCART  -9.33  100.34
RE DISCCART  1.45  100.4
RE DISCCART  1.45  80.34
RE DISCCART  1.45  60.34
RE DISCCART  1.45  40.34
RE DISCCART  1.45  20.34
RE DISCCART  1.45  1.33
RE FINISHED

ME STARTING
ME INPUTFIL  C:\TRINITY\SUITE\MET\PHXTUS89.BIN  UNFORM
ME ANEMHGHT  10.0  METERS
ME SURFDATA  23183  1989
ME UAIRDATA  23160  1989
ME STARTEND  89  01  01  1  89  12  31  24
ME FINISHED

OU STARTING
OU RECTABLE  1  FIRST
OU RECTABLE  ALLAVE  FIRST
OU FINISHED

**********************************
*** SETUP Finishes Successfully ***
**********************************

 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/26/97
                                    ***  RUN3-1989MET DATA                                                  ***       08:52:55
                                                                                                                      PAGE   1
**MODELOPTs: CONC                         URBAN  FLAT          DFAULT

                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected
```

```
**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE = F
**Model Uses NO WET DEPLETION.  WDPLETE = F
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
          1. Final Plume Rise.
          2. Stack-tip Downwash.
          3. Buoyancy-induced Dispersion.
          4. Use Calms Processing Routine.
          5. Not Use Missing Data Processing Routine.
          6. Default Wind Profile Exponents.
          7. Default Vertical Potential Temperature Gradients.
          8. "Upper Bound" Values for Supersquat Buildings.
          9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR
    and Calculates ANNUAL Averages

**This Run Includes:     1 Source(s);       1 Source Group(s); and    390 Receptor(s)

**The Model Assumes A Pollutant Type of:  TCE

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    .0000     ;   Rot. Angle =      .0
                 Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =    .10000E+07
                 Output Units   = MICROGRAMS/M**3

**Input Runstream File: C:\TRINITY\SUITE\EM72096.DAT           ;  **Output Print File: C:\TRINITY\SUITE\EM72096.LST
 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                   ***  RUN3-1989MET DATA                                             ***        08:52:55
                                                                                                                  PAGE   2
```

```
**MODELOPTs: CONC                           URBAN  FLAT           DFAULT


                                              *** POINT SOURCE DATA ***

              NUMBER EMISSION RATE                          BASE     STACK   STACK    STACK     STACK    BUILDING EMISSION RATE
   SOURCE      PART. (USER UNITS)     X         Y          ELEV.    HEIGHT  TEMP.  EXIT VEL.  DIAMETER   EXISTS   SCALAR VARY
    ID         CATS.                (METERS)  (METERS)   (METERS)  (METERS) (DEG.K)  (M/SEC)   (METERS)                  BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  STACK1        0    .15750E-01     -4.7      12.7        .0      4.88   299.82    18.29       .28       YES
 *** ISCST3 - VERSION 96113 ***       ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                      ***  RUN3-1989MET DATA                                                  ***        08:52:55
                                                                                                                         PAGE   3
**MODELOPTs: CONC                           URBAN  FLAT           DFAULT


                                        *** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID                                                 SOURCE IDs


 ALL        STACK1   ,
 *** ISCST3 - VERSION 96113 ***       ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                      ***  RUN3-1989MET DATA                                                  ***        08:52:55
                                                                                                                         PAGE   4
**MODELOPTs: CONC                           URBAN  FLAT           DFAULT
                                       *** DIRECTION SPECIFIC BUILDING DIMENSIONS ***


SOURCE ID: STACK1
 IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK
   1   4.3,   20.9, 0     2   4.3,   24.1, 0     3   4.3,   26.6, 0     4   4.3,   28.2, 0     5   4.3,   29.0, 0     6   4.3,   28.9, 0
   7   4.3,   28.0, 0     8   4.3,   26.2, 0     9   4.3,   23.6, 0    10   4.3,   26.2, 0    11   4.3,   20.0, 0    12   4.3,   29.0, 0
  13   4.3,   29.1, 0    14   4.3,   28.3, 0    15   4.3,   26.7, 0    16   4.3,   24.2, 0    17   4.3,   21.0, 0    18   4.3,   17.2, 0
  19   4.3,   20.9, 0    20   4.3,   24.1, 0    21   4.3,   26.6, 0    22   4.3,   28.2, 0    23   4.3,   29.0, 0    24   4.3,   28.9, 0
  25   4.3,   28.0, 0    26   4.3,   26.2, 0    27   4.3,   23.6, 0    28   4.3,   26.2, 0    29   4.3,   28.0, 0    30   4.3,   29.0, 0
  31   7.6,   63.6, 0    32   7.6,   55.7, 0    33   7.6,   46.1, 0    34   7.6,   35.2, 0    35   7.6,   23.1, 0    36   4.3,   17.2, 0

 *** ISCST3 - VERSION 96113 ***       ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                      ***  RUN3-1989MET DATA                                                  ***        08:52:55
                                                                                                                         PAGE   5
**MODELOPTs: CONC                           URBAN  FLAT           DFAULT
```

```
                         *** GRIDDED RECEPTOR NETWORK SUMMARY ***

                    *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                         *** ORIGIN FOR POLAR NETWORK ***
                 X-ORIG =       .00 ;   Y-ORIG =        .00  (METERS)

                         *** DISTANCE RANGES OF NETWORK ***
                                   (METERS)

      50.0,      150.0,      200.0,      250.0,      300.0,      400.0,      500.0,      600.0,      800.0,     1000.0,

                         *** DIRECTION RADIALS OF NETWORK ***
                                   (DEGREES)

     360.0,       10.0,       20.0,       30.0,       40.0,       50.0,       60.0,       70.0,       80.0,       90.0,
     100.0,      110.0,      120.0,      130.0,      140.0,      150.0,      160.0,      170.0,      180.0,      190.0,
     200.0,      210.0,      220.0,      230.0,      240.0,      250.0,      260.0,      270.0,      280.0,      290.0,
     300.0,      310.0,      320.0,      330.0,      340.0,      350.0,      360.0,
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/26/97
                                  ***  RUN3-1989MET DATA                                                  ***       08:52:55
                                                                                                                    PAGE   6
**MODELOPTs: CONC                      URBAN  FLAT          DFAULT

                             *** DISCRETE CARTESIAN RECEPTORS ***
                              (X-COORD, Y-COORD, ZELEV, ZFLAG)
                                          (METERS)

   (     -18.5,        1.3,        .0,        .0);          (     -38.5,        1.3,        .0,        .0);
   (     -58.5,        1.3,        .0,        .0);          (     -78.6,        1.3,        .0,        .0);
   (     -89.3,        1.3,        .0,        .0);          (     -89.3,       21.3,        .0,        .0);
   (     -89.3,       41.3,        .0,        .0);          (     -89.3,       61.3,        .0,        .0);
   (     -89.3,       81.3,        .0,        .0);          (     -89.3,      100.4,        .0,        .0);
   (     -69.3,      100.3,        .0,        .0);          (     -49.3,      100.3,        .0,        .0);
   (     -29.3,      100.3,        .0,        .0);          (      -9.3,      100.3,        .0,        .0);
   (       1.4,      100.4,        .0,        .0);          (       1.4,       80.3,        .0,        .0);
   (       1.4,       60.3,        .0,        .0);          (       1.4,       40.3,        .0,        .0);
   (       1.4,       20.3,        .0,        .0);          (       1.4,        1.3,        .0,        .0);
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/26/97
                                  ***  RUN3-1989MET DATA                                                  ***       08:52:55
                                                                                                                    PAGE   7
**MODELOPTs: CONC                      URBAN  FLAT          DFAULT

                   * SOURCE-RECEPTOR COMBINATIONS FOR WHICH CALCULATIONS MAY NOT BE PERFORMED *
                      LESS THAN 1.0 METER OR 3*ZLB IN DISTANCE, OR WITHIN OPEN PIT SOURCE
```

```
                    SOURCE          - - RECEPTOR LOCATION - -          DISTANCE
                      ID          XR (METERS)    YR (METERS)           (METERS)
                   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

                    STACK1                1.4           20.3              9.78
 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/26/97
                                   ***  RUN3-1989MET DATA                                                     ***       08:52:55
                                                                                                                      PAGE   8
 **MODELOPTs: CONC                           URBAN  FLAT           DFAULT

                                          *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                            (1=YES; 0=NO)

                  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
                  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
                  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
                  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
                  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
                  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
                  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
                  1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1

               METEOROLOGICAL DATA PROCESSED BETWEEN START DATE:  89  1  1  1
                                                   AND END DATE:  89 12 31 24

            NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                                 *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                          (METERS/SEC)

                                              1.54,    3.09,    5.14,    8.23,   10.80,

                                                   *** WIND PROFILE EXPONENTS ***

            STABILITY                                   WIND SPEED CATEGORY
            CATEGORY          1               2               3               4               5               6
                A        .15000E+00      .15000E+00      .15000E+00      .15000E+00      .15000E+00      .15000E+00
                B        .15000E+00      .15000E+00      .15000E+00      .15000E+00      .15000E+00      .15000E+00
                C        .20000E+00      .20000E+00      .20000E+00      .20000E+00      .20000E+00      .20000E+00
                D        .25000E+00      .25000E+00      .25000E+00      .25000E+00      .25000E+00      .25000E+00
                E        .30000E+00      .30000E+00      .30000E+00      .30000E+00      .30000E+00      .30000E+00
                F        .30000E+00      .30000E+00      .30000E+00      .30000E+00      .30000E+00      .30000E+00

                                       *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
```

```
                                   (DEGREES KELVIN PER METER)

          STABILITY                         WIND SPEED CATEGORY
          CATEGORY        1              2              3              4              5              6
             A      .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
             B      .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
             C      .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
             D      .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
             E      .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01
             F      .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01
 *** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***      03/26/97
                                   *** RUN3-1989MET DATA                                                ***      08:52:55
                                                                                                                 PAGE   9
 **MODELOPTs: CONC                        URBAN  FLAT          DFAULT


                 *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

          FILE: C:\TRINITY\SUITE\MET\PHXTUS89.BIN        FORMAT: UNFORM
          SURFACE STATION NO.:  23183                    UPPER AIR STATION NO.:  23160
                        NAME: UNKNOWN                                   NAME: UNKNOWN
                        YEAR:    1989                                   YEAR:    1989

                                   FLOW    SPEED   TEMP     STAB   MIXING HEIGHT (M)    USTAR  M-O LENGTH   Z-0 IPCODE PRATE
          YEAR  MONTH  DAY  HOUR   VECTOR  (M/S)    (K)     CLASS   RURAL    URBAN      (M/S)     (M)       (M)        (mm/HR)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 - - - - - - -

           89     1     1     1    281.0    2.06   278.2     6     1933.0     81.0     .0000       .0  .0000   0    .00
           89     1     1     2    288.0    2.57   277.6     6     1933.0     81.0     .0000       .0  .0000   0    .00
           89     1     1     3    304.0    2.57   276.5     6     1933.0     81.0     .0000       .0  .0000   0    .00
           89     1     1     4    293.0    2.57   275.9     6     1933.0     81.0     .0000       .0  .0000   0    .00
           89     1     1     5    293.0    1.00   275.4     7     1933.0     81.0     .0000       .0  .0000   0    .00
           89     1     1     6    202.0    2.06   274.8     6     1933.0     81.0     .0000       .0  .0000   0    .00
           89     1     1     7    205.0    1.00   274.8     7     1933.0     81.0     .0000       .0  .0000   0    .00
           89     1     1     8    283.0    2.06   275.9     6      117.0    193.1     .0000       .0  .0000   0    .00
           89     1     1     9    297.0    2.06   278.2     5      419.7    483.1     .0000       .0  .0000   0    .00
           89     1     1    10    261.0    3.60   279.8     4      722.3    773.1     .0000       .0  .0000   0    .00
           89     1     1    11    274.0    3.09   283.2     3     1025.0   1063.0     .0000       .0  .0000   0    .00
           89     1     1    12    316.0    3.09   285.4     3     1327.7   1353.0     .0000       .0  .0000   0    .00
           89     1     1    13    343.0    2.57   288.2     3     1630.3   1643.0     .0000       .0  .0000   0    .00
           89     1     1    14    339.0    1.00   289.8     2     1933.0   1933.0     .0000       .0  .0000   0    .00
           89     1     1    15    342.0    1.00   290.9     2     1933.0   1933.0     .0000       .0  .0000   0    .00
           89     1     1    16     74.0    2.06   291.5     3     1933.0   1933.0     .0000       .0  .0000   0    .00
           89     1     1    17    121.0    2.06   289.8     4     1933.0   1933.0     .0000       .0  .0000   0    .00
           89     1     1    18    117.0    2.06   288.2     5     1897.8   1778.0     .0000       .0  .0000   0    .00
           89     1     1    19     94.0    2.06   285.9     6     1835.5   1503.7     .0000       .0  .0000   0    .00
           89     1     1    20     87.0    1.00   284.3     7     1773.2   1229.4     .0000       .0  .0000   0    .00
           89     1     1    21     70.0    1.54   283.2     7     1710.9    955.0     .0000       .0  .0000   0    .00
```

```
    89    1    1   22      132.0   1.54  282.6      7      1648.7   680.7      .0000        .0  .0000  0    .00
    89    1    1   23      210.0   2.06  281.5      6      1586.4   406.3      .0000        .0  .0000  0    .00
    89    1    1   24      320.0   2.57  280.9      6      1524.1   132.0      .0000        .0  .0000  0    .00


*** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
            FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.
 *** ISCST3 - VERSION 96113 ***     ***  WIBN REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                    ***  RUN3-1989MET DATA                                                     ***        08:52:55
                                                                                                                          PAGE  10
**MODELOPTs: CONC                             URBAN  FLAT           DFAULT

                              *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL      ***
                                  INCLUDING SOURCE(S):      STACK1   ,

                                *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                  ** CONC OF TCE      IN MICROGRAMS/M**3                              **

 DIRECTION |                                        DISTANCE (METERS)
 (DEGREES) |       50.00       150.00      200.00      250.00      300.00      400.00      500.00      600.00      800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.00 |       .50762      .09521      .05873      .03954      .02835      .01662      .01095      .00779      .00457
    10.00 |       .45164      .09133      .05821      .03995      .02900      .01725      .01147      .00821      .00485
    20.00 |       .47332      .09520      .06071      .04180      .03044      .01819      .01213      .00871      .00517
    30.00 |       .62939      .10945      .06765      .04587      .03300      .01954      .01293      .00923      .00544
    40.00 |       .96536      .18102      .10922      .07284      .05196      .03027      .01989      .01413      .00828
    50.00 |      1.33026      .29763      .18177      .12225      .08773      .05159      .03414      .02440      .01443
    60.00 |      1.52629      .39970      .25358      .17464      .12747      .07671      .05154      .03725      .02240
    70.00 |      1.51756      .41759      .26715      .18559      .13653      .08317      .05635      .04096      .02481
    80.00 |      1.31596      .40037      .25607      .17744      .13023      .07905      .05340      .03871      .02333
    90.00 |      1.03849      .34514      .22611      .15887      .11771      .07233      .04925      .03591      .02183
   100.00 |       .82901      .26162      .17171      .12091      .08973      .05524      .03763      .02743      .01665
   110.00 |       .67416      .21068      .13681      .09556      .07049      .04302      .02912      .02113      .01272
   120.00 |       .53922      .18734      .12380      .08724      .06467      .03970      .02697      .01962      .01187
   130.00 |       .40826      .15514      .10540      .07564      .05681      .03550      .02441      .01792      .01099
   140.00 |       .30106      .10329      .06944      .04954      .03704      .02298      .01570      .01146      .00695
   150.00 |       .25180      .07923      .05258      .03721      .02767      .01703      .01158      .00842      .00508
   160.00 |       .23175      .07356      .04916      .03497      .02609      .01614      .01101      .00803      .00487
   170.00 |       .22354      .07392      .04981      .03560      .02664      .01653      .01130      .00824      .00500
   180.00 |       .23513      .08420      .05738      .04130      .03107      .01945      .01338      .00983      .00603
   190.00 |       .23630      .08148      .05493      .03920      .02929      .01815      .01240      .00906      .00551
   200.00 |       .22334      .07545      .05083      .03627      .02712      .01681      .01149      .00839      .00509
   210.00 |       .22379      .08474      .05801      .04175      .03137      .01958      .01345      .00986      .00603
   220.00 |       .23545      .09117      .06249      .04510      .03395      .02123      .01458      .01068      .00652
   230.00 |       .25985      .11506      .07948      .05740      .04318      .02695      .01049      .01354      .00826
   240.00 |       .32271      .14836      .10271      .07460      .05643      .03552      .02449      .01798      .01100
   250.00 |       .45892      .25102      .17652      .12935      .09839      .06234      .04318      .03183      .01961
```

```
    260.00 |        .77818       .42307       .28704       .20585       .15446       .09631       .06610       .04846       .02966
    270.00 |       1.33657       .58163       .37708       .26381       .19483       .11915       .08085       .05883       .03568
    280.00 |       1.90944       .63057       .39850       .27483       .20113       .12159       .08196       .05930       .03585
    290.00 |       2.04459       .54430       .33596       .22859       .16578       .09894       .06608       .04753       .02836
    300.00 |       1.73423       .42777       .26700       .18240       .13245       .07913       .05292       .03813       .02285
    310.00 |       1.44542       .30671       .18425       .12254       .08727       .05080       .03337       .02370       .01386
    320.00 |       1.53910       .26021       .15474       .10255       .07307       .04280       .02835       .02032       .01211
    330.00 |       1.24160       .17851       .10406       .06801       .04793       .02759       .01802       .01275       .00743
    340.00 |        .87019       .12673       .07377       .04824       .03403       .01961       .01282       .00908       .00530
    350.00 |        .67044       .10390       .06087       .03993       .02821       .01627       .01062       .00751       .00437
    360.00 |        .50762       .09521       .05873       .03954       .02835       .01662       .01095       .00779       .00457
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                    ***  RUN3-1989MET DATA                                                  ***        08:52:55
                                                                                                                       PAGE  11
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                               *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                                   INCLUDING SOURCE(S):        STACK1  ,

                                    *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                       ** CONC OF TCE       IN MICROGRAMS/M**3                           **

  DIRECTION |                                        DISTANCE (METERS)
  (DEGREES) |        1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.00 |        .00304
     10.00 |        .00324
     20.00 |        .00347
     30.00 |        .00362
     40.00 |        .00550
     50.00 |        .00966
     60.00 |        .01517
     70.00 |        .01687
     80.00 |        .01580
     90.00 |        .01488
    100.00 |        .01131
    110.00 |        .00859
    120.00 |        .00804
    130.00 |        .00754
    140.00 |        .00471
    150.00 |        .00344
    160.00 |        .00331
    170.00 |        .00339
    180.00 |        .00413
    190.00 |        .00375
    200.00 |        .00346
    210.00 |        .00413
    220.00 |        .00445
```

```
       230.00 |        .00563
       240.00 |        .00751
       250.00 |        .01346
       260.00 |        .02031
       270.00 |        .02430
       280.00 |        .02436
       290.00 |        .01909
       300.00 |        .01546
       310.00 |        .00918
       320.00 |        .00818
       330.00 |        .00491
       340.00 |        .00351
       350.00 |        .00288
       360.00 |        .00304
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                    ***  RUN3-1989MET DATA                                                   ***        08:52:55
                                                                                                                        PAGE  12
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                                 *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL      ***
                                     INCLUDING SOURCE(S):       STACK1  ,

                                                 *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                         ** CONC OF TCE      IN MICROGRAMS/M**3                         **

     X-COORD (M)  Y-COORD (M)        CONC                        X-COORD (M)  Y-COORD (M)        CONC
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
         -18.55         1.33        .56718                         -38.55         1.33        1.33469
         -58.55         1.33       1.43840                         -78.55         1.33        1.26990
         -89.33         1.33       1.13563                         -89.33        21.33        1.26531
         -89.33        41.33        .93334                         -89.33        61.33         .63694
         -89.33        81.33        .41454                         -89.33       100.40         .32037
         -69.33       100.34        .32660                         -49.33       100.34         .25764
         -29.33       100.34        .23062                          -9.33       100.34         .19249
           1.45       100.40        .17619                           1.45        80.34         .24371
           1.45        60.34        .37078                           1.45        40.34         .64876
           1.45        20.34        .00000                           1.45         1.33         .33211
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***      | 03/26/97
                                    ***  RUN3-1989MET DATA                                                   ***        08:52:55
                                                                                                                        PAGE  13
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                                 *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                     INCLUDING SOURCE(S):       STACK1  ,

                                     *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                         ** CONC OF TCE      IN MICROGRAMS/M**3                         **
```

```
DIRECTION |                                          DISTANCE (METERS)
(DEGREES) |         50.00                 150.00                200.00                250.00                300.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |    24.30530 (89121614)    9.67003 (89053105)    7.31705 (89091801)    5.60305 (89091801)    4.34444 (89091801)
    10.0 |    23.70537 (89010316)   10.03692 (89031822)    7.87813 (89031822)    5.91732 (89031822)    4.54137 (89092923)
    20.0 |    23.73466 (89032616)    9.83384 (89042801)    7.81237 (89042801)    5.90118 (89042801)    5.01504 (89012805)
    30.0 |    21.70063 (89110117)    8.89728 (89111524)    7.30706 (89111524)    5.65183 (89080704)    4.41187 (89080704)
    40.0 |    22.57541 (89032808)    9.88214 (89080504)    7.61224 (89062501)    5.75122 (89062501)    4.43847 (89032003)
    50.0 |    21.61138 (89122217)    9.70990 (89030822)    7.53213 (89062223)    5.60528 (89062223)    4.24674 (89062223)
    60.0 |    21.02518 (89123010)    9.70483 (89062724)    7.44127 (89052404)    5.88708 (89013101)    4.88027 (89013101)
    70.0 |    20.57032 (89011318)    9.43883 (89081824)    7.33873 (89081824)    5.48327 (89081824)    4.17053 (89081824)
    80.0 |    20.02258 (89042607)    9.50379 (89041523)    7.26500 (89101803)    5.41775 (89101803)    4.22434 (89073001)
    90.0 |    19.23956 (89122416)    9.19398 (89050323)    7.12169 (89062424)    5.40790 (89062424)    4.18667 (89091901)
   100.0 |    18.94830 (89012515)    9.24461 (89052524)    7.06099 (89071801)    5.33816 (89071801)    4.11436 (89071801)
   110.0 |    18.50078 (89090206)    9.16207 (89082524)    6.98917 (89082524)    5.29026 (89060721)    4.11522 (89060721)
   120.0 |    18.16319 (89102908)    9.15324 (89062723)    6.91647 (89071802)    5.25076 (89071802)    4.07507 (89071802)
   130.0 |    18.39513 (89011121)    9.11418 (89110819)    6.89202 (89110819)    5.20715 (89031923)    4.06029 (89031923)
   140.0 |    16.51979 (89012815)    9.04293 (89040603)    6.85296 (89040603)    5.19834 (89040603)    4.04451 (89040603)
   150.0 |    17.41006 (89121317)    9.02299 (89070202)    6.80621 (89070202)    5.15643 (89070202)    4.01118 (89070202)
   160.0 |    17.09859 (89092218)    8.89671 (89080703)    6.71915 (89080703)    5.09727 (89080703)    3.96973 (89080703)
   170.0 |    17.30029 (89051608)    9.02455 (89072301)    6.80792 (89072301)    5.15779 (89072301)    4.01221 (89072301)
   180.0 |    17.92060 (89011222)    9.07933 (89051401)    6.83639 (89092820)    5.19020 (89092820)    4.04010 (89092820)
   190.0 |    17.75570 (89020618)    8.92218 (89092005)    6.84335 (89092005)    5.21475 (89092005)    4.06503 (89092005)
   200.0 |    17.76280 (89022024)    9.10303 (89111021)    6.91713 (89072420)    5.25213 (89072420)    4.07638 (89072420)
   210.0 |    18.49549 (89020620)    9.23716 (89100623)    7.02692 (89032401)    5.29781 (89052804)    4.12009 (89052804)
   220.0 |    18.71171 (89010215)    9.24985 (89101320)    6.93219 (89040323)    5.32864 (89040323)    4.15485 (89040323)
   230.0 |    18.73542 (89020810)    9.41921 (89031122)    7.16397 (89022522)    5.43060 (89110422)    4.18697 (89061203)
   240.0 |    19.43327 (89051606)    9.56666 (89040607)    7.22672 (89110722)    5.49693 (89110722)    4.23969 (89110722)
   250.0 |    20.71242 (89122709)    9.61247 (89101401)    7.34173 (89070804)    5.48548 (89070804)    4.26999 (89080603)
   260.0 |    20.98802 (89120609)    9.75310 (89040507)    7.44127 (89080401)    5.64175 (89042405)    4.34167 (89042405)
   270.0 |    21.50314 (89021109)    9.86200 (89050202)    7.52678 (89040606)    5.70768 (89040606)    4.38173 (89040606)
   280.0 |    22.62494 (89111408)    9.94378 (89111124)    7.65584 (89111124)    5.75292 (89062503)    4.43122 (89080404)
   290.0 |    23.22081 (89030608)   10.03011 (89051006)    7.73465 (89050401)    5.80221 (89050401)    4.42495 (89050401)
   300.0 |    23.64284 (89030210)   10.00302 (89050603)    7.78789 (89050603)    5.87624 (89092524)    4.51316 (89092524)
   310.0 |    32.01928 (89010601)   14.82810 (89092424)    9.42513 (89092424)    6.56419 (89020222)    4.90463 (89020222)
   320.0 |    51.68488 (89011905)   15.31841 (89041803)    9.97692 (89092124)    6.94908 (89092124)    5.11008 (89092124)
   330.0 |    51.19592 (89112104)   14.71187 (89111122)    9.71219 (89111122)    6.77461 (89111122)    4.99106 (89111122)
   340.0 |    53.10055 (89121308)   15.25502 (89050704)    9.96234 (89050704)    6.90896 (89050704)    5.07185 (89050704)
   350.0 |    52.44215 (89041406)   13.73778 (89031524)    9.13477 (89031524)    6.47412 (89010422)    4.83053 (89010422)
   360.0 |    24.30530 (89121614)    9.67003 (89053105)    7.31705 (89091801)    5.60305 (89091801)    4.34444 (89091801)
 *** ISCST3 - VERSION 96113 ***    ***  N1BW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH 8 ***        03/26/97.
                                   ***  RUN3-1989MET DATA                                                    ***        08:52:56
                                                                                                                        PAGE  14
**MODELOPTs: CONC                        URBAN  FLAT          DFAULT

                              *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL        ***
                                  INCLUDING SOURCE(S):       STACK1   ,

                                  *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***
```

```
                                     ** CONC OF TCE      IN MICROGRAMS/M**3                        **

DIRECTION |                                              DISTANCE (METERS)
(DEGREES) |        400.00               500.00               600.00               800.00               1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.0 |     2.80776 (89091801)    1.97449 (89091801)    1.47765 (89091801)     .93835 (89091801)     .66415 (89091801)
     10.0 |     2.91246 (89092923)    2.03764 (89092923)    1.51938 (89092923)     .96078 (89040706)     .68026 (89040706)
     20.0 |     3.57412 (89012805)    2.63121 (89012805)    2.01809 (89012805)    1.31161 (89012805)     .93693 (89012805)
     30.0 |     2.86578 (89080704)    2.01748 (89080704)    1.50963 (89080704)     .95751 (89080704)     .67684 (89080704)
     40.0 |     2.85473 (89032003)    1.99587 (89032003)    1.48555 (89032003)     .94392 (89051501)     .67147 (89051501)
     50.0 |     2.69587 (89081005)    1.92948 (89081005)    1.45931 (89081005)     .93786 (89081005)     .66823 (89081005)
     60.0 |     3.35656 (89013101)    2.41459 (89013101)    1.82009 (89013101)    1.15216 (89013101)     .80607 (89013101)
     70.0 |     2.74703 (89022622)    1.95572 (89022622)    1.47382 (89022622)     .94254 (89022622)     .66928 (89022622)
     80.0 |     2.75453 (89073001)    1.94249 (89073001)    1.46460 (89050422)     .93804 (89050422)     .66672 (89050422)
     90.0 |     2.72997 (89091901)    2.08418 (89020701)    1.65887 (89020701)    1.12861 (89020701)     .82818 (89020701)
    100.0 |     2.80631 (89013006)    2.15406 (89013006)    1.70090 (89013006)    1.14746 (89013006)     .83842 (89013006)
    110.0 |     2.67832 (89060721)    1.89188 (89060721)    1.41930 (89060721)     .90268 (89060721)     .63847 (89060721)
    120.0 |     2.67555 (89110321)    1.90393 (89110321)    1.43679 (89110321)     .92210 (89110321)     .65672 (89053022)
    130.0 |     2.66206 (89031923)    1.89362 (89031923)    1.42915 (89031923)     .91825 (89091403)     .65651 (89091403)
    140.0 |     2.64787 (89040603)    1.88320 (89040603)    1.42153 (89040603)     .91325 (89040603)     .65105 (89040603)
    150.0 |     2.62742 (89070202)    1.86998 (89070202)    1.41246 (89070202)     .90832 (89070202)     .64799 (89070202)
    160.0 |     2.60481 (89080703)    1.85614 (89080703)    1.40323 (89080703)     .90344 (89080703)     .64499 (89080703)
    170.0 |     2.62803 (89072301)    1.87037 (89072301)    1.41273 (89072301)     .90846 (89072301)     .64807 (89072301)
    180.0 |     2.64626 (89092820)    1.88248 (89092820)    1.42117 (89092820)     .91313 (89092820)     .65333 (89110103)
    190.0 |     2.66426 (89092005)    1.89483 (89092005)    1.42989 (89092005)     .91836 (89060604)     .65657 (89060604)
    200.0 |     2.67311 (89051901)    1.90281 (89051901)    1.43620 (89051901)     .92188 (89051901)     .65662 (89051901)
    210.0 |     2.68067 (89052804)    1.89320 (89052804)    1.42227 (89040707)     .91897 (89040707)     .65727 (89040707)
    220.0 |     2.70659 (89040323)    1.91094 (89040323)    1.43257 (89040323)     .92004 (89042924)     .65805 (89042924)
    230.0 |     2.73039 (89061203)    1.92706 (89061203)    1.44377 (89061203)     .92392 (89111604)     .65908 (89111604)
    240.0 |     2.75593 (89060301)    1.94328 (89060301)    1.45460 (89060301)     .93205 (89042703)     .66363 (89042703)
    250.0 |     2.78051 (89080603)    1.95807 (89080603)    1.47456 (89040506)     .94286 (89040506)     .66946 (89040506)
    260.0 |     2.77271 (89050804)    1.97040 (89050804)    1.48293 (89050804)     .94676 (89050804)     .67159 (89050804)
    270.0 |     2.83028 (89052701)    1.98460 (89052701)    1.48536 (89030102)     .94793 (89030102)     .67221 (89030102)
    280.0 |     2.85181 (89080404)    2.00399 (89052605)    1.50234 (89052605)     .95485 (89052605)     .67567 (89052605)
    290.0 |     2.86738 (89040801)    2.01825 (89040801)    1.51004 (89040801)     .95767 (89040801)     .67692 (89040801)
    300.0 |     2.89562 (89041902)    2.03101 (89041902)    1.51655 (89041902)     .95978 (89041902)     .67771 (89041902)
    310.0 |     3.05203 (89020222)    2.10720 (89020222)    1.56060 (89020222)     .98030 (89020222)     .69023 (89020222)
    320.0 |     3.12442 (89092124)    2.13688 (89092124)    1.57572 (89071206)     .98645 (89071206)     .69337 (89071206)
    330.0 |     3.07370 (89120401)    2.11031 (89120401)    1.55725 (89120401)     .97898 (89121902)     .68957 (89121902)
    340.0 |     3.09832 (89050704)    2.11933 (89050704)    1.56088 (89050704)     .97607 (89020805)     .68808 (89020805)
    350.0 |     3.00133 (89010422)    2.07042 (89010422)    1.53243 (89010422)     .96165 (89010422)     .67649 (89010422)
    360.0 |     2.80776 (89091801)    1.97449 (89091801)    1.47765 (89091801)     .93835 (89091801)     .66415 (89091801)
 *** ISCST3 - VERSION 96113 ***    ***  HIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                   ***  RUN3-1989MET DATA                                                     ***        08:52:55
                                                                                                                         PAGE  15
**MODELOPTs: CONC                        URBAN  FLAT           DFAULT

                         *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL        ***
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Exhibit A
Page 311 of 495
Attachment 3

City of Scottsdale Contract No. 1998-006-COS-A2

```
                              INCLUDING SOURCE(S):      STACK1  ,

                                          *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                       ** CONC OF TCE      IN MICROGRAMS/M**3                             **

     X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)               X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
          -18.55         1.33       30.31133  (89120209)                    -38.55         1.33       25.37577  (89051209)
          -50.55         1.33       19.94170  (89010309)                    -78.55         1.33       16.60041  (89032905)
          -89.33         1.33       15.00490  (89031306)                    -89.33        21.33       15.08980  (89033005)
          -89.33        41.33       14.33303  (89102102)                    -89.33        61.33       13.16533  (89070904)
          -89.33        81.33       18.09685  (89020222)                    -89.33       100.40       17.68571  (89112006)
          -69.33       100.34       19.03435  (89040403)                    -49.33       100.34       21.23934  (89101601)
          -29.33       100.34       23.00785  (89101620)                     -9.33       100.34       23.00147  (89031901)
            1.45       100.40       14.34217  (89082023)                      1.45        80.34       16.63600  (89082023)
            1.45        60.34       20.61328  (89112516)                      1.45        40.34       29.61325  (89011414)
            1.45        20.34         .00000  (89012805)                      1.45         1.33       26.82072  (89080609)
 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***          03/26/97
                                   ***  RUN3-1989MET DATA                                                   ***          08:52:55
                                                                                                                        PAGE  16
 **MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                           *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                              INCLUDING SOURCE(S):      STACK1  ,

                                *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                       ** CONC OF TCE      IN MICROGRAMS/M**3                             **

 DIRECTION |                                               DISTANCE (METERS)
 (DEGREES) |          50.00                150.00                200.00                250.00                300.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     360.0 |    4.11360c(89011424)     .78675c(89082024)     .46650c(89082024)     .34052c(89123024)     .26177c(89123024)
      10.0 |    3.46126c(89011424)     .90103c(89042824)     .60700c(89042024)     .42149c(89042824)     .30668c(89042824)
      20.0 |    3.71533c(89110324)    1.03362c(89042824)     .81634c(89042824)     .61868c(89042824)     .47635c(89042824)
      30.0 |    3.89816c(89020424)     .88293c(89110324)     .57672c(89010924)     .44766c(89010924)     .34793c(89010924)
      40.0 |    4.48872c(89072324)    1.01030c(89063024)     .60611c(89063024)     .43234c(89122624)     .33268c(89122624)
      50.0 |    5.97684c(89020724)    1.64009c(89103024)    1.01500c(89103024)     .68436c(89103024)     .48751c(89103024)
      60.0 |    5.54868c(89052424)    2.49250 (89090824)    1.55321 (89090824)    1.10258c(89103024)     .85029c(89103024)
      70.0 |    5.78786c(89081324)    1.84690 (89090824)    1.31479 (89090824)     .96689 (89090824)     .73767 (89090824)
      80.0 |    5.55025 (89081224)    1.61862c(89103124)    1.07531c(89041524)     .78658c(89041524)     .59557c(89041524)
      90.0 |    5.21687 (89081224)    1.55209 (89081224)     .92457c(89082924)     .63559c(89082924)     .48390c(89013024)
     100.0 |    4.87962 (89090224)    1.32064 (89081224)     .89230 (89081224)     .63719 (89081224)     .47954c(89110224)
     110.0 |    4.48495 (89090224)    1.31989c(89083124)     .89002c(89083124)     .63287c(89083124)     .47261c(89083124)
     120.0 |    3.41916 (89080324)     .85685c(89110324)     .62602c(89110324)     .46401c(89110324)     .35516c(89110324)
     130.0 |    2.21021c(89082424)    1.15267c(89030524)     .85220c(89030524)     .63447c(89030524)     .48627c(89030524)
     140.0 |    1.91703 (89072924)     .72192c(89121924)     .55881c(89121924)     .43035c(89121924)     .33809c(89121924)
     150.0 |    1.92409c(89041924)     .78243c(89070224)     .55232c(89070224)     .40370c(89070224)     .30666c(89070224)
```

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  160.0 |     2.42989c(89081124)      .76890c(89081124)      .51166c(89070224)      .37010c(89070224)      .27941c(89070224)
  170.0 |     2.28629c(89070624)      .70724c(89102224)      .53371c(89030524)      .41235c(89030524)      .32431c(89030524)
  100.0 |     3.33826c(89011224)     1.05624c(89070624)      .73586c(89011124)      .58582c(89011124)      .46892c(89011124)
  190.0 |     4.00205c(89011224)     1.11364c(89081924)      .76184c(89081924)      .54814c(89081924)      .41275c(89081924)
  200.0 |     2.72551 (89121124)      .67037c(89101324)      .45669c(89101324)      .32692c(89101324)      .24508c(89101324)
  210.0 |     2.71537 (89121124)      .76836c(89052824)      .56434c(89082724)      .42421c(89082724)      .32843c(89082724)
  220.0 |     2.96346 (89121124)      .81561c(89082724)      .52071c(89040324)      .41902c(89040324)      .33367c(89040324)
  230.0 |     3.46426c(89112824)      .89121c(89022524)      .65835c(89022524)      .48056c(89022524)      .36056c(89022524)
  240.0 |     3.39571 (89112924)     1.06959c(89042224)      .76199c(89040624)      .56291c(89040624)      .42858c(89040624)
  250.0 |     4.20785 (89112924)     1.81515c(89040524)     1.48650c(89040524)     1.17585c(89040524)      .93620c(89040524)
  260.0 |     5.05418c(89111924)     2.99748c(89040524)     1.90478c(89040524)     1.27861c(89040524)      .90726c(89040524)
  270.0 |     5.66441c(89040524)     2.12965c(89111324)     1.37783c(89111324)      .94992c(89111324)      .69318c(89111324)
  280.0 |     6.99419c(89012124)     2.48290c(89090424)     1.73219c(89090424)     1.24501c(89090424)      .93231c(89090424)
  290.0 |     7.43677c(89012124)     2.43779c(89121724)     1.76336c(89121724)     1.28958c(89121724)      .97330c(89121724)
  300.0 |     6.99835 (89102124)     1.77992c(89112324)     1.26804c(89112324)      .92054c(89112324)      .68939c(89112324)
  310.0 |     6.72690 (89102024)     1.50219c(89111524)     1.12313c(89111524)      .83363c(89111524)      .63674c(89111524)
  320.0 |     7.97414 (89102024)     1.67750c(89111524)     1.04936c(89111524)      .70163c(89111524)      .49949c(89111524)
  330.0 |     6.22676c(89112224)     1.30761c(89112124)      .81041c(89112124)      .55341c(89112124)      .40221c(89112124)
  340.0 |     5.94548c(89091524)     1.31434c(89110924)      .82718c(89110924)      .56695c(89110924)      .41439c(89110924)
  350.0 |     5.90122c(89112124)     1.19513c(89010424)      .76910c(89010424)      .53682c(89010424)      .39673c(89010424)
  360.0 |     4.11360c(89011424)      .78675c(89082024)      .46650c(89082024)      .34052c(89123024)      .26177c(89123024)
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                    ***  RUN3-1989MET DATA                                                   ***        08:52:55
                                                                                                                        PAGE  17
**MODELOPTs: CONC                        URBAN  FLAT         DFAULT

                               *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                   INCLUDING SOURCE(S):      STACK1   ,

                                   *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                       ** CONC OF TCE      IN MICROGRAMS/M**3                          **

 DIRECTION |                                            DISTANCE (METERS)
 (DEGREES) |        400.00                 500.00                 600.00                 800.00                 1000.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  360.0 |      .16605c(89123024)      .11472c(89123024)      .08446c(89123024)      .05206c(89011324)      .03630c(89011324)
   10.0 |      .18236c(89042824)      .12111c(89042824)      .08665c(09042824)      .05312c(89052624)      .03754c(89022224)
   20.0 |      .30459c(89042824)      .21237c(89042824)      .15777c(89042824)      .09899c(89042824)      .06938c(89042824)
   30.0 |      .22326c(89010924)      .15507c(89010924)      .11447c(89010924)      .07072c(89010924)      .04877c(89010924)
   40.0 |      .21399c(89122624)      .14989c(89122624)      .11164c(89122624)      .07012c(89122624)      .04908c(89122624)
   50.0 |      .28029c(89103024)      .18140c(89103024)      .12709c(89103024)      .07264c(89103024)      .04717c(89103024)
   60.0 |      .54566c(89103024)      .38092c(89103024)      .28281c(89103024)      .17662c(89103024)      .12293c(89103024)
   70.0 |      .47061 (89090824)      .32858 (89090824)      .24429 (89090824)      .15297 (89090824)      .10665 (89090824)
   80.0 |      .37472c(89041524)      .26661c(89012624)      .20115c(09012624)      .12765c(09012624)      .08938c(89012624)
   90.0 |      .32386c(89013024)      .23051c(89013024)      .17284c(89013024)      .10872c(09013024)      .07567c(89013024)
  100.0 |      .30788c(89110224)      .21583c(89110224)      .16111c(89110224)      .10181c(09110224)      .07173c(89110224)
  110.0 |      .29439c(89083124)      .20316c(89003124)      .15014c(89083124)      .09361c(89083124)      .06527c(89083124)
  120.0 |      .22744c(89110324)      .15939c(89110324)      .11901c(89110324)      .07524c(89110324)      .05301c(89110324)
```

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    !                                        |
  130.0 |       .31096c(89030524)       .21714c(89030524)       .16142c(89030524)       .10109c(89030524)       .07052c(89030524)
  140.0 |       .22353c(89121924)       .15946c(89121924)       .12034c(89121924)       .07691c(89121924)       .05440c(89121924)
  150.0 |       .19453c(89070224)       .13533c(89070224)       .10038c(89070224)       .06270c(89070224)       .04370c(89070224)
  160.0 |       .18013c(89121324)       .12710c(89121324)       .09525c(89121324)       .06041c(89121324)       .04258c(89121324)
  170.0 |       .21448c(89030524)       .15295c(89030524)       .11537c(89030524)       .07366c(89030524)       .05204c(89030524)
  180.0 |       .31646c(89011124)       .22844c(89011124)       .17383c(89011124)       .11246c(89011124)       .08031c(89011124)
  190.0 |       .25967c(89081924)       .18012c(89081924)       .13349c(89081924)       .08344c(89081924)       .05824c(89081924)
  200.0 |       .15305c(89101324)       .10547c(89101324)       .07769c(89101324)       .04918c(89092224)       .03524c(89092224)
  210.0 |       .21350c(89082724)       .15086c(89082724)       .11315c(89082724)       .07179c(89082724)       .05057c(89082724)
  220.0 |       .22330c(89040324)       .16025c(89040324)       .12143c(89040324)       .07812c(89040324)       .05558c(89040324)
  230.0 |       .22235c(89022524)       .15309c(89120724)       .11494c(89020424)       .07494c(89020424)       .05363c(89020424)
  240.0 |       .27100c(89040624)       .18749c(89040624)       .13829c(89040624)       .08550c(89040624)       .05976c(89013024)
  250.0 |       .62634c(89040524)       .44903c(89040524)       .33976c(89040524)       .21783c(89040524)       .15442c(89040524)
  260.0 |       .52058c(89040524)       .33735c(89040524)       .23698c(89040524)       .13642c(89040524)       .08928c(89040524)
  270.0 |       .42265c(89122224)       .30112c(89122224)       .22629c(89122224)       .14317c(89122224)       .10028c(89122224)
  200.0 |       .57971c(89090424)       .39847c(89090424)       .29693c(89121724)       .18927c(89121724)       .13310c(89121724)
  290.0 |       .60239c(89121724)       .40929c(89121724)       .29761c(89121724)       .18026c(89121724)       .12272c(89121724)
  300.0 |       .42520c(89112324)       .28938c(89112324)       .21106c(09112324)       .12873c(89112324)       .08823c(89112324)
  310.0 |       .40596c(89111524)       .28365c(89111524)       .21135c(89111524)       .13326c(89111524)       .09368c(89111524)
  320.0 |       .29030c(89111524)       .19506c(89040424)       .14369c(89040424)       .08959c(89040424)       .06273c(89040424)
  330.0 |       .24138c(89112124)       .16232c(89112124)       .11758c(89112124)       .07108c(89112124)       .04838c(89112124)
  340.0 |       .25256c(89110924)       .17274c(89110924)       .12726c(89110924)       .07946c(89110924)       .05574c(89110924)
  350.0 |       .24419c(89010424)       .16763c(89010424)       .12367c(89010424)       .07725c(89010424)       .05416c(89010424)
  360.0 |       .16605c(89123024)       .11472c(89123024)       .08446c(89123024)       .05206c(89011324)       .03630c(89011324)
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                    ***  RUN3-1989MET DATA                                                 ***        08:52:55
                                                                                                                      PAGE  18
**MODELOPTs: CONC                          URBAN  FLAT         DFAULT

                               *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                   INCLUDING SOURCE(S):      STACK1  ,

                                            *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                       ** CONC OF TCE       IN MICROGRAMS/M**3                         **

      X-COORD (M)  Y-COORD (M)        CONC      (YYMMDDHH)               X-COORD (M)  Y-COORD (M)        CONC      (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
          -18.55         1.33      4.59713c (89110224)                  -38.55         1.33      6.65971c (89040524)
          -58.55         1.33      5.44651  (89101924)                  -78.55         1.33      4.26142c (89111324)
          -89.33         1.33      4.08002c (89111324)                  -89.33        21.33      4.69685c (89083024)
          -89.33        41.33      4.08529  (89102124)                  -89.33        61.33      3.06367c (89112224)
          -89.33        81.33      2.33918c (89111524)                  -89.33       100.40      2.34630c (89111524)
          -69.33       100.34      2.07476c (89112224)                  -49.33       100.34      1.92795c (89112124)
          -29.33       100.34      2.13858c (89110924)                   -9.33       100.34      1.53260c (89111424)
            1.45       100.40      1.46346c (89082024)                    1.45        80.34      1.79415c (89011424)
            1.45        60.34      3.11596c (89011424)                    1.45        40.34      4.76631c (89011424)
            1.45        20.34       .00000c (89013124)                    1.45         1.33      3.43381  (89072924)
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                    ***  RUN3-1989MET DATA                                                 ***        08:52:55
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                                                                                                                    PAGE  19
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                                                  *** THE SUMMARY OF MAXIMUM PERIOD (  8760 HRS) RESULTS ***

                                             ** CONC OF TCE       IN MICROGRAMS/M**3                         **

                                                                                                         NETWORK
GROUP ID                        AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      1ST HIGHEST VALUE IS       2.04459 AT (     -46.98,       17.10,        .00,        .00)  GP    POLR1
         2ND HIGHEST VALUE IS       1.90944 AT (     -49.24,        8.68,        .00,        .00)  GP    POLR1


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
 *** ISCST3 - VERSION 96113 ***      ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                     ***  RUN3-1989MET DATA                                                  ***        08:52:55
                                                                                                                    PAGE  20
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                                                  *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***

                                             ** CONC OF TCE       IN MICROGRAMS/M**3                         **

                                                      DATE                                                               NETWORK
GROUP ID                           AVERAGE CONC     (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS       53.10055  ON 89121308: AT (     -17.10,        46.98,        .00,        .00)  GP   POLR1


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
 *** ISCST3 - VERSION 96113 ***      ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/26/97
                                     ***  RUN3-1989MET DATA                                                  ***        08:52:55
                                                                                                                    PAGE  21
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                                                  *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***
```

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                                       ** CONC OF TCE      IN MICROGRAMS/M**3                        **

                                                                   DATE                                                   NETWORK
GROUP ID                                        AVERAGE CONC     (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS       7.97414  ON 89102024: AT (     -32.14,       38.30,       .00,       .00)  GP   POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
 *** ISCST3 - VERSION 96113 ***    ***  HIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/26/97
                                   ***  RUN3-1989MET DATA                                                   ***       08:52:55
                                                                                                                      PAGE  22
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           2 Warning Message(s)
A Total of        1158 Informational Message(s)

A Total of        1158 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
MX W430  4431 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=     89070415
MX W430  4432 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=     89070416

   *************************************
   *** ISCST3 Finishes Successfully ***
   *************************************
```

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1                     ISCST3 - (DATED 96113)

                  IBM-PC VERSION (3.05)     ISCST3R
       (C) COPYRIGHT 1992-1996, TRINITY CONSULTANTS, INC.

Run Began on  3/27/1997 at 14:52:02

** BREEZE AIR SUITE (ISCST3) - C:\TRINITY\SUITE\EM72096.DAT
** Trinity Consultants Incorporated, Dallas, TX

CO STARTING
CO TITLEONE  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S
CO TITLETWO  RUN3-1990MET DATA
CO MODELOPT  DFAULT  CONC  URBAN
CO AVERTIME  1  24  ANNUAL
CO POLLUTID  TCE
CO TERRHGTS  FLAT
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
SO ELEVUNIT  METERS
SO LOCATION  STACK1  POINT  -4.7  12.7  0
** SRCDESCR  AIR STRIPPER EXHAUST
SO SRCPARAM  STACK1  1.574974E-02  4.8768  299.82  18.288  0.280416
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  7.62  7.62  7.62  7.62  7.62  4.27
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  29.1  28.31  26.66  24.2  21.0  17.17
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  63.61  55.73  46.15  35.17  23.12  17.17
SO EMISUNIT  1.0E+06  GRAMS/SEC  MICROGRAMS/M**3
SO SRCGROUP  ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POLR1 STA
RE GRIDPOLR POLR1 ORIG  0  0
RE GRIDPOLR POLR1 DIST 50  100  150  200  250  300  400  500  600  800
RE GRIDPOLR POLR1 DIST 1000
RE GRIDPOLR POLR1 DDIR  0  10  20  30  40  50  60  70  80  90  100  110
RE GRIDPOLR POLR1 DDIR  120  130  140  150  160  170  180  190  200  210
RE GRIDPOLR POLR1 DDIR  220  230  240  250  260  270  280  290  300  310
RE GRIDPOLR POLR1 DDIR  320  330  340  350
```

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RE GRIDPOLR POLR1 END
** BOUNDARY
RE DISCCART  -10.55  1.33
RE DISCCART  -38.55  1.33
RE DISCCART  -58.55  1.33
RE DISCCART  -78.55  1.33
RE DISCCART  -89.33  1.33
RE DISCCART  -89.33  21.33
RE DISCCART  -89.33  41.33
RE DISCCART  -89.33  61.33
RE DISCCART  -89.33  81.33
RE DISCCART  -89.33  100.4
RE DISCCART  -69.33  100.34
RE DISCCART  -49.33  100.34
RE DISCCART  -29.33  100.34
RE DISCCART  -9.33  100.34
RE DISCCART  1.45  100.4
RE DISCCART  1.45  80.34
RE DISCCART  1.45  60.34
RE DISCCART  1.45  40.34
RE DISCCART  1.45  20.34
RE DISCCART  1.45  1.33
RE FINISHED

ME STARTING
ME INPUTFIL  C:\TRINITY\SUITE\MET\PHXTUS90.BIN  UNFORM
ME ANEMHGHT  10.0  METERS
ME SURFDATA  23183  1990
ME UAIRDATA  23160  1990
ME STARTEND  90  01  01  1  90  12  31  24
ME FINISHED

OU STARTING
OU RECTABLE  1  FIRST
OU RECTABLE  ALLAVE  FIRST
OU FINISHED

**********************************
*** SETUP Finishes Successfully ***
**********************************


*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1990MET DATA                                                 ***          14:52:02
                                                                                                                         PAGE   1
**MODELOPTs: CONC                          URBAN  FLAT           DFAULT

                                             ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE = F
**Model Uses NO WET DEPLETION.  WDPLETE = F
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
            1. Final Plume Rise.
            2. Stack-tip Downwash.
            3. Buoyancy-induced Dispersion.
            4. Use Calms Processing Routine.
            5. Not Use Missing Data Processing Routine.
            6. Default Wind Profile Exponents.
            7. Default Vertical Potential Temperature Gradients.
            8. "Upper Bound" Values for Supersquat Buildings.
            9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR
    and Calculates ANNUAL Averages

**This Run Includes:    1 Source(s);      1 Source Group(s); and    416 Receptor(s)

**The Model Assumes A Pollutant Type of:  TCE

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
        Model Outputs Tables of ANNUAL Averages by Receptor
        Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    .0000      ;    Rot. Angle =      .0
                 Emission Units = GRAMS/SEC                                  ;  Emission Rate Unit Factor =    .10000E+07
                 Output Units   = MICROGRAMS/M**3

**Input Runstream File: C:\TRINITY\SUITE\EH72096.DAT          ;  **Output Print File: C:\TRINITY\SUITE\EH72096.LST
```

```
*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1990MET DATA                                                     ***        14:52:02
                                                                                                                           PAGE   2
 **MODELOPTs: CONC                                URBAN  FLAT           DFAULT



                                                      *** POINT SOURCE DATA ***


                    NUMBER EMISSION RATE                          BASE      STACK    STACK     STACK     STACK     BUILDING EMISSION RATE
   SOURCE            PART. (USER UNITS)       X          Y        ELEV.     HEIGHT   TEMP.   EXIT VEL. DIAMETER    EXISTS   SCALAR VARY
     ID              CATS.                 (METERS)  (METERS)  (METERS)  (METERS)  (DEG.K)   (M/SEC)   (METERS)                  BY
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  STACK1             0    .15750E-01      -4.7       12.7        .0      4.88   299.82    18.29       .28       YES
*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1990MET DATA                                                     ***        14:52:02
                                                                                                                           PAGE   3
 **MODELOPTs: CONC                                URBAN  FLAT           DFAULT



                                             *** SOURCE IDs DEFINING SOURCE GROUPS ***

 GROUP ID                                                  SOURCE IDs



  ALL        STACK1   ,
*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1990MET DATA                                                     ***        14:52:02
                                                                                                                           PAGE   4
 **MODELOPTs: CONC                                URBAN  FLAT           DFAULT

                                             *** DIRECTION SPECIFIC BUILDING DIMENSIONS ***


 SOURCE ID: STACK1
  IFV    BH       BW  WAK   IFV    BH       BW  WAK   IFV    BH       BW  WAK   IFV    BH       BW  WAK   IFV    BH       BW  WAK   IFV    BH       BW  WAK
    1    4.3,   20.9, 0      2    4.3,   24.1, 0      3    4.3,   26.6, 0      4    4.3,   28.2, 0      5    4.3,   29.0, 0      6    4.3,   28.9, 0
    7    4.3,   28.0, 0      8    4.3,   26.2, 0      9    4.3,   23.6, 0     10    4.3,   26.2, 0     11    4.3,   28.0, 0     12    4.3,   29.0, 0
   13    4.3,   29.1, 0     14    4.3,   28.3, 0     15    4.3,   26.7, 0     16    4.3,   24.2, 0     17    4.3,   21.0, 0     18    4.3,   17.2, 0
   19    4.3,   20.9, 0     20    4.3,   24.1, 0     21    4.3,   26.6, 0     22    4.3,   28.2, 0     23    4.3,   29.0, 0     24    4.3,   28.9, 0
   25    4.3,   28.0, 0     26    4.3,   26.2, 0     27    4.3,   23.6, 0     28    4.3,   26.2, 0     29    4.3,   28.0, 0     30    4.3,   29.0, 0
   31    7.6,   63.6, 0     32    7.6,   55.7, 0     33    7.6,   46.1, 0     34    7.6,   35.2, 0     35    7.6,   23.1, 0     36    4.3,   17.2, 0
```

```
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1990MET DATA                                                      ***      14:52:02
                                                                                                                          PAGE   5
 **MODELOPTs: CONC                          URBAN  FLAT           DFAULT

                                          *** GRIDDED RECEPTOR NETWORK SUMMARY ***

                                    *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                              *** ORIGIN FOR POLAR NETWORK ***
                                 X-ORIG =       .00 ;    Y-ORIG =        .00  (METERS)

                                              *** DISTANCE RANGES OF NETWORK ***
                                                         (METERS)

            50.0,      100.0,     150.0,     200.0,     250.0,     300.0,     400.0,     500.0,     600.0,     800.0,
          1000.0,

                                              *** DIRECTION RADIALS OF NETWORK ***
                                                         (DEGREES)

           360.0,       10.0,      20.0,      30.0,      40.0,      50.0,      60.0,      70.0,      80.0,      90.0,
           100.0,      110.0,     120.0,     130.0,     140.0,     150.0,     160.0,     170.0,     180.0,     190.0,
           200.0,      210.0,     220.0,     230.0,     240.0,     250.0,     260.0,     270.0,     280.0,     290.0,
           300.0,      310.0,     320.0,     330.0,     340.0,     350.0,
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1990MET DATA                                                      ***      14:52:02
                                                                                                                          PAGE   6
 **MODELOPTs: CONC                          URBAN  FLAT           DFAULT

                                                *** DISCRETE CARTESIAN RECEPTORS ***
                                                 (X-COORD, Y-COORD, ZELEV, ZFLAG)
                                                             (METERS)

      (     -18.5,        1.3,         .0,         .0);          (     -38.5,        1.3,         .0,         .0);
      (     -58.5,        1.3,         .0,         .0);          (     -78.6,        1.3,         .0,         .0);
      (     -89.3,        1.3,         .0,         .0);          (     -89.3,       21.3,         .0,         .0);
      (     -89.3,       41.3,         .0,         .0);          (     -89.3,       61.3,         .0,         .0);
      (     -89.3,       81.3,         .0,         .0);          (     -89.3,      100.4,         .0,         .0);
      (     -69.3,      100.3,         .0,         .0);          (     -49.3,      100.3,         .0,         .0);
      (     -29.3,      100.3,         .0,         .0);          (      -9.3,      100.3,         .0,         .0);
      (       1.4,      100.4,         .0,         .0);          (       1.4,       80.3,         .0,         .0);
      (       1.4,       60.3,         .0,         .0);          (       1.4,       40.3,         .0,         .0);
      (       1.4,       20.3,         .0,         .0);          (       1.4,        1.3,         .0,         .0);

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
```

```
                              ***  RUN3-1990MET DATA                                                              ***        14:52:02
                                                                                                                             PAGE   7
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                          * SOURCE-RECEPTOR COMBINATIONS FOR WHICH CALCULATIONS MAY NOT BE PERFORMED *
                            LESS THAN 1.0 METER OR 3*ZLB IN DISTANCE, OR WITHIN OPEN PIT SOURCE

                                  SOURCE         - - RECEPTOR LOCATION - -          DISTANCE
                                   ID           XR (METERS)   YR (METERS)          (METERS)
                                 - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

                                  STACK1                1.4         20.3               9.81
 *** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***          03/27/97
                              ***  RUN3-1990MET DATA                                                              ***        14:52:02
                                                                                                                             PAGE   8
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                          *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                           (1=YES; 0=NO)

          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1

                METEOROLOGICAL DATA PROCESSED BETWEEN START DATE:  90  1  1  1
                                                    AND END DATE:  90 12 31 24

       NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                             *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                      (METERS/SEC)

                                          1.54,    3.09,    5.14,    8.23,   10.80,

                                                 *** WIND PROFILE EXPONENTS ***

       STABILITY                                   WIND SPEED CATEGORY
       CATEGORY          1                 2                 3                 4                 5                 6
```

```
           A       .15000E+00    .15000E+00    .15000E+00    .15000E+00    .15000E+00    .15000E+00
           B       .15000E+00    .15000E+00    .15000E+00    .15000E+00    .15000E+00    .15000E+00
           C       .20000E+00    .20000E+00    .20000E+00    .20000E+00    .20000E+00    .20000E+00
           D       .25000E+00    .25000E+00    .25000E+00    .25000E+00    .25000E+00    .25000E+00
           E       .30000E+00    .30000E+00    .30000E+00    .30000E+00    .30000E+00    .30000E+00
           F       .30000E+00    .30000E+00    .30000E+00    .30000E+00    .30000E+00    .30000E+00

                                *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                                          (DEGREES KELVIN PER METER)

          STABILITY                              WIND SPEED CATEGORY
          CATEGORY         1             2             3             4             5             6
           A       .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
           B       .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
           C       .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
           D       .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
           E       .20000E-01    .20000E-01    .20000E-01    .20000E-01    .20000E-01    .20000E-01
           F       .35000E-01    .35000E-01    .35000E-01    .35000E-01    .35000E-01    .35000E-01

*** ISCST3 - VERSION 96113 ***     ***  WIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1990MET DATA                                                  ***        14:52:02
                                                                                                                          PAGE   9
**MODELOPTs: CONC                             URBAN  FLAT           DFAULT

                        *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

                  FILE: C:\TRINITY\SUITE\MET\PHXTUS90.BIN          FORMAT: UNFORM
                  SURFACE STATION NO.:  23183                      UPPER AIR STATION NO.:  23160
                                 NAME: UNKNOWN                                        NAME: UNKNOWN
                                 YEAR:    1990                                        YEAR:    1990

                                          FLOW     SPEED   TEMP     STAB   MIXING HEIGHT (M)    USTAR  M-O LENGTH   Z-0  IPCODE PRATE
                  YEAR  MONTH  DAY  HOUR  VECTOR   (M/S)    (K)     CLASS   RURAL    URBAN      (M/S)     (M)       (M)        (mm/HR)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - -

                   90     1     1     1    281.0    2.06   282.0      6     1669.9    137.0     .0000        .0    .0000   0     .00
                   90     1     1     2    298.0    2.57   280.4      6     1661.3    137.0     .0000        .0    .0000   0     .00
                   90     1     1     3    314.0    2.06   279.8      6     1652.7    137.0     .0000        .0    .0000   0     .00
                   90     1     1     4    293.0    3.09   280.4      6     1644.1    137.0     .0000        .0    .0000   0     .00
                   90     1     1     5    283.0    2.57   280.9      6     1635.5    137.0     .0000        .0    .0000   0     .00
                   90     1     1     6    282.0    1.00   279.8      7     1626.9    137.0     .0000        .0    .0000   0     .00
                   90     1     1     7    285.0    1.00   279.3      7     1618.2    137.0     .0000        .0    .0000   0     .00
                   90     1     1     8    283.0    1.00   278.7      6       94.3    223.0     .0000        .0    .0000   0     .00
                   90     1     1     9    277.0    1.00   281.5      5      338.2    445.5     .0000        .0    .0000   0     .00
                   90     1     1    10    271.0    2.57   284.3      4      582.2    668.0     .0000        .0    .0000   0     .00
                   90     1     1    11    304.0    4.63   287.0      3      826.1    890.5     .0000        .0    .0000   0     .00
```

```
  90     1     1    12      336.0    2.57    288.7       3        1070.1   1113.0      .0000          .0   .0000   0     .00
  90     1     1    13      333.0    2.57    289.8       3        1314.0   1335.5      .0000          .0   .0000   0     .00
  90     1     1    14      299.0    3.60    290.9       3        1558.0   1558.0      .0000          .0   .0000   0     .00
  90     1     1    15      322.0    3.09    292.0       3        1558.0   1558.0      .0000          .0   .0000   0     .00
  90     1     1    16      324.0    3.09    292.6       4        1558.0   1558.0      .0000          .0   .0000   0     .00
  90     1     1    17      341.0    1.54    292.0       3        1558.0   1558.0      .0000          .0   .0000   0     .00
  90     1     1    18       17.0    1.54    289.8       4        1561.1   1561.1      .0000          .0   .0000   0     .00
  90     1     1    19      204.0    1.54    288.2       5        1566.5   1204.0      .0000          .0   .0000   0     .00
  90     1     1    20      197.0    1.00    286.5       6        1572.0    977.8      .0000          .0   .0000   0     .00
  90     1     1    21      200.0    1.00    285.4       6        1577.4    751.6      .0000          .0   .0000   0     .00
  90     1     1    22      262.0    2.57    285.4       6        1582.9    525.4      .0000          .0   .0000   0     .00
  90     1     1    23      280.0    3.09    284.3       6        1588.3    299.2      .0000          .0   .0000   0     .00
  90     1     1    24      290.0    4.63    284.3       5        1593.8     73.0      .0000          .0   .0000   0     .00


*** NOTES:   STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
             FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                       ***  RUN3-1990MET DATA                                               ***        14:52:02
                                                                                                                      PAGE  10
**MODELOPTs: CONC                                URBAN  FLAT           DFAULT

                              *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL      ***
                                  INCLUDING SOURCE(S):       STACK1   ,

                                 *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                     ** CONC OF TCE       IN MICROGRAMS/M**3                             **

  DIRECTION |                                           DISTANCE (METERS)
  (DEGREES) |         50.00        100.00        150.00        200.00        250.00        300.00        400.00        500.00        600.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     360.00 |        .61004        .22653        .12024        .07437        .05026        .03617        .02133        .01412        .01009
      10.00 |        .52666        .18057        .09590        .05955        .04030        .02902        .01710        .01130        .00805
      20.00 |        .59512        .19324        .09732        .05873        .03913        .02789        .01622        .01063        .00752
      30.00 |        .79101        .28166        .14537        .08784        .05836        .04147        .02402        .01571        .01112
      40.00 |       1.10312        .41772        .21451        .13081        .08794        .06307        .03704        .02447        .01746
      50.00 |       1.32885        .61247        .32933        .20341        .13749        .09895        .05836        .03866        .02764
      60.00 |       1.42778        .67717        .38381        .24671        .17144        .12594        .07646        .05167        .03750
      70.00 |       1.37254        .69721        .38960        .24849        .17205        .12612        .07640        .05153        .03733
      80.00 |       1.16354        .63268        .36937        .24027        .16822        .12427        .07605        .05165        .03761
      90.00 |        .90263        .51461        .30822        .20282        .14301        .10617        .06537        .04454        .03248
     100.00 |        .71700        .39478        .23924        .15873        .11242        .08370        .05170        .03527        .02573
     110.00 |        .57877        .32544        .19776        .13152        .09320        .06940        .04285        .02922        .02131
     120.00 |        .45388        .26007        .16042        .10756        .07664        .05730        .03557        .02434        .01779
     130.00 |        .35039        .20448        .12725        .08571        .06119        .04578        .02844        .01946        .01422
     140.00 |        .26131        .14636        .09141        .06172        .04419        .03315        .02067        .01419        .01040
```

```
   150.00 |        .20505     .10471     .06297     .04142     .02910     .02152     .01313     .00886     .00640
   160.00 |        .18555     .09623     .05961     .03998     .02847     .02126     .01316     .00898     .00655
   170.00 |        .19024     .10305     .06459     .04359     .03115     .02333     .01450     .00993     .00727
   180.00 |        .19777     .11007     .06835     .04570     .03244     .02417     .01493     .01019     .00744
   190.00 |        .19010     .09910     .06051     .04035     .02862     .02132     .01315     .00895     .00651
   200.00 |        .19421     .10876     .06910     .04700     .03370     .02527     .01573     .01077     .00788
   210.00 |        .20939     .12328     .07983     .05482     .03952     .02976     .01862     .01280     .00939
   220.00 |        .23899     .14943     .09616     .06561     .04709     .03533     .02199     .01506     .01102
   230.00 |        .28770     .17818     .11466     .07921     .05733     .04326     .02713     .01866     .01368
   240.00 |        .35718     .24978     .16921     .11953     .08776     .06682     .04237     .02935     .02163
   250.00 |        .50761     .42304     .28589     .19947     .14543     .11025     .06956     .04806     .03538
   260.00 |        .83378     .69251     .43785     .29453     .21029     .15728     .09762     .06680     .04887
   270.00 |       1.30304     .94353     .55659     .36178     .25310     .18698     .11428     .07749     .05635
   280.00 |       1.74791    1.04489     .58236     .37078     .25683     .18849     .11430     .07712     .05588
   290.00 |       1.90770    1.02838     .56191     .35378     .24338     .17761     .10681     .07167     .05172
   300.00 |       1.83232     .89456     .48617     .30648     .21077     .15365     .09222     .06181     .04458
   310.00 |       1.73859     .79905     .42147     .25846     .17393     .12488     .07353     .04872     .03485
   320.00 |       2.10404     .72414     .35368     .20908     .13802     .09802     .05711     .03766     .02689
   330.00 |       1.69189     .52457     .25140     .14668     .09602     .06781     .03919     .02570     .01826
   340.00 |       1.18088     .36600     .17159     .09911     .06447     .04530     .02596     .01689     .01192
   350.00 |        .90660     .31516     .15476     .09157     .06038     .04281     .02483     .01630     .01159

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1990MET DATA                                                 ***          14:52:02
                                                                                                                          PAGE  11
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                              *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                    ** CONC OF TCE       IN MICROGRAMS/M**3                               **

 DIRECTION |                                              DISTANCE (METERS)
 (DEGREES) |       800.00      1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.00 |        .00596     .00399
    10.00 |        .00473     .00315
    20.00 |        .00437     .00288
    30.00 |        .00647     .00428
    40.00 |        .01030     .00687
    50.00 |        .01635     .01093
    60.00 |        .02269     .01543
    70.00 |        .02247     .01521
    80.00 |        .02282     .01554
    90.00 |        .01973     .01343
   100.00 |        .01562     .01062
   110.00 |        .01294     .00880
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    120.00 |        .01084       .00738
    130.00 |        .00865       .00588
    140.00 |        .00636       .00435
    150.00 |        .00381       .00255
    160.00 |        .00398       .00270
    170.00 |        .00443       .00302
    180.00 |        .00453       .00309
    190.00 |        .00393       .00266
    200.00 |        .00480       .00327
    210.00 |        .00575       .00393
    220.00 |        .00671       .00457
    230.00 |        .00835       .00569
    240.00 |        .01330       .00911
    250.00 |        .02177       .01494
    260.00 |        .02983       .02039
    270.00 |        .03415       .02324
    280.00 |        .03369       .02285
    290.00 |        .03102       .02097
    300.00 |        .02673       .01808
    310.00 |        .02065       .01384
    320.00 |        .01591       .01066
    330.00 |        .01072       .00714
    340.00 |        .00691       .00455
    350.00 |        .00681       .00454

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                   ***  RUN3-1990MET DATA                                                      ***        14:52:02
                                                                                                                           PAGE  12
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                              *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                                  INCLUDING SOURCE(S):      STACK1  ,

                                             *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                        ** CONC OF TCE       IN MICROGRAMS/M**3                            **

     X-COORD (M)   Y-COORD (M)        CONC                          X-COORD (M)   Y-COORD (M)        CONC
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
         -18.55          1.33        .58817                             -38.55          1.33       1.31315
         -58.55          1.33       1.36929                             -78.55          1.33       1.20566
         -89.33          1.33       1.07909                             -89.33         21.33       1.16384
         -89.33         41.33        .99879                             -89.33         61.33        .74712
         -89.33         81.33        .58525                             -89.33        100.40        .44644
         -69.33        100.34        .43784                             -49.33        100.34        .36771
         -29.33        100.34        .31645                              -9.33        100.34        .27277
           1.45        100.40        .21869                               1.45         80.34        .30218
           1.45         60.34        .45101                               1.45         40.34        .73583
           1.45         20.34        .00000                               1.45          1.33        .26805
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*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***      03/27/97
                                   *** RUN3-1990MET DATA                                              ***        14:52:02
                                                                                                                 PAGE  13
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                              *** THE  1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                *** NETWORK ID: POLR1    ; NETWORK TYPE: GRIDPOLR ***

                                   ** CONC OF TCE      IN MICROGRAMS/M**3                        **

DIRECTION |                                         DISTANCE (METERS)
(DEGREES) |          50.00                100.00               150.00               200.00               250.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |    24.30751 (90022115)   13.15714 (90112003)   10.01469 (90101321)    7.89486 (90101321)    5.95568 (90101321)
    10.0 |    23.37146 (90020617)   12.44000 (90010118)   10.15634 (90100902)    7.80499 (90100902)    5.78901 (90100902)
    20.0 |    23.18304 (90122516)   13.84182 (90080920)    9.56767 (90100520)    7.44585 (90030403)    5.63913 (90030403)
    30.0 |    23.04516 (90033018)   13.90265 (90070321)    9.89080 (90040921)    7.59337 (90092505)    5.80026 (90092505)
    40.0 |    22.52450 (90122805)   13.54001 (90071401)    9.97757 (90102302)    7.65004 (90040902)    5.77073 (90040902)
    50.0 |    21.83260 (90122808)   13.31460 (90052122)    9.84207 (90051924)    7.51965 (90021120)    5.70415 (90021120)
    60.0 |    21.14882 (90121612)   13.02810 (90090323)    9.68791 (90090422)    7.44768 (90092203)    5.61090 (90082823)
    70.0 |    20.35758 (90112015)   12.68172 (90060103)    9.61789 (90091523)    7.22191 (90091523)    5.44941 (90090604)
    80.0 |    19.95060 (90123116)   12.37335 (90042124)    9.52979 (90092204)    7.22955 (90090624)    5.39954 (90090624)
    90.0 |    19.12288 (90032118)   12.22952 (90072821)    9.37716 (90091001)    7.13677 (90112518)    5.31576 (90112518)
   100.0 |    19.01685 (90020824)   11.90217 (90032623)    9.11213 (90100920)    7.05863 (90100920)    5.33646 (90100920)
   110.0 |    18.37651 (90012017)   11.91345 (90100102)    9.23513 (90030819)    6.87201 (90030819)    5.09096 (90030819)
   120.0 |    18.21297 (90122201)   11.75867 (90090405)    9.19223 (90040703)    6.90976 (90060423)    5.24674 (90060423)
   130.0 |    17.92245 (90040501)   11.70483 (90081124)    8.85745 (90082521)    6.81018 (90082521)    5.19619 (90082521)
   140.0 |    17.68833 (90122110)   11.64458 (90061901)    9.02649 (90110919)    6.84439 (90110919)    5.19347 (90110919)
   150.0 |    17.23480 (90090509)   11.12097 (90060803)    8.68801 (90040222)    6.60359 (90040222)    5.02751 (90040222)
   160.0 |    17.39752 (90021905)   11.04765 (90062402)    9.05649 (90042303)    6.82960 (90042303)    5.17783 (90042303)
   170.0 |    17.08809 (90101518)   11.62251 (90051321)    8.92948 (90060524)    6.77518 (90060524)    5.15141 (90060524)
   180.0 |    17.71107 (90122122)   11.68530 (90051301)    9.00611 (90102621)    6.83739 (90102621)    5.19097 (90102621)
   190.0 |    17.52682 (90031011)   11.56701 (90080220)    8.57377 (90022221)    6.58057 (90102724)    5.06490 (90102724)
   200.0 |    18.52240 (90010521)   11.76166 (90082105)    9.20059 (90102223)    6.92831 (90040322)    5.25856 (90040322)
   210.0 |    17.59870 (90012609)   11.56210 (90081403)    9.21534 (90061906)    6.95454 (90111024)    5.30679 (90111024)
   220.0 |    19.02792 (90122123)   11.94935 (90082203)    9.38046 (90040804)    7.05267 (90040804)    5.30280 (90040123)
   230.0 |    19.50109 (90020317)   12.24290 (90031920)    9.41354 (90082506)    7.11764 (90072706)    5.40767 (90072706)
   240.0 |    20.17300 (90020811)   12.20849 (90103003)    9.49425 (90081802)    7.26891 (90103004)    5.42156 (90103004)
   250.0 |    20.35060 (90012517)   12.48994 (90110106)    9.59303 (90072923)    7.35092 (90100922)    5.49088 (90100922)
   260.0 |    21.42444 (90122119)   13.11735 (90051506)    9.67771 (90102324)    7.45376 (90100301)    5.63189 (90042304)
   270.0 |    21.93530 (90122318)   13.43657 (90022823)    9.86831 (90100806)    7.55066 (90100404)    5.70536 (90110104)
   280.0 |    22.49056 (90110108)   13.74345 (90111703)    9.82493 (90091007)    7.61039 (90081706)    5.75041 (90081706)
   290.0 |    23.35650 (90021908)   13.92934 (90071805)    9.87187 (90042705)    7.76140 (90042705)    5.82339 (90040223)
   300.0 |    23.80673 (90011509)   14.31623 (90102707)    9.98803 (90071624)    7.78123 (90071624)    5.88517 (90092706)
   310.0 |    32.09926 (90011009)   23.79278 (90070803)   15.12935 (90061703)    9.93757 (90093019)    6.89850 (90093019)
   320.0 |    52.07030 (90121719)   24.30224 (90111206)   15.24257 (90060301)    9.94471 (90060301)    6.07239 (90060301)
   330.0 |    52.82324 (90031624)   24.39706 (90061705)   15.37740 (90011218)   10.04854 (90011218)    6.96596 (90011218)
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     340.0 |      53.08740 (90042205)     24.22341 (90102701)     14.16363 (90030924)      9.38108 (90030924)      6.54497 (90030924)
     350.0 |      52.86400 (90022706)     24.35886 (90041220)     15.29237 (90031902)      9.89078 (90031902)      6.81606 (90031902)

*** ISCST3 - VERSION 96113 ***     *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***         03/27/97
                                    ***  RUN3-1990MET DATA                                                ***          14:52:02
                                                                                                                   :  PAGE  14
**MODELOPTs: CONC                              URBAN  FLAT           DFAULT

                                   *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                       INCLUDING SOURCE(S):        STACK1   ,

                                        *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                             ** CONC OF TCE       IN MICROGRAMS/M**3                          **

DIRECTION |                                                DISTANCE (METERS)
(DEGREES) |           300.00                  400.00                  500.00                  600.00                  800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     360.0 |       4.57325 (90101321)      2.92079 (90101321)      2.03969 (90101321)      1.51944 (90101321)       .95941 (90101321)
      10.0 |       4.43682 (90092024)      2.87127 (90092024)      2.01998 (90092024)      1.51199 (90092024)       .96047 (90092024)
      20.0 |       4.32364 (90030403)      2.78085 (90120222)      1.95553 (90120222)      1.46047 (90120222)       .92242 (90120222)
      30.0 |       4.47768 (90092505)      2.86728 (90092505)      2.00026 (90092505)      1.48698 (90092505)       .94585 (90022020)
      40.0 |       4.43918 (90022321)      2.85513 (90022321)      2.00338 (90111623)      1.50202 (90111623)       .95473 (90111623)
      50.0 |       4.37990 (90021120)      2.78068 (90021120)      1.94381 (90031101)      1.46005 (90030501)       .93817 (90030501)
      60.0 |       4.32422 (90082823)      2.80531 (90032423)      1.97187 (90032423)      1.47253 (90032423)       .93268 (90110124)
      70.0 |       4.26569 (90090604)      2.77857 (90090604)      1.95706 (90090604)      1.46353 (90090604)       .93110 (90012518)
      80.0 |       4.11103 (90090624)      2.63730 (90110806)      1.88531 (90041904)      1.43152 (90041904)       .92471 (90041904)
      90.0 |       4.08136 (90050623)      2.70522 (90050623)      1.92932 (90050623)      1.45632 (90050623)       .93370 (90050623)
     100.0 |       4.14820 (90061802)      2.70341 (90061802)      1.91730 (90031622)      1.44789 (90031622)       .92912 (90031622)
     110.0 |       3.87580 (90030819)      2.52287 (90122722)      1.82911 (90122722)      1.39609 (90122722)       .90782 (90122722)
     120.0 |       4.07250 (90060423)      2.67362 (90022421)      1.90290 (90022421)      1.43618 (90022421)       .92182 (90022421)
     130.0 |       4.05374 (90082521)      2.65921 (90082521)      1.89213 (90082521)      1.42827 (90082521)       .91858 (90011319)
     140.0 |       4.04151 (90110919)      2.64650 (90110919)      1.88245 (90110919)      1.42108 (90110919)       .91304 (90110919)
     150.0 |       3.92430 (90040222)      2.58201 (90040222)      1.84278 (90040222)      1.39456 (90040222)       .89899 (90040222)
     160.0 |       4.03145 (90042303)      2.64521 (90042303)      1.88537 (90042303)      1.42583 (90042303)       .91876 (90042303)
     170.0 |       4.01721 (90060524)      2.64001 (90060524)      1.88303 (90060524)      1.42461 (90060524)       .91833 (90060524)
     180.0 |       4.04068 (90102621)      2.64660 (90102621)      1.88270 (90102621)      1.42458 (90110920)       .91855 (90110920)
     190.0 |       3.97491 (90102724)      2.62770 (90102724)      1.87887 (90102724)      1.42317 (90102724)       .91831 (90102724)
     200.0 |       4.08038 (90040322)      2.65239 (90040322)      1.87482 (90061801)      1.42160 (90061801)       .91813 (90061801)
     210.0 |       4.12558 (90111024)      2.68556 (90040802)      1.91275 (90040802)      1.44368 (90040802)       .92627 (90040802)
     220.0 |       4.14027 (90040123)      2.70086 (90040123)      1.91994 (90072301)      1.44949 (90072301)       .92986 (90072301)
     230.0 |       4.17354 (90072706)      2.67594 (90072706)      1.87781 (90110103)      1.42625 (90110103)       .92191 (90110103)
     240.0 |       4.23055 (90111223)      2.75751 (90111223)      1.94414 (90111223)      1.46585 (90111723)       .93860 (90111723)
     250.0 |       4.27438 (90092104)      2.78246 (90092104)      1.95911 (90092104)      1.47344 (90060701)       .94242 (90060701)
     260.0 |       4.33639 (90042304)      2.80822 (90100405)      1.97337 (90100405)      1.48351 (90092105)       .94701 (90092105)
     270.0 |       4.38864 (90041004)      2.83545 (90041004)      1.98716 (90041004)      1.49272 (90100802)       .95098 (90100802)
     280.0 |       4.44428 (90032406)      2.85704 (90032406)      1.99698 (90032406)      1.48615 (90032406)       .94716 (90022121)
     290.0 |       4.49033 (90040223)      2.87196 (90040223)      2.00238 (90040223)      1.48808 (90040223)       .94406 (90012424)
     300.0 |       4.51811 (90092706)      2.89742 (90102602)      2.03188 (90102602)      1.51704 (90102602)       .95998 (90102602)
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   310.0 |      5.08257 (90030224)      3.11906 (90030224)      2.13659 (90030224)      1.57425 (90030224)       .98284 (90102804)
   320.0 |      5.06457 (90102403)      3.11325 (90102403)      2.13666 (90102403)      1.57700 (90102403)       .98697 (90102403)
   330.0 |      5.11296 (90071603)      3.13180 (90071603)      2.14559 (90071603)      1.58198 (90071603)       .98899 (90071603)
   340.0 |      4.81868 (90030924)      2.95017 (90030924)      2.01856 (90030924)      1.48592 (90030924)       .92560 (90030924)
   350.0 |      4.98081 (90031902)      3.02326 (90031902)      2.05866 (90031902)      1.51082 (90031902)       .93767 (90031902)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1990MET DATA                                               ***          14:52:02
                                                                                                                      PAGE  15
 **MODELOPTs: CONC                          URBAN  FLAT          DFAULT

                            *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                INCLUDING SOURCE(S):       STACK1  ,

                              *** NETWORK ID: POLR1    ; NETWORK TYPE: GRIDPOLR ***

                                ** CONC OF TCE      IN MICROGRAMS/M**3                         **

 DIRECTION |                                           DISTANCE (METERS)
 (DEGREES) |         1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |       .67676 (90101321)
    10.0 |       .68011 (90092024)
    20.0 |       .65413 (90032521)
    30.0 |       .67087 (90022020)
    40.0 |       .67562 (90111623)
    50.0 |       .66839 (90030501)
    60.0 |       .66542 (90110124)
    70.0 |       .66337 (90012518)
    80.0 |       .66091 (90041904)
    90.0 |       .66414 (90050623)
   100.0 |       .66135 (90031622)
   110.0 |       .65143 (90122722)
   120.0 |       .65656 (90022421)
   130.0 |       .65668 (90011319)
   140.0 |       .65094 (90110919)
   150.0 |       .64228 (90040222)
   160.0 |       .65653 (90042303)
   170.0 |       .65633 (90060524)
   180.0 |       .65653 (90110920)
   190.0 |       .65655 (90102724)
   200.0 |       .65663 (90061801)
   210.0 |       .65942 (90040802)
   220.0 |       .66176 (90072301)
   230.0 |       .65925 (90110103)
   240.0 |       .66703 (90111723)
   250.0 |       .66923 (90060701)
   260.0 |       .67173 (90092105)
   270.0 |       .67378 (90100802)
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       280.0 |        .67172 (90022121)
       290.0 |        .66993 (90012424)
       300.0 |        .67780 (90102602)
       310.0 |        .69153 (90102804)
       320.0 |        .69364 (90102403)
       330.0 |        .69466 (90071603)
       340.0 |        .64765 (90030924)
       350.0 |        .65471 (90031902)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH 8 ***       03/27/97
                                    ***  RUN3-1990MET DATA                                               ***        14:52:02
                                                                                                                    PAGE  16
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                               *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                   INCLUDING SOURCE(S):      STACK1  ,

                                           *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                      ** CONC OF TCE      IN MICROGRAMS/M**3                                 **

     X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)              X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
          -18.55         1.33       30.33992  (90102110)                   -38.55         1.33       25.54766  (90011311)
          -58.55         1.33       19.58290  (90092907)                   -78.55         1.33       16.49779  (90110601)
          -89.33         1.33       14.99846  (90052006)                   -89.33        21.33       15.00960  (90100306)
          -89.33        41.33       14.41516  (90102606)                   -89.33        61.33       13.11433  (90111523)
          -89.33        81.33       19.65108  (90030224)                   -89.33       100.40       17.66133  (90103006)
          -69.33       100.34       19.69631  (90110319)                   -49.33       100.34       21.31529  (90111524)
          -29.33       100.34       22.98577  (90073024)                    -9.33       100.34       22.88268  (90061902)
            1.45       100.40       13.11725  (90121606)                     1.45        80.34       16.71333  (90121606)
            1.45        60.34       20.98722  (90081206)                     1.45        40.34       29.41292  (90020616)
            1.45        20.34         .00000  (        0)                     1.45         1.33       27.11593  (90031414)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1990MET DATA                                               ***        14:52:02
                                                                                                                    PAGE  17
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                               *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                   INCLUDING SOURCE(S):      STACK1  ,

                                  *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                      ** CONC OF TCE      IN MICROGRAMS/M**3                                 **

 DIRECTION |                                           DISTANCE (METERS)
 (DEGREES) |          50.00              100.00              150.00              200.00              250.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
360.0 |     6.26500c(90041724)     1.91379c(90041724)      .85248c(90041724)      .47751c(90041724)      .37529c(90012424)
 10.0 |     2.58564c(90041724)     1.47799c(90090224)      .93061c(90090224)      .59255c(90090224)      .40574c(90090224)
 20.0 |     3.05182c(90041924)     1.17263c(90113024)      .67409c(90090224)      .47969c(90120224)      .36205c(90120224)
 30.0 |     3.53431c(90041924)     2.12158 (90071524)     1.20258c(90040924)      .83395c(90040924)      .58807c(90040924)
 40.0 |     4.76581c(90051824)     2.14212 (90071524)     1.58503 (90071524)     1.07564 (90071524)      .75845 (90071524)
 50.0 |     5.53885c(90062524)     2.99159c(90041924)     1.75766c(90041924)     1.15456c(90123024)      .84949c(90123024)
 60.0 |     5.87425c(90091424)     3.38920c(90062624)     1.89168c(90062624)     1.25528c(90123024)      .94895c(90123024)
 70.0 |     5.96971c(90063024)     3.11355c(90062624)     1.97785c(90062624)     1.40319c(90123124)     1.04991c(90123124)
 80.0 |     5.76530c(90010324)     2.60714c(90123124)     1.72844c(90123124)     1.28778c(90110824)     1.01723c(90110824)
 90.0 |     4.12121 (90122224)     2.28812c(90010324)     1.59558c(90091024)     1.16574c(90091024)      .85218c(90091024)
100.0 |     4.00401 (90122224)     2.27056c(90082924)     1.49983c(90082924)     1.00039c(90082924)      .70319c(90082924)
110.0 |     3.78335 (90122224)     1.84526c(90040724)     1.14016c(90082824)      .75295c(90082824)      .52960c(90011924)
120.0 |     3.87418c(90102024)     2.03893c(90061624)     1.24865c(90040724)      .87880c(90040724)      .64346c(90040724)
130.0 |     3.07708c(90102024)     1.93971c(90061624)     1.40898c(90061624)     1.00594c(90061624)      .74308c(90061624)
140.0 |     2.82604c(90100124)     1.20250c(90100124)      .83970c(90102524)      .65443c(90102524)      .50480c(90102524)
150.0 |     2.08359c(90100124)      .88469c(90050924)      .57627c(90050924)      .38928c(90050924)      .27788c(90050924)
160.0 |     1.91136c(90021924)      .98700c(90021924)      .68526c(90110324)      .55999c(90110324)      .44321c(90110324)
170.0 |     2.21773 (90041824)     1.19366 (90041824)      .66923 (90041824)      .50367c(90120824)      .38305c(90120824)
180.0 |     2.21576 (90041824)     1.28280c(90040324)      .96950c(90040324)      .69582c(90040324)      .51339c(90040324)
190.0 |     1.71403c(90081324)     1.20606c(90080224)      .75604c(90080224)      .50192c(90080224)      .35549c(90080224)
200.0 |     2.17723c(90080224)     1.12539c(90082124)      .73663c(90052024)      .53309c(90052024)      .39321c(90052024)
210.0 |     1.75926c(90010524)     1.35254c(90102124)     1.09157c(90020324)      .82041c(90020324)      .61531c(90020324)
220.0 |     3.08549c(90102124)     1.54000c(90102124)      .86507c(90020324)      .60480c(90020324)      .44167c(90012424)
230.0 |     3.26836c(90102124)     1.84938c(90120324)     1.28759c(90120324)      .97524c(90120324)      .74426c(90120324)
240.0 |     3.07995c(90102124)     2.25789c(90103024)     1.77480c(90103024)     1.24473c(90103024)      .88562c(90103024)
250.0 |     4.53629c(90120624)     2.84623c(90120624)     1.70438c(90120624)     1.18312c(90120624)      .86406c(90120624)
260.0 |     4.97675c(90112924)     3.69770c(90112924)     1.83844 (90100724)     1.25264 (90100724)      .90172c(90110324)
270.0 |     6.63521c(90112924)     3.75019c(90092424)     2.37260c(90101224)     1.88361c(90101224)     1.45126c(90101224)
280.0 |     5.55513c(90092424)     4.49841c(90101224)     2.72309c(90101224)     1.75374c(90101224)     1.26445c(90111424)
290.0 |     6.46842c(90050324)     4.34483c(90121124)     2.35368c(90121124)     1.52490c(90111424)     1.05096c(90111424)
300.0 |     8.26420c(90121524)     3.32562c(90121524)     2.23548c(90102924)     1.55592c(90091624)     1.12558c(90091624)
310.0 |     8.59632c(90121524)     4.58974c(90102824)     2.86058c(90102824)     1.84093c(90102824)     1.27003c(90102824)
320.0 |     8.34260c(90081224)     3.75388c(90113024)     2.18353c(90113024)     1.42297c(90113024)      .99574c(90113024)
330.0 |     8.18630c(90100424)     4.01753c(90100424)     2.30062c(90100424)     1.41825c(90100424)      .95391c(90100424)
340.0 |     6.95911c(90072324)     2.71916c(90071824)     1.41633c(90071824)      .85681c(90071824)      .57550c(90071824)
350.0 |     8.21444c(90041724)     2.40260c(90041124)     1.37600 (90121924)      .86971 (90121924)      .59211 (90121924)

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1990MET DATA                                                 ***          14:52:02
                                                                                                                          PAGE  18
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                    INCLUDING SOURCE(S):       STACK1  ,

                                     *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                         ** CONC OF TCE       IN MICROGRAMS/M**3                            **

DIRECTION |                                            DISTANCE (METERS)
```

```
 (DEGREES) |        300.00              400.00              500.00              600.00              800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.0 |     .29691c(90012424)   .19580c(90012424)   .13891c(90012424)   .10438c(90012424)   .06641c(90012424)
     10.0 |     .29496c(90090224)   .17672c(90090224)   .11873c(90090224)   .08603c(90090224)   .05220c(90090224)
     20.0 |     .27804c(90120224)   .17700c(90120224)   .12295c(90120224)   .09106c(90120224)   .05686c(90120224)
     30.0 |     .43221c(90040924)   .26077c(90040924)   .17533c(90040924)   .12691c(90040924)   .07673c(90040924)
     40.0 |     .56065 (90071524)   .34325 (90071524)   .23394 (90071524)   .17136 (90071524)   .10564 (90071524)
     50.0 |     .64830c(90123024)   .40962c(90123024)   .28244c(90123024)   .20746c(90123024)   .12718c(90123024)
     60.0 |     .73740c(90123024)   .47833c(90123024)   .33613c(90123024)   .25061c(90123024)   .15728c(90123024)
     70.0 |     .80768c(90123124)   .51773c(90123124)   .36104c(90123124)   .26758c(90123124)   .16632c(90123124)
     80.0 |     .80598c(90110824)   .53318c(90110824)   .37844c(90110824)   .28396c(90110824)   .17971c(90110824)
     90.0 |     .64212c(90091024)   .39934c(90091024)   .28006c(90092524)   .20899c(90092524)   .13156c(90092524)
    100.0 |     .51931c(90082924)   .31719c(90082924)   .21537c(90082924)   .15898c(90010524)   .09936c(90010524)
    110.0 |     .41671c(90011924)   .27438c(90011924)   .19435c(90011924)   .14555c(90011924)   .09167c(90011924)
    120.0 |     .49007c(90040724)   .31166c(90040724)   .21697c(90040724)   .16086c(90040724)   .10015c(90040724)
    130.0 |     .56982c(90061624)   .36726c(90061624)   .25885c(90061624)   .19411c(90061624)   .12345c(90061624)
    140.0 |     .39710c(90102524)   .26343c(90102524)   .18872c(90102524)   .14306c(90102524)   .09227c(90102524)
    150.0 |     .20799c(90050924)   .13670c(90102924)   .09750c(90102924)   .07374c(90102924)   .04748c(90102924)
    160.0 |     .35385c(90110324)   .23828c(90110324)   .17185c(90110324)   .13073c(90110324)   .08460c(90110324)
    170.0 |     .29775c(90120824)   .19370c(90120824)   .13656c(90120824)   .10210c(90120824)   .06430c(90120824)
    180.0 |     .39272c(90040324)   .25192c(90040324)   .17691c(90040324)   .13231c(90040324)   .08384c(90040324)
    190.0 |     .26523c(90080224)   .16520c(90080224)   .11399c(90080224)   .08419c(90080224)   .05240c(90080224)
    200.0 |     .30009c(90052024)   .19147c(90052024)   .13384c(90052024)   .09972c(90052024)   .06285c(90052024)
    210.0 |     .47248c(90020324)   .30106c(90020324)   .20867c(90020324)   .15377c(90020324)   .09456c(90020324)
    220.0 |     .33628c(90012424)   .21407c(90012424)   .14916c(90012424)   .11057c(90012424)   .06875c(90012424)
    230.0 |     .57987c(90120324)   .37808c(90120324)   .26665c(90120324)   .19922c(90120324)   .12508c(90120324)
    240.0 |     .65477c(90103024)   .39752c(90103024)   .26786c(90103024)   .19498c(90120324)   .12206c(90111224)
    250.0 |     .65698c(90120624)   .43125c(90110324)   .30740c(90110324)   .23126c(90110324)   .14661c(90110324)
    260.0 |     .68160c(90110324)   .42326c(90110324)   .28824c(90110324)   .20982c(90110324)   .12703c(90110324)
    270.0 |    1.13230c(90101224)   .73723c(90101224)   .51973c(90101224)   .38886c(90101224)   .24586c(90101224)
    280.0 |     .97348c(90111424)   .62374c(90111424)   .43533c(90111424)   .32329c(90111424)   .20210c(90111424)
    290.0 |     .76388c(90121124)   .47073c(90102924)   .32076c(90102924)   .23405c(90102924)   .14243c(90102924)
    300.0 |     .84523c(90091624)   .52660c(90091624)   .36237c(90091624)   .26707c(90091624)   .16590c(90091624)
    310.0 |     .92822c(90102824)   .56266c(90102824)   .38228c(90102824)   .27986c(90102824)   .17288c(90102824)
    320.0 |     .73250c(90113024)   .44549c(90113024)   .30204c(90113024)   .22016c(90113024)   .13447c(90113024)
    330.0 |     .68604c(90100424)   .40734c(90100424)   .27289c(90100424)   .19759c(90100424)   .11993c(90100424)
    340.0 |     .41533c(90071824)   .24902c(90071824)   .16837c(90071824)   .12287c(90071824)   .07549c(90071824)
    350.0 |     .42856 (90121924)   .25572 (90121924)   .17144 (90121924)   .12392 (90121924)   .07069 (90121924)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                  ***  RUN3-1990MET DATA                                                   ***         14:52:02
                                                                                                                       PAGE  19
**MODELOPTs: CONC                                   URBAN  FLAT           DFAULT

                              *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***
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                                        ** CONC OF TCE      IN MICROGRAMS/M**3                          **

                                                              DATE                                                          NETWORK
GROUP ID                                 AVERAGE CONC      (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS       53.08740  ON 90042205: AT (     -17.10,       46.98,       .00,       .00)  GP   POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1990MET DATA                                                  ***          14:52:02
                                                                                                                           PAGE  23
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                                   *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***


                                        ** CONC OF TCE      IN MICROGRAMS/M**3                          **

                                                              DATE                                                          NETWORK
GROUP ID                                 AVERAGE CONC      (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS        8.59632c ON 90121524: AT (     -38.30,       32.14,       .00,       .00)  GP   POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1990MET DATA                                                  ***          14:52:02
                                                                                                                           PAGE  24
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of          0 Fatal Error Message(s)
A Total of         14 Warning Message(s)
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A Total of        1055 Informational Message(s)

A Total of        1055 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
MX W430   4214 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062514
MX W430   4215 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062515
MX W430   4216 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062516
MX W430   4217 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062517
MX W430   4218 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062518
MX W430   4237 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062613
MX W430   4238 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062614
MX W430   4239 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062615
MX W430   4240 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062616
MX W430   4241 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062617
MX W430   4242 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062618
MX W430   4263 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062715
MX W430   4264 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062716
MX W430   4265 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    90062717

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
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                                     ** CONC OF TCE      IN MICROGRAMS/M**3                         **

 DIRECTION |                                              DISTANCE (METERS)
 (DEGREES) |         1000.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     360.0 |       .04693c(90012424)
      10.0 |       .03576c(90090224)
      20.0 |       .03971c(90120224)
      30.0 |       .05235c(90040924)
      40.0 |       .07320 (90071524)
      50.0 |       .08711c(90123024)
      60.0 |       .10978c(90123024)
      70.0 |       .11513c(90123124)
      80.0 |       .12617c(90110824)
      90.0 |       .09215c(90092524)
     100.0 |       .06912c(90010524)
     110.0 |       .06399c(90011924)
     120.0 |       .06940c(90040724)
     130.0 |       .08727c(90061624)
     140.0 |       .06584c(90102524)
     150.0 |       .03390c(90102924)
     160.0 |       .06048c(90110324)
     170.0 |       .04492c(90120824)
     180.0 |       .05914c(90040324)
     190.0 |       .03647c(90102724)
     200.0 |       .04416c(90052024)
     210.0 |       .06481c(90020324)
     220.0 |       .04755c(90012424)
     230.0 |       .08706c(90120324)
     240.0 |       .08549c(90111224)
     250.0 |       .10282c(90110324)
     260.0 |       .08622c(90110324)
     270.0 |       .17286c(90101224)
     280.0 |       .14084c(90111424)
     290.0 |       .09712c(90102924)
     300.0 |       .11549c(90091624)
     310.0 |       .12023c(90102824)
     320.0 |       .09233c(90113024)
     330.0 |       .08220c(90100424)
     340.0 |       .05219c(90071824)
     350.0 |       .05072 (90121924)
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH 8 ***      03/27/97
                                     ***  RUN3-1990MET DATA                                               ***        14:52:02
                                                                                                                      PAGE  20
 **MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                                ***  THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                     INCLUDING SOURCE(S):      STACK1   ,
```

```
                                     *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                  ** CONC OF TCE        IN MICROGRAMS/M**3                            **

     X-COORD (M)  Y-COORD (M)          CONC      (YYMMDDHH)               X-COORD (M)  Y-COORD (M)         CONC      (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
          -10.55         1.33        7.32344c (90102124)                    -38.55         1.33        7.00853c (90112924)
          -58.55         1.33        6.14308c (90092424)                    -78.55         1.33        5.13034c (90092424)
          -89.33         1.33        4.33764c (90092424)                    -89.33        21.33        3.89087c (90101224)
          -89.33        41.33        4.30224c (90121124)                    -89.33        61.33        3.19583c (90091624)
          -89.33        81.33        4.04729c (90102824)                    -89.33       100.40        2.59983c (90113024)
          -69.33       100.34        3.16596c (90100424)                    -49.33       100.34        2.47494c (90100424)
          -29.33       100.34        2.63819c (90072324)                     -9.33       100.34        2.24476c (90041724)
            1.45       100.40        1.83703c (90041724)                      1.45        80.34        2.79382c (90041724)
            1.45        60.34        4.48794c (90041724)                      1.45        40.34        6.22818c (90041724)
            1.45        20.34         .00000 (        0)                      1.45         1.33        2.86788c (90070124)

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1990MET DATA                                                 ***          14:52:02
                                                                                                                          PAGE  21
**MODELOPTs: CONC                               URBAN  FLAT          DFAULT

                                      *** THE SUMMARY OF MAXIMUM PERIOD (  8760 HRS) RESULTS ***


                                  ** CONC OF TCE        IN MICROGRAMS/M**3                            **

                                                                                                    NETWORK
GROUP ID                         AVERAGE CONC              RECEPTOR  (XR, YR, ZELEV, ZFLAG)   OF TYPE  GRID-ID
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      1ST HIGHEST VALUE IS       2.10404 AT (     -32.14,        38.30,         .00,          .00)  GP   POLR1
         2ND HIGHEST VALUE IS       1.90770 AT (     -46.98,        17.10,         .00,          .00)  GP   POLR1


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1990MET DATA                                                 ***          14:52:02
                                                                                                                          PAGE  22
**MODELOPTs: CONC                               URBAN  FLAT          DFAULT

                                         *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***
```

```
1                    ISCST3 - (DATED 96113)

                 IBM-PC VERSION (3.05)     ISCST3R
      (C) COPYRIGHT 1992-1996, TRINITY CONSULTANTS, INC.

Run Began on  3/27/1997 at 15:13:36

** BREEZE AIR SUITE (ISCST3) - C:\TRINITY\SUITE\EM72096.DAT
** Trinity Consultants Incorporated, Dallas, TX

CO STARTING
CO TITLEONE  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S
CO TITLETWO  RUN3-1991MET DATA
CO MODELOPT  DFAULT  CONC  URBAN
CO AVERTIME  1  24  ANNUAL
CO POLLUTID  TCE
CO TERRHGTS  FLAT
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
SO ELEVUNIT  METERS
SO LOCATION  STACK1  POINT  -4.7  12.7  0
** SRCDESCR  AIR STRIPPER EXHAUST
SO SRCPARAM  STACK1  1.574974E-02  4.8768  299.82  18.288  0.280416
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  7.62  7.62  7.62  7.62  7.62  4.27
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  29.1  28.31  26.66  24.2  21.0  17.17
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  63.61  55.73  46.15  35.17  23.12  17.17
SO EMISUNIT  1.0E+06  GRAMS/SEC  MICROGRAMS/M**3
SO SRCGROUP  ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POLR1 STA
RE GRIDPOLR POLR1 ORIG  0  0
RE GRIDPOLR POLR1 DIST 50  100  150  200  250  300  400  500  600  800
RE GRIDPOLR POLR1 DIST 1000
RE GRIDPOLR POLR1 DDIR  0  10  20  30  40  50  60  70  80  90  100  110
RE GRIDPOLR POLR1 DDIR  120  130  140  150  160  170  180  190  200  210
RE GRIDPOLR POLR1 DDIR  220  230  240  250  260  270  280  290  300  310
RE GRIDPOLR POLR1 DDIR  320  330  340  350
RE GRIDPOLR POLR1 END
** BOUNDARY
```

```
RE DISCCART  -18.55  1.33
RE DISCCART  -38.55  1.33
RE DISCCART  -58.55  1.33
RE DISCCART  -78.55  1.33
RE DISCCART  -89.33  1.33
RE DISCCART  -89.33  21.33
RE DISCCART  -89.33  41.33
RE DISCCART  -89.33  61.33
RE DISCCART  -89.33  81.33
RE DISCCART  -09.33  100.4
RE DISCCART  -69.33  100.34
RE DISCCART  -49.33  100.34
RE DISCCART  -29.33  100.34
RE DISCCART  -9.33  100.34
RE DISCCART  1.45  100.4
RE DISCCART  1.45  80.34
RE DISCCART  1.45  60.34
RE DISCCART  1.45  40.34
RE DISCCART  1.45  20.34
RE DISCCART  1.45  1.33
RE FINISHED

ME STARTING
ME INPUTFIL  C:\TRINITY\SUITE\MET\PHXTUS91.BIN  UNFORM
ME ANEMHGHT  10.0  METERS
ME SURFDATA  23183  1991
ME UAIRDATA  23160  1991
ME STARTEND  91  01  01  1  91  12  31  24
ME FINISHED

OU STARTING
OU RECTABLE  1  FIRST
OU RECTABLE  ALLAVE  FIRST
OU FINISHED

***********************************
*** SETUP Finishes Successfully ***
***********************************

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                   ***  RUN3-1991MET DATA                                                    ***        15:13:36
                                                                                                                       PAGE   1
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                        ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
```

```
**Model Uses NO DRY DEPLETION.  DDPLETE = F
**Model Uses NO WET DEPLETION.  WDPLETE = F
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
          1. Final Plume Rise.
          2. Stack-tip Downwash.
          3. Buoyancy-induced Dispersion.
          4. Use Calms Processing Routine.
          5. Not Use Missing Data Processing Routine.
          6. Default Wind Profile Exponents.
          7. Default Vertical Potential Temperature Gradients.
          8. "Upper Bound" Values for Supersquat Buildings.
          9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR
    and Calculates ANNUAL Averages

**This Run Includes:     1 Source(s);      1 Source Group(s); and    416 Receptor(s)

**The Model Assumes A Pollutant Type of:  TCE

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
        Model Outputs Tables of ANNUAL Averages by Receptor
        Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                               m for Missing Hours
                                                               b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =     10.00 ;    Decay Coef. =    .0000      ;    Rot. Angle =      .0
                 Emission Units = GRAMS/SEC                                    ;  Emission Rate Unit Factor =    .10000E+07
                 Output Units   = MICROGRAMS/M**3

**Input Runstream File: C:\TRINITY\SUITE\EM72096.DAT           ;  **Output Print File: C:\TRINITY\SUITE\EM72096.LST

*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                       ***  RUN3-1991MET DATA                                          ***        15:13:36
                                                                                                                  PAGE   2
**MODELOPTs: CONC                        URBAN  FLAT          DFAULT
```

```
                                   *** POINT SOURCE DATA ***

            NUMBER EMISSION RATE                    BASE     STACK   STACK    STACK     STACK    BUILDING EMISSION RATE
   SOURCE    PART. (USER UNITS)     X        Y      ELEV.    HEIGHT  TEMP.  EXIT VEL. DIAMETER   EXISTS   SCALAR VARY
     ID      CATS.               (METERS) (METERS) (METERS) (METERS) (DEG.K)  (M/SEC)  (METERS)               BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  STACK1       0    .15750E-01     -4.7     12.7       .0     4.88   299.82    18.29      .28      YES
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                   ***  RUN3-1991MET DATA                                                  ***      15:13:36
                                                                                                                    PAGE   3
**MODELOPTs: CONC                          URBAN  FLAT          DFAULT


                                *** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID                                                   SOURCE IDs


 ALL       STACK1  ,
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                   ***  RUN3-1991MET DATA                                                  ***      15:13:36
                                                                                                                    PAGE   4
**MODELOPTs: CONC                          URBAN  FLAT          DFAULT
                               *** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE ID: STACK1
 IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK
   1  4.3,   20.9, 0      2  4.3,   24.1, 0      3  4.3,   26.6, 0      4  4.3,   28.2, 0      5  4.3,   29.0, 0      6  4.3,   28.9, 0
   7  4.3,   28.0, 0      8  4.3,   26.2, 0      9  4.3,   23.6, 0     10  4.3,   26.2, 0     11  4.3,   28.0, 0     12  4.3,   29.0, 0
  13  4.3,   29.1, 0     14  4.3,   28.3, 0     15  4.3,   26.7, 0     16  4.3,   24.2, 0     17  4.3,   21.0, 0     18  4.3,   17.2, 0
  19  4.3,   20.9, 0     20  4.3,   24.1, 0     21  4.3,   26.6, 0     22  4.3,   28.2, 0     23  4.3,   29.0, 0     24  4.3,   28.9, 0
  25  4.3,   28.0, 0     26  4.3,   26.2, 0     27  4.3,   23.6, 0     28  4.3,   26.2, 0     29  4.3,   28.0, 0     30  4.3,   29.0, 0
  31  7.6,   63.6, 0     32  7.6,   55.7, 0     33  7.6,   46.1, 0     34  7.6,   35.2, 0     35  7.6,   23.1, 0     36  4.3,   17.2, 0


*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                   ***  RUN3-1991MET DATA                                                  ***      15:13:36
                                                                                                                    PAGE   5
**MODELOPTs: CONC                          URBAN  FLAT          DFAULT

                             *** GRIDDED RECEPTOR NETWORK SUMMARY ***
```

```
                        *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                              *** ORIGIN FOR POLAR NETWORK ***
                       X-ORIG =       .00 ;   Y-ORIG =        .00  (METERS)

                              *** DISTANCE RANGES OF NETWORK ***
                                         (METERS)

      50.0,     100.0,     150.0,     200.0,     250.0,     300.0,     400.0,     500.0,     600.0,     800.0,
    1000.0,

                              *** DIRECTION RADIALS OF NETWORK ***
                                         (DEGREES)

     360.0,      10.0,      20.0,      30.0,      40.0,      50.0,      60.0,      70.0,      80.0,      90.0,
     100.0,     110.0,     120.0,     130.0,     140.0,     150.0,     160.0,     170.0,     180.0,     190.0,
     200.0,     210.0,     220.0,     230.0,     240.0,     250.0,     260.0,     270.0,     280.0,     290.0,
     300.0,     310.0,     320.0,     330.0,     340.0,     350.0,

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1991MET DATA                                                ***          15:13:36
                                                                                                                        PAGE   6
 **MODELOPTs: CONC                                URBAN  FLAT           DFAULT


                                 *** DISCRETE CARTESIAN RECEPTORS ***
                                   (X-COORD, Y-COORD, ZELEV, ZFLAG)
                                              (METERS)

   (     -18.5,       1.3,        .0,        .0);         (     -38.5,       1.3,        .0,        .0);
   (     -58.5,       1.3,        .0,        .0);         (     -78.6,       1.3,        .0,        .0);
   (     -89.3,       1.3,        .0,        .0);         (     -89.3,      21.3,        .0,        .0);
   (     -89.3,      41.3,        .0,        .0);         (     -89.3,      61.3,        .0,        .0);
   (     -89.3,      81.3,        .0,        .0);         (     -89.3,     100.4,        .0,        .0);
   (     -69.3,     100.3,        .0,        .0);         (     -49.3,     100.3,        .0,        .0);
   (     -29.3,     100.3,        .0,        .0);         (      -9.3,     100.3,        .0,        .0);
   (       1.4,     100.4,        .0,        .0);         (       1.4,      80.3,        .0,        .0);
   (       1.4,      60.3,        .0,        .0);         (       1.4,      40.3,        .0,        .0);
   (       1.4,      20.3,        .0,        .0);         (       1.4,       1.3,        .0,        .0);

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1991MET DATA                                                ***          15:13:36
                                                                                                                        PAGE   7
 **MODELOPTs: CONC                                URBAN  FLAT           DFAULT

                  * SOURCE-RECEPTOR COMBINATIONS FOR WHICH CALCULATIONS MAY NOT BE PERFORMED *
                       LESS THAN 1.0 METER OR 3*ZLB IN DISTANCE, OR WITHIN OPEN PIT SOURCE


                           SOURCE         - - RECEPTOR LOCATION - -          DISTANCE
                             ID          XR (METERS)    YR (METERS)          (METERS)
                         - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
                    STACK1                    1.4          20.3            9.81

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1991MET DATA                                                  ***          15:13:36
                                                                                                                         PAGE   8
 **MODELOPTs: CONC                                 URBAN  FLAT          DFAULT

                                     *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                       (1=YES; 0=NO)

               1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
               1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
               1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
               1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
               1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
               1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
               1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
               1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1

                    METEOROLOGICAL DATA PROCESSED BETWEEN START DATE:  91  1  1  1
                                                        AND END DATE:  91 12 31 24

               NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                                 *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                        (METERS/SEC)

                                          1.54,   3.09,   5.14,   8.23,  10.80,

                                            *** WIND PROFILE EXPONENTS ***

               STABILITY                                WIND SPEED CATEGORY
               CATEGORY         1              2              3              4              5              6
                   A       .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00
                   B       .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00
                   C       .20000E+00     .20000E+00     .20000E+00     .20000E+00     .20000E+00     .20000E+00
                   D       .25000E+00     .25000E+00     .25000E+00     .25000E+00     .25000E+00     .25000E+00
                   E       .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00
                   F       .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00

                                    *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                                                 (DEGREES KELVIN PER METER)

               STABILITY                                WIND SPEED CATEGORY
```

```
              CATEGORY        1              2              3              4              5              6
                 A      .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
                 B      .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
                 C      .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
                 D      .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
                 E      .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01
                 F      .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01

 *** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1991MET DATA                                                ***        15:13:36
                                                                                                                      PAGE   9
 **MODELOPTs: CONC                           URBAN  FLAT          DFAULT


                   *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

           FILE: C:\TRINITY\SUITE\MET\PHXTUS91.BIN          FORMAT: UNFORM
           SURFACE STATION NO.:  23183                      UPPER AIR STATION NO.:  23160
                         NAME: UNKNOWN                                          NAME: UNKNOWN
                         YEAR:    1991                                          YEAR:    1991

                                    FLOW    SPEED   TEMP     STAB   MIXING HEIGHT (M)    USTAR  M-O LENGTH    Z-0 IPCODE PRATE
           YEAR  MONTH  DAY  HOUR  VECTOR   (M/S)    (K)     CLASS   RURAL    URBAN      (M/S)     (M)        (M)        (mm/HR)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 - - - - - - -

            91     1     1     1     51.0   1.00   282.6      7    1455.6    121.0      .0000        .0   .0000   0    .00
            91     1     1     2     58.0   2.06   281.5      6    1438.6    121.0      .0000        .0   .0000   0    .00
            91     1     1     3     84.0   1.00   280.9      7    1421.7    121.0      .0000        .0   .0000   0    .00
            91     1     1     4     63.0   1.00   280.4      7    1404.7    121.0      .0000        .0   .0000   0    .00
            91     1     1     5     63.0   1.00   279.3      7    1387.7    121.0      .0000        .0   .0000   0    .00
            91     1     1     6     62.0   1.00   279.3      7    1370.8    121.0      .0000        .0   .0000   0    .00
            91     1     1     7    295.0   1.54   279.8      6    1353.8    121.0      .0000        .0   .0000   0    .00
            91     1     1     8    283.0   3.09   281.5      5      74.7    188.4      .0000        .0   .0000   0    .00
            91     1     1     9    217.0   2.06   282.0      4     268.1    362.9      .0000        .0   .0000   0    .00
            91     1     1    10     91.0   2.06   283.2      4     461.5    537.3      .0000        .0   .0000   0    .00
            91     1     1    11    124.0   1.54   286.5      3     654.9    711.7      .0000        .0   .0000   0    .00
            91     1     1    12     46.0   2.06   288.2      4     848.2    886.1      .0000        .0   .0000   0    .00
            91     1     1    13     73.0   1.54   288.7      3    1041.6   1060.6      .0000        .0   .0000   0    .00
            91     1     1    14    339.0   1.54   290.4      2    1235.0   1235.0      .0000        .0   .0000   0    .00
            91     1     1    15    242.0   3.60   293.2      3    1235.0   1235.0      .0000        .0   .0000   0    .00
            91     1     1    16    254.0   2.57   293.2      4    1235.0   1235.0      .0000        .0   .0000   0    .00
            91     1     1    17    281.0   2.06   293.2      4    1235.0   1235.0      .0000        .0   .0000   0    .00
            91     1     1    18    277.0   1.00   290.4      5    1240.6   1134.8      .0000        .0   .0000   0    .00
            91     1     1    19     74.0   2.06   288.7      6    1250.5    957.5      .0000        .0   .0000   0    .00
            91     1     1    20     67.0   1.00   287.0      7    1260.4    780.2      .0000        .0   .0000   0    .00
            91     1     1    21    270.0   1.54   285.4      7    1270.4    602.9      .0000        .0   .0000   0    .00
            91     1     1    22    342.0   2.57   284.8      6    1280.3    425.6      .0000        .0   .0000   0    .00
            91     1     1    23    340.0   1.00   283.7      6    1290.2    248.3      .0000        .0   .0000   0    .00
            91     1     1    24     70.0   1.54   283.2      6    1300.1     71.0      .0000        .0   .0000   0    .00
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*** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
            FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                   ***  RUN3-1991MET DATA                                                 ***       : 15:13:36
                                                                                                                     PAGE  10
**MODELOPTs: CONC                               URBAN  FLAT           DFAULT

                              *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL        ***
                                  INCLUDING SOURCE(S):        STACK1  ,

                                   *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                      ** CONC OF TCE       IN MICROGRAMS/M**3                              **

 DIRECTION |                                           DISTANCE (METERS)
 (DEGREES) |       50.00       100.00       150.00      200.00      250.00      300.00      400.00      500.00      600.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.00 |       .47663      .16356       .08366      .05102      .03424      .02451      .01432      .00941      .00668
     10.00 |       .42781      .14096       .07486      .04650      .03148      .02266      .01334      .00880      .00627
     20.00 |       .51428      .16778       .08822      .05448      .03668      .02626      .01532      .01005      .00711
     30.00 |       .71719      .25810       .13661      .08439      .05696      .04093      .02409      .01593      .01138
     40.00 |      1.05158      .42153       .22621      .14002      .09459      .06799      .04003      .02649      .01894
     50.00 |      1.34015      .60753       .33659      .21228      .14542      .10561      .06307      .04214      .03032
     60.00 |      1.43462      .69327       .39584      .25443      .17670      .12975      .07870      .05314      .03853
     70.00 |      1.38398      .69570       .39542      .25376      .17626      .12960      .07882      .05332      .03871
     80.00 |      1.20673      .66388       .38388      .24675      .17127      .12579      .07639      .05162      .03744
     90.00 |       .97744      .55747       .33366      .21883      .15383      .11396      .07001      .04767      .03477
    100.00 |       .00844      .44969       .26866      .17615      .12383      .09173      .05630      .03829      .02788
    110.00 |       .66647      .37498       .22708      .15002      .10580      .07853      .04830      .03287      .02395
    120.00 |       .53486      .29672       .18102      .12047      .08539      .06361      .03930      .02682      .01956
    130.00 |       .40839      .22984       .14158      .09443      .06702      .04996      .03090      .02110      .01540
    140.00 |       .28992      .16022       .09866      .06589      .04681      .03492      .02161      .01476      .01077
    150.00 |       .20477      .10651       .06459      .04277      .03021      .02243      .01376      .00932      .00676
    160.00 |       .16519      .08753       .05449      .03664      .02612      .01952      .01208      .00825      .00601
    170.00 |       .15727      .08544       .05363      .03630      .02600      .01947      .01209      .00826      .00602
    180.00 |       .16415      .09594       .06299      .04373      .03182      .02410      .01521      .01052      .00775
    190.00 |       .17783      .10805       .07059      .04854      .03501      ,02635      .01647      .01132      .00830
    200.00 |       .17844      .10978       .07164      .04926      .03552      .02672      .01670      .01147      .00841
    210.00 |       .17974      .11970       .07957      .05552      .04038      .03054      .01921      .01324      .00973
    220.00 |       .20041      .13765       .09097      .06358      .04633      .03510      .02210      .01524      .01120
    230.00 |       .24732      .17183       .11381      .07934      .05767      .04357      .02731      .01877      .01376
    240.00 |       .32570      .22438       .14593      .10078      .07307      .05519      .03464      .02382      .01745
    250.00 |       .47188      .36164       .23996      .16620      .12070      .09128      .05744      .03962      .02913
    260.00 |       .78999      .59242       .36683      .24616      .17575      .13160      .08185      .05605      .04099
    270.00 |      1.26399      .87379       .53161      .35251      .24966      .18589      .11485      .07841      .05729
    280.00 |      1.79286     1.09654       .60670      .38359      .26428      .19316      .11652      .07832      .05658
    290.00 |      2.03764     1.07347       .59545      .38077      .26484      .19484      .11852      .08014      .05818
    300.00 |      1.96373     1.01009       .55366      .34990      .24059      .17525      .10498      .07023      .05057
    310.00 |      1.90926      .88692       .47169      .28970      .19524      .14040      .08294      .05512      .03956
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 320.00 |     2.23840      .72143      .34519      .20102      .13135      .09260      .05337      .03492      .02477
 330.00 |     1.50122      .45326      .21598      .12576      .08226      .05805      .03351      .02194      .01556
 340.00 |      .96199      .31489      .15359      .09020      .05917      .04181      .02413      .01578      .01118
 350.00 |      .67812      .23501      .11597      .06898      .04561      .03238      .01880      .01234      .00876

*** ISCST3 - VERSION 96113 ***    ***  NIBN REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                   ***  RUN3-1991MET DATA                                                  ***        15:13:36
                                                                                                                      PAGE  11
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                              *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL      ***
                                  INCLUDING SOURCE(S):      STACK1   ,

                                *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                    ** CONC OF TCE      IN MICROGRAMS/M**3                              **

 DIRECTION |                                           DISTANCE (METERS)
 (DEGREES) |      800.00      1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.00 |       .00390      .00257
    10.00 |       .00368      .00245
    20.00 |       .00414      .00273
    30.00 |       .00673      .00451
    40.00 |       .01122      .00752
    50.00 |       .01812      .01222
    60.00 |       .02326      .01579
    70.00 |       .02339      .01587
    80.00 |       .02259      .01531
    90.00 |       .02115      .01442
   100.00 |       .01689      .01147
   110.00 |       .01453      .00988
   120.00 |       .01188      .00807
   130.00 |       .00936      .00637
   140.00 |       .00654      .00444
   150.00 |       .00406      .00273
   160.00 |       .00365      .00247
   170.00 |       .00365      .00247
   180.00 |       .00478      .00329
   190.00 |       .00507      .00347
   200.00 |       .00514      .00351
   210.00 |       .00598      .00410
   220.00 |       .00686      .00469
   230.00 |       .00841      .00574
   240.00 |       .01064      .00724
   250.00 |       .01788      .01226
   260.00 |       .02497      .01702
   270.00 |       .03496      .02392
   280.00 |       .03395      .02292
   290.00 |       .03520      .02395
   300.00 |       .03023      .02038
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       310.00 |         .02359        .01590
       320.00 |       . .01450        .00963
       330.00 |         .00912        .00606
       340.00 |         .00652        .00432
       350.00 |         .00513        .00341

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1991MET DATA                                                 ***          15:13:36
                                                                                                                         PAGE  12
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                                *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL        ***
                                    INCLUDING SOURCE(S):       STACK1  ,

                                              *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                         ** CONC OF TCE       IN MICROGRAMS/M**3                         **

        X-COORD (M)   Y-COORD (M)        CONC                         X-COORD (M)   Y-COORD (M)        CONC
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
            -18.55          1.33        .54244                            -38.55          1.33        1.32105
            -50.55          1.33       1.30079                            -78.55          1.33        1.12579
            -89.33          1.33       1.00808                            -89.33         21.33        1.22675
            -89.33         41.33       1.09163                            -89.33         61.33         .82945
            -89.33         81.33        .65432                            -89.33        100.40         .45834
            -69.33        100.34        .38225                            -49.33        100.34         .32511
            -29.33        100.34        .25804                             -9.33        100.34         .19576
              1.45        100.40        .15869                              1.45         80.34         .22503
              1.45         60.34        .34919                              1.45         40.34         .58309
              1.45         20.34        .00000                              1.45          1.33         .27332

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1991MET DATA                                                 ***          15:13:36
                                                                                                                         PAGE  13
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                                *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                    INCLUDING SOURCE(S):       STACK1  ,

                                      *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                         ** CONC OF TCE       IN MICROGRAMS/M**3                         **

 DIRECTION |                                         DISTANCE (METERS)
 (DEGREES) |          50.00                100.00               150.00               200.00               250.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

      360.0 |     24.36581 (91010812)   13.56883 (91081623)   9.64676 (91022120)   7.68929 (91092222)   5.84882 (91092222)
       10.0 |     23.40727 (91111109)   13.36495 (91102120)   9.98537 (91090403)   7.85606 (91090403)   5.90691 (91090403)
       20.0 |     23.22637 (91120216)   14.24456 (91042102)   9.76329 (91051622)   7.63569 (91040906)   5.73412 (91040906)
       30.0 |     22.60644 (91111917)   13.56980 (91092304)   9.97248 (91052224)   7.64432 (91052224)   5.81977 (91102504)
       40.0 |     22.49082 (91031613)   13.65091 (91080806)   9.92671 (91040903)   7.64967 (91040903)   5.74691 (91072323)
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   50.0 |     21.59016 (91032510)     13.33758 (91042421)     9.88954 (91120922)     7.55136 (91042223)     5.69485 (91041823,
   60.0 |     21.13282 (91010611)     13.02201 (91040721)     9.74602 (91102423)     7.43886 (91051223)     5.61090 (91081823)
   70.0 |     19.94218 (91010407)     12.75560 (91040901)     9.61168 (91061505)     7.21912 (91061505)     5.45513 (91101006)
   80.0 |     19.46526 (91021615)     12.41139 (91051723)     9.43517 (91042401)     7.26254 (91042401)     5.47059 (91071706)
   90.0 |     19.25361 (91022217)     12.24838 (91040320)     9.37504 (91110319)     7.14474 (91110319)     5.31983 (91110319)
  100.0 |     18.70875 (91102318)     12.08138 (91051121)     9.22925 (91060221)     6.91533 (91083107)     5.31831 (91083107)
  110.0 |     18.62768 (91041106)     11.91345 (91020419)     9.27317 (91020420)     6.90167 (91062621)     5.29151 (91051524)
  120.0 |     18.04079 (91072402)     11.74279 (91060923)     9.08126 (91060101)     6.90976 (91063022)     5.24674 (91063022)
  130.0 |     18.18354 (91042721)     11.66165 (91090420)     9.06561 (91061720)     6.86808 (91061720)     5.19162 (91061720)
  140.0 |     17.41787 (91030209)     11.65218 (91091502)     8.83946 (91022619)     6.56554 (91022619)     4.91497 (91022619)
  150.0 |     17.13722 (91060719)     11.26524 (91072003)     9.05000 (91111118)     6.81813 (91111118)     5.16237 (91111118)
  160.0 |     15.93722 (91090519)     10.55284 (91090519)     9.00618 (91061003)     6.80598 (91061003)     5.16540 (91061003)
  170.0 |     16.92985 (91011602)     11.40424 (91061122)     8.92948 (91060901)     6.77518 (91060901)     5.15141 (91060901)
  180.0 |     17.52737 (91112918)     11.63958 (91080603)     9.09937 (91042723)     6.83025 (91070605)     5.18722 (91070605)
  190.0 |     18.39828 (91103018)     11.68351 (91090406)     9.04517 (91072704)     6.80755 (91060501)     5.19619 (91060501)
  200.0 |     17.37808 (91070719)     11.75371 (91052401)     9.05907 (91021422)     6.94314 (91021422)     5.26633 (91021422)
  210.0 |     18.36891 (91102918)     11.83782 (91072005)     9.28593 (91013119)     6.91953 (91061121)     5.28839 (91061121)
  220.0 |     18.75547 (91072009)     11.75531 (91111002)     9.00127 (91032922)     6.91504 (91071303)     5.32024.(91071303)
  230.0 |     19.65215 (91010109)     12.29707 (91121619)     9.38478 (91062301)     7.11764 (91091805)     5.40767 (91091805)
  240.0 |     19.84224 (91091007)     12.41943 (91083102)     9.46673 (91021604)     7.27725 (91042504)     5.48608 (91101306)
  250.0 |     20.57755 (91010409)     12.65408 (91082802)     9.42711 (91050506)     7.33672 (91082503)     5.56705 (91110803)
  260.0 |     20.87354 (91102107)     12.93187 (91041603)     9.60704 (91080503)     7.40900 (91042304)     5.63794 (91042304)
  270.0 |     21.66319 (91010116)     13.36974 (91062805)     9.87511 (91021222)     7.57213 (91042104)     5.71003 (91022423)
  280.0 |     22.64416 (91012509)     13.76628 (91060207)     9.95970 (91060205)     7.64383 (91043001)     5.75041 (91072804)
  290.0 |     23.17076 (91121010)     13.91405 (91100402)     9.95726 (91091401)     7.72882 (91092905)     5.80549 (91062704)
  300.0 |     23.85693 (91031208)     14.31623 (91040507)    10.09683 (91051005)     7.79780 (91031023)     5.89353 (91031023)
  310.0 |     32.04035 (91021106)     23.81236 (91093007)    15.11415 (91111224)     9.96071 (91111224)     6.90911 (91111224)
  320.0 |     51.97174 (91103019)     24.30284 (91021023)    15.25247 (91051923)     9.97219 (91071305)     6.94686 (91071305)
  330.0 |     52.83679 (91020105)     24.45811 (91121622)    14.72492 (91021602)     9.71823 (91021602)     6.77782 (91021602)
  340.0 |     51.10080 (91010122)     23.33722 (91100205)    15.14841 (91071622)     9.92101 (91071622)     6.88934 (91071622)
  350.0 |     51.50507 (91062724)     24.35726 (91081622)    13.70820 (91111622)     9.29348 (91111622)     6.55144 (91112206)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                   ***  RUN3-1991MET DATA                                                ***          15:13:36
                                                                                                                      PAGE  14
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                              *** THE  1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL        ***
                                  INCLUDING SOURCE(S):      STACK1  ,

                                  *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                      ** CONC OF TCE      IN MICROGRAMS/M**3                            **

DIRECTION |                                          DISTANCE (METERS)
(DEGREES) |         300.00                  400.00                  500.00                  600.00                 800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  360.0 |      4.51552 (91092222)      2.90343 (91092222)      2.03598 (91092222)      1.52107 (91092222)       .96424 (91052421)
   10.0 |      4.52085 (91090403)      2.87082 (91090403)      1.99553 (91090403)      1.48084 (91090403)       .93003 (91042601)
   20.0 |      4.37615 (91040906)      2.82744 (91083124)      1.99799 (91083124)      1.49943 (91083124)       .95521 (91083124)
   30.0 |      4.48858 (91102504)      2.87155 (91102504)      2.00233 (91102504)      1.48813 (91102504)      1.04665 (91102714)
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   40.0 |      4.44097 (91030321)      2.85584 (91030321)      2.00407 (91120921)      1.50241 (91120921)       .95489 (91120921)
   50.0 |      4.94733 (91010101)      3.61323 (91010101)      2.70025 (91010101)      2.09234 (91010101)      1.37825 (91010101)
   60.0 |      4.32422 (91081823)      2.80700 (91042323)      1.97271 (91042323)      1.47300 (91042323)       .93814 (91122121)
   70.0 |      4.26897 (91101006)      2.77990 (91101006)      1.95771 (91101006)      1.47288 (91073021)       .94215 (91073021)
   80.0 |      4.22424 (91071706)      2.72947 (91121007)      1.94080 (91051724)      1.46423 (91051724)       .93788 (91051724)
   90.0 |      4.08136 (91062001)      2.70522 (91062001)      1.92932 (91062001)      1.45632 (91062001)       .93370 (91062001)
  100.0 |      4.14820 (91083107)      2.70341 (91083107)      1.92141 (91051504)      1.45023 (91051504)       .93010 (91051504)
  110.0 |      4.11571 (91051524)      2.68461 (91022421)      1.91205 (91022421)      1.44318 (91022421)       .92598 (91022421)
  120.0 |      4.07250 (91063022)      2.67086 (91101918)      1.90151 (91101918)      1.43538 (91101918)       .92149 (91101918)
  130.0 |      4.02364 (91061720)      2.62917 (91051501)      1.87952 (91051501)      1.42350 (91051501)       .91843 (91051501)
  140.0 |      3.78733 (91022619)      2.53753 (91013022)      1.82724 (91013022)      1.38930 (91013022)       .89957 (91013022)
  150.0 |      4.01445 (91111118)      2.62866 (91111118)      1.87056 (91111118)      1.41277 (91111118)       .90843 (91111118)
  160.0 |      4.02424 (91061003)      2.64222 (91061003)      1.88386 (91061003)      1.42496 (91061003)       .91839 (91061003)
  170.0 |      4.01721 (91060901)      2.64001 (91060901)      1.88303 (91060901)      1.42461 (91060901)       .91833 (91060901)
  180.0 |      4.03850 (91070605)      2.64570 (91070605)      1.88224 (91070605)      1.42371 (91093022)       .91818 (91093022)
  190.0 |      4.05444 (91060501)      2.66000 (91060501)      1.89274 (91060501)      1.42872 (91060501)       .91806 (91091804)
  200.0 |      4.08485 (91021422)      2.65423 (91021422)      1.87711 (91051505)      1.42292 (91051505)       .91869 (91051505)
  210.0 |      4.11497 (91061121)      2.67880 (91061121)      1.89237 (91061121)      1.42156 (91101824)       .91868 (91101824)
  220.0 |      4.15033 (91071303)      2.70498 (91071303)      1.92073 (91041821)      1.44994 (91041821)       .93005 (91041821)
  230.0 |      4.19414 (91040223)      2.73354 (91040223)      1.92872 (91040223)      1.45011 (91110501)       .93115 (91110501)
  240.0 |      4.23390 (91101306)      2.75490 (91061202)      1.94285 (91061202)      1.46548 (91111321)       .93844 (91111321)
  250.0 |      4.29195 (91110803)      2.78014 (91092902)      1.95796 (91092902)      1.47005 (91013118)       .94100 (91013118)
  260.0 |      4.33979 (91042304)      2.80551 (91083105)      1.97204 (91083105)      1.47265 (91083105)       .93379 (91112318)
  270.0 |      4.38323 (91022423)      2.82992 (91070306)      1.98446 (91070306)      1.47967 (91070306)       .94350 (91030901)
  280.0 |      4.40358 (91072804)      2.83834 (91021321)      2.00437 (91021321)      1.50257 (91021321)       .95495 (91021321)
  290.0 |      4.48032 (91062704)      2.86804 (91062704)      2.01776 (91090802)      1.50977 (91090802)       .95756 (91090802)
  300.0 |      4.52275 (91031023)      2.89416 (91061605)      2.03030 (91061605)      1.51616 (91061605)       .95962 (91061605)
  310.0 |      5.08605 (91021205)      3.12036 (91021205)      2.13721 (91021205)      1.57459 (91021205)       .98259 (91102122)
  320.0 |      5.10887 (91071305)      3.12393 (91071305)      2.13663 (91071305)      1.57580 (91100803)       .98649 (91100803)
  330.0 |      4.99297 (91021602)      3.06256 (91021602)      2.09966 (91021602)      1.54865 (91021602)       .96825 (91021602)
  340.0 |      5.06111 (91071622)      3.09407 (91071622)      2.11721 (91071622)      1.55965 (91071622)       .97365 (91071622)
  350.0 |      4.90102 (91112206)      3.05229 (91112206)      2.10778 (91112206)      1.56108 (91112206)       .98055 (91112206)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                       ***  RUN3-1991MET DATA                                              ***         15:13:36
                                                                                                                       PAGE  15
 **MODELOPTs: CONC                                 URBAN  FLAT          DFAULT

                                  *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                      INCLUDING SOURCE(S):      STACK1  ,

                                       *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                          ** CONC OF TCE       IN MICROGRAMS/M**3                               **

 DIRECTION |                                               DISTANCE (METERS)
 (DEGREES) |         1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |       .68205 (91092222)
    10.0 |       .65946 (91042601)
    20.0 |       .67739 (91083124)
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  30.0 |       .84394 (91102714)
  40.0 |       .75734 (91102714)
  50.0 |       .99337 (91010101)
  60.0-|       .66715 (91122121)
  70.0 |       .66908 (91073021)
  80.0 |       .66664 (91051724)
  90.0 |       .66414 (91062001)
 100.0 |       .66186 (91051504)
 110.0 |       .65924 (91022421)
 120.0 |       .65682 (91110320)
 130.0 |       .65660 (91051501)
 140.0 |       .64390 (91013022)
 150.0 |       .64804 (91111118)
 160.0 |       .65634 (91061003)
 170.0 |       .65633 (91060901)
 180.0 |       .65634 (91093022)
 190.0 |       .65641 (91091804)
 200.0 |       .65692 (91051605)
 210.0 |       .65712 (91101824)
 220.0 |       .66186 (91041821)
 230.0 |       .66284 (91110501)
 240.0 |       .66695 (91111321)
 250.0 |       .66850 (91013118)
 260.0 |       .66573 (91042309)
 270.0 |       .66993 (91030901)
 280.0 |       .67572 (91021321)
 290.0 |       .67686 (91090802)
 300.0 |       .67762 (91061605)
 310.0 |       .69140 (91102122)
 320.0 |       .69339 (91100803)
 330.0 |       .67987 (91021602)
 340.0 |       .68305 (91071622)
 350.0 |       .69037 (91112206)

*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    *** RUN3-1991MET DATA                                                ***         15:13:36
                                                                                                                     PAGE  16
 **MODELOPTs: CONC                               URBAN  FLAT          DFAULT

                               *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                   INCLUDING SOURCE(S):      STACK1  ,

                                            *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                        ** CONC OF TCE      IN MICROGRAMS/M**3                   **

   X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)              X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
       -18.55         1.33       30.06836  (91110312)                 -38.55         1.33       25.40216  (91060116)
       -58.55         1.33       19.93713  (91012008)                 -78.55         1.33       16.56881  (91021605)
       -89.33         1.33       14.88584  (91062805)                 -89.33        21.33       15.07252  (91021324)
       -89.33        41.33       14.24342  (91101205)                 -89.33        61.33       13.16190  (91032921)
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        -89.33        81.33        19.72770  (91021205)                 -89.33       100.40       17.31795  (91092304)
        -69.33       100.34        19.31546  (91090324)                 -49.33       100.34       21.08995  (91111319)
        -29.33       100.34        22.98577  (91082203)                  -9.33       100.34       21.67543  (91112423)
          1.45       100.40        13.68935  (91081623)                   1.45        80.34       15.99259  (91012210)
          1.45        60.34        21.29215  (91121919)                   1.45        40.34       29.25046  (91082712)
          1.45        20.34          .00000  (91010101)                   1.45         1.33       26.56471  (91092215)

*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***      03/27/97
                                   ***  RUN3-1991MET DATA                                                  ***      15:13:36
                                                                                                                    PAGE  17
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                              *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                  INCLUDING SOURCE(S):      STACK1   ,

                                 *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                     ** CONC OF TCE       IN MICROGRAMS/M**3                          **

DIRECTION |                                             DISTANCE (METERS)
(DEGREES) |          50.00                100.00                150.00                200.00                250.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |      7.57448 (91030124)    2.27362 (91030124)     .98754 (91030124)     .54533 (91030124)     .34548 (91030124)
    10.0 |      4.88153 (91030124)    1.68880 (91030124)     .78254 (91030124)     .44551 (91030124)     .30740c(91040424)
    20.0 |      4.16456 (91111424)    1.09353 (91030124)     .82085c(91013124)     .60018c(91013124)     .42789c(91013124)
    30.0 |      4.06379 (91031924)    1.67651c(91102724)    1.11243c(91102724)     .77784c(91102724)     .59000c(91012524)
    40.0 |      5.71210c(91010624)    2.39097 (91031424)    1.06275c(91120924)     .78260c(91120924)     .56845c(91120924)
    50.0 |      9.18296c(91010624)    3.05926c(91010624)    1.75232c(91122124)    1.16578c(91122124)     .82158c(91122124)
    60.0 |      9.30913c(91010624)    4.46120c(91010624)    2.15696c(91010624)    1.42088c(91122124)    1.08147c(91122124)
    70.0 |      7.46025c(91030624)    4.11768c(91010624)    2.25740c(91010624)    1.37238c(91010624)     .99162c(91012224)
    80.0 |      6.57710c(91070624)    2.71130c(91072624)    1.63342c(91072624)    1.10722c(91122524)     .83647c(91122524)
    90.0 |      4.67293c(91070624)    2.59987c(91062124)    1.60131c(91072724)    1.07608c(91072724)     .76401c(91072724)
   100.0 |      3.70351c(91080124)    1.87935c(91071124)    1.20492c(91070824)     .80730c(91070824)     .56963c(91112024)
   110.0 |      3.04980c(91092224)    2.19527 (91102424)    1.22750 (91102424)     .80587c(91070824)     .60274c(91070824)
   120.0 |      3.30297 (91121924)    1.54645c(91112024)    1.16673c(91112024)     .85587c(91112024)     .63524c(91112024)
   130.0 |      2.88915 (91121924)    1.53562c(91081124)    1.03447c(91042324)     .73312c(91042324)     .53770c(91042324)
   140.0 |      2.05384c(91031024)    1.73736c(91052824)    1.18650c(91052824)     .81631c(91052824)     .58939c(91052824)
   150.0 |      1.64415c(91031024)    1.12306c(91111124)     .90897c(91111124)     .66838c(91111124)     .49861c(91111124)
   160.0 |      2.25010c(91083124)     .96801c(91062624)     .79641c(91062624)     .59286c(91062624)     .44622c(91062624)
   170.0 |      2.78276c(91083124)    1.03655c(91083124)     .64128c(91060924)     .45324c(91112324)     .33734c(91112324)
   180.0 |      2.33367c(91083124)     .99354c(91121224)     .84597c(91121224)     .64801c(91121224)     .49524c(91121224)
   190.0 |      1.99661c(91061024)     .92865c(91100724)     .67671c(91021924)     .53084c(91021924)     .40829c(91021924)
   200.0 |      1.73581c(91061024)    1.40274c(91111024)     .91170c(91111024)     .66255c(91101224)     .51716c(91101224)
   210.0 |      2.19524c(91111024)    1.33091c(91101224)    1.03115c(91101224)     .72594 (91042124)     .55322 (91042124)
   220.0 |      2.50418c(91072024)    1.62321c(91010424)     .97853c(91010424)     .64505c(91010424)     .46636c(91010424)
   230.0 |      4.13473c(91010424)    2.22045c(91010424)    1.19312c(91060124)     .75795c(91060124)     .58184c(91112024)
   240.0 |      4.43507c(91010424)    2.06385c(91060124)    1.09311c(91060124)     .66991c(91112324)     .44665c(91112024)
   250.0 |      4.47012c(91112324)    2.26349 (91111224)    1.39750 (91111224)     .93406c(91022024)     .69559c(91022024)
   260.0 |      5.89900 (91111224)    3.22063 (91111224)    1.75137 (91122724)    1.09119 (91122724)     .76428c(91112124)
   270.0 |      8.05801 (91122724)    3.38896 (91122724)    1.93463c(91100324)    1.24381c(91100324)     .89855c(91111624)
   280.0 |      8.27123 (91122724)    3.68273c(91021324)    2.39655c(91021324)    1.63634c(91021324)    1.17817c(91021324)
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  290.0 |      6.32114c(91101024)      4.17298c(91112724)      2.62353c(91101524)      1.74954c(91101524)      1.26352c(91012724)
  300.0 |      7.58254c(91122224)      4.07692c(91122224)      2.09096c(91110824)      1.38482c(91110524)      1.02930c(91110524)
  310.0 |      9.35843 (91091924)      4.35383c(91111324)      2.53061c(91111324)      1.64343c(91111324)      1.14279c(91111324)
  320.0 |     11.75501c(91122824)      4.16573c(91122824)      2.07847c(91111324)      1.25752c(91111324)       .83484c(91111324)
  330.0 |      9.39415c(91021124)      3.44918c(91021124)      1.62682c(91021124)       .95549c(91021124)       .63924c(91021124)
  340.0 |      6.80989c(91113024)      2.41015c(91113024)      1.43679c(91121624)       .95219c(91121624)       .66523c(91121624)
  350.0 |      5.19925 (91030124)      1.87245c(91111624)      1.42234c(91111624)       .97201c(91111624)       .68771c(91111624)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1991MET DATA                                                      ***        15:13:36
                                                                                                                           PAGE  18
**MODELOPTs: CONC                              URBAN  FLAT            DFAULT

                              *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                  *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                      ** CONC OF TCE       IN MICROGRAMS/M**3                            **

 DIRECTION |                                            DISTANCE (METERS)
 (DEGREES) |          300.00                  400.00                  500.00                  600.00                  800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  360.0 |        .23882 (91030124)       .15667c(91111524)       .11134c(91111524)       .08349c(91111524)       .05263c(91111524)
   10.0 |        .23084c(91040424)       .14291c(91040424)       .09762c(91040424)       .07377c(91120724)       .04753c(91120724)
   20.0 |        .31423c(91013124)       .18744c(91013124)       .12422c(91013124)       .09084c(91032424)       .05503c(91032424)
   30.0 |        .47070c(91012524)       .31294c(91012524)       .22282c(91012524)       .16778c(91012524)       .10708c(91012524)
   40.0 |        .45713c(91102724)       .32347c(91102724)       .24431c(91102724)       .19396c(91102724)       .13537c(91102724)
   50.0 |        .60356c(91122124)       .38947c(91041224)       .27373c(91041224)       .20429c(91041224)       .12863c(91041224)
   60.0 |        .83689c(91122124)       .53771c(91122124)       .37474c(91122124)       .27749c(91122124)       .17228c(91122124)
   70.0 |        .76171c(91012224)       .48417c(91012224)       .33461c(91012224)       .24588c(91012224)       .15033c(91012224)
   80.0 |        .64635c(91122524)       .41622c(91122524)       .29118c(91122524)       .21646c(91122524)       .13537c(91122524)
   90.0 |        .58098c(91112424)       .38383c(91112424)       .27294c(91112424)       .20532c(91112424)       .13062c(91112424)
  100.0 |        .43858c(91112024)       .28116c(91112024)       .19757c(91121324)       .15067c(91121324)       .09763c(91121324)
  110.0 |        .46489c(91070824)       .30044c(91070824)       .21129c(91070824)       .15781c(91070824)       .09936c(91070824)
  120.0 |        .48552c(91112024)       .30863c(91112024)       .21418c(91112024)       .15825c(91112024)       .09801c(91112024)
  130.0 |        .41094c(91042324)       .26351c(91042324)       .18505c(91042324)       .13839c(91042324)       .08765c(91042324)
  140.0 |        .44516c(91052824)       .28159c(91052824)       .19627c(91052824)       .14611c(91052824)       .09206c(91052824)
  150.0 |        .38355c(91111124)       .24709c(91111124)       .17359c(91111124)       .12966c(91111124)       .08178c(91111124)
  160.0 |        .34560c(91062624)       .22493c(91062624)       .15925c(91062624)       .11973c(91062624)       .07635c(91062624)
  170.0 |        .25905c(91112324)       .16642c(91112324)       .11666c(91112324)       .08697c(91112324)       .05469c(91112324)
  180.0 |        .38666c(91121224)       .25317c(91121224)       .17928c(91121224)       .13448c(91121224)       .08512c(91121224)
  190.0 |        .31915c(91021924)       .20859c(91021924)       .14733c(91021924)       .11029c(91021924)       .06964c(91021924)
  200.0 |        .40894c(91101224)       .27202c(91101224)       .19463c(91101224)       .14714c(91101224)       .09424c(91101224)
  210.0 |        .42923 (91042124)       .27793 (91042124)       .19541 (91042124)       .14599 (91042124)       .09219 (91042124)
  220.0 |        .35267c(91010424)       .22328c(91033024)       .15447c(91033024)       .11399c(91010424)       .07064c(91010424)
  230.0 |        .45758c(91112024)       .30063c(91112024)       .21270c(91112024)       .15931c(91112024)       .10063c(91112024)
  240.0 |        .32403c(91112024)       .20943c(91062924)       .15021c(91062924)       .11382c(91062924)       .07329c(91062924)
  250.0 |        .52757c(91022024)       .32921c(91022024)       .22518c(91022024)       .16468c(91022024)       .10070c(91022024)
  260.0 |        .59137c(91112124)       .37838c(91112124)       .26524c(91111624)       .20197c(91111624)       .12990c(91111624)
  270.0 |        .67824c(91111624)       .42155c(91111624)       .29137c(91043024)       .21598c(91043024)       .13501c(91043024)
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      280.0 |        .87918c(91021324)        .54142c(91021324)        .36816c(91021324)        .26841c(91021324)        .16367c(91021324)
      290.0 |        .97152c(91010724)        .64430c(91010724)        .45666c(91010724)        .34204c(91010724)        .21585c(91010724)
      300.0 |        .78379c(91110524)        .49532c(91110524)        .34335c(91110524)        .25425c(91110524)        .16899c(91110524)
      310.0 |        .83992c(91111324)        .51194c(91111324)        .34809c(91111324)        .25436c(91111324)        .15590c(91111324)
      320.0 |        .59364c(91111324)        .35308c(91110424)        .24291c(91110424)        .17951c(91110424)        .11237c(91110424)
      330.0 |        .46366c(91020124)        .28540c(91020124)        .19605c(91020124)        .14473c(91020124)        .09047c(91020124)
      340.0 |        .48991c(91121624)        .29970c(91121624)        .20477c(91121624)        .15049c(91121624)        .09345c(91121624)
      350.0 |        .51018c(91111624)        .31479c(91111624)        .21624c(91111624)        .15958c(91111624)        .09972c(91111624)

*** ISCST3 - VERSION 96113 ***     ***  NIBN REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                     ***  RUN3-1991MET DATA                                                  ***          15:13:36
                                                                                                                            PAGE  19
 **MODELOPTs: CONC                         URBAN  FLAT          DFAULT

                                 *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                     INCLUDING SOURCE(S):       STACK1  ,

                                      *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                          ** CONC OF TCE       IN MICROGRAMS/M**3                          **

 DIRECTION |                                              DISTANCE (METERS)
 (DEGREES) |          1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

      360.0 |        .03674c(91111524)
       10.0 |        .03385c(91120724)
       20.0 |        .03830c(91032424)
       30.0 |        .07590c(91012524)
       40.0 |        .10317c(91102724)
       50.0 |        .09015c(91041224)
       60.0 |        .11925c(91122124)
       70.0 |        .10237c(91012224)
       80.0 |        .09433c(91122524)
       90.0 |        .09216c(91112424)
      100.0 |        .06973c(91121324)
      110.0 |        .06949c(91070824)
      120.0 |        .06773c(91112024)
      130.0 |        .06177c(91042324)
      140.0 |        .06472c(91052824)
      150.0 |        .05734c(91111124)
      160.0 |        .05405c(91062624)
      170.0 |        .03826c(91112324)
      180.0 |        .05972c(91121224)
      190.0 |        .04883c(91021924)
      200.0 |        .06674c(91101224)
      210.0 |        .06479 (91042124)
      220.0 |        .04888c(91010424)
      230.0 |        .07058c(91112024)
      240.0 |        .05223c(91062924)
      250.0 |        .06908c(91022024)
      260.0 |        .09188c(91111624)
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  270.0 |       .09429c(91043024)
  280.0 |       .11219c(91021324)
  290.0 |       .15125c(91010724)
  300.0 |       .11127c(91110524)
  310.0 |       .10728c(91111324)
  320.0 |       .07886c(91110424)
  330.0 |       .06343c(91020124)
  340.0 |       .06521c(91121624)
  350.0 |       .06994c(91111624)
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1991MET DATA                                                  ***        15:13:36
                                                                                                                       PAGE  20
**MODELOPTs: CONC                                URBAN  FLAT          DEFAULT

                                  *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                      INCLUDING SOURCE(S):      STACK1  ,

                                                 *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                             ** CONC OF TCE      IN MICROGRAMS/M**3                          **

     X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)                X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        -18.55         1.33        5.12694c (91021924)                   -38.55         1.33        8.23845c (91122424)
        -58.55         1.33        7.57378  (91122724)                   -78.55         1.33        5.13466  (91122724)
        -89.33         1.33        4.10146  (91122724)                   -89.33        21.33        4.63290c (91112724)
        -89.33        41.33        4.34080c (91120724)                   -89.33        61.33        3.56291c (91122224)
        -89.33        81.33        3.80407c (91111324)                   -89.33       100.40        2.83428c (91111324)
        -69.33       100.34        2.61713c (91021124)                   -49.33       100.34        2.03513c (91020124)
        -29.33       100.34        2.14353c (91021524)                    -9.33       100.34        2.04803  (91030124)
          1.45       100.40        2.24258  (91030124)                     1.45        80.34        3.47399  (91030124)
          1.45        60.34        5.75205  (91030124)                     1.45        40.34        8.07173  (91030124)
          1.45        20.34         .00000c (91010124)                     1.45         1.33        3.94574c (91042824)
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                     ***  RUN3-1991MET DATA                                                  ***        15:13:36
                                                                                                                       PAGE  21
**MODELOPTs: CONC                                URBAN  FLAT          DEFAULT

                                              *** THE SUMMARY OF MAXIMUM PERIOD (  8760 HRS) RESULTS ***

                                             ** CONC OF TCE      IN MICROGRAMS/M**3                          **

                                                                                                      NETWORK
GROUP ID                       AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV, ZFLAG)   OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      1ST HIGHEST VALUE IS       2.23840 AT (     -32.14,       38.30,       .00,        .00)  GP    POLR1
         2ND HIGHEST VALUE IS       2.03764 AT (     -46.98,       17.10,       .00,        .00)  GP    POLR1
```

```
 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                     ***  RUN3-1991MET DATA                                                    ***       15:13:36
                                                                                                                          PAGE  22
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                                      *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***


                                              ** CONC OF TCE      IN MICROGRAMS/M**3                          **

                                                           DATE                                                          NETWORK
 GROUP ID                                AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZFLAG)    OF TYPE  GRID-ID
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 ALL      HIGH  1ST HIGH VALUE IS      52.83679  ON 91020105: AT (     -25.00,       43.30,       .00,        .00)  GP   POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                     ***  RUN3-1991MET DATA                                                    ***       15:13:36
                                                                                                                          PAGE  23
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                                      *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***


                                              ** CONC OF TCE      IN MICROGRAMS/M**3                          **

                                                           DATE                                                          NETWORK
 GROUP ID                                AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZFLAG)    OF TYPE  GRID-ID
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 ALL      HIGH  1ST HIGH VALUE IS      11.75501c ON 91122824: AT (     -32.14,       38.30,       .00,        .00)  GP   POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

```
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                   ***  RUN3-1991MET DATA                                                   ***         15:13:36
                                                                                                                       PAGE  24
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of          0 Fatal Error Message(s)
A Total of          0 Warning Message(s)
A Total of       1052 Informational Message(s)

A Total of       1052 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
              ***  NONE  ***

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
1                     ISCST3 - (DATED 96113)

                  IBM-PC VERSION (3.05)     ISCST3R
        (C) COPYRIGHT 1992-1996, TRINITY CONSULTANTS, INC.

 Run Began on  3/27/1997 at 15:20:20

 ** BREEZE AIR SUITE (ISCST3) - C:\TRINITY\SUITE\EM72096.DAT
 ** Trinity Consultants Incorporated, Dallas, TX

 CO STARTING
 CO TITLEONE  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S
 CO TITLETWO  RUN3-1992MET DATA
 CO MODELOPT  DFAULT  CONC  URBAN
 CO AVERTIME  1  24  ANNUAL
 CO POLLUTID  TCE
 CO TERRHGTS  FLAT
 CO RUNORNOT  RUN
 CO FINISHED

 SO STARTING
 SO ELEVUNIT  METERS
 SO LOCATION  STACK1  POINT  -4.7  12.7  0
 ** SRCDESCR  AIR STRIPPER EXHAUST
 SO SRCPARAM  STACK1  1.574974E-02  4.8768  299.82  18.288  0.280416
 SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
 SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
 SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
 SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
 SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
 SO BUILDHGT  STACK1  7.62  7.62  7.62  7.62  7.62  4.27
 SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
 SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
 SO BUILDWID  STACK1  29.1  28.31  26.66  24.2  21.0  17.17
 SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
 SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
 SO BUILDWID  STACK1  63.61  55.73  46.15  35.17  23.12  17.17
 SO EMISUNIT  1.0E+06  GRAMS/SEC  MICROGRAMS/M**3
 SO SRCGROUP  ALL
 SO FINISHED

 RE STARTING
 RE GRIDPOLR POLR1 STA
 RE GRIDPOLR POLR1 ORIG  0  0
 RE GRIDPOLR POLR1 DIST 50  100  150  200  250  300  400  500  600  800
 RE GRIDPOLR POLR1 DIST 1000
 RE GRIDPOLR POLR1 DDIR  0  10  20  30  40  50  60  70  80  90  100  110
 RE GRIDPOLR POLR1 DDIR  120  130  140  150  160  170  180  190  200  210
 RE GRIDPOLR POLR1 DDIR  220  230  240  250  260  270  280  290  300  310
 RE GRIDPOLR POLR1 DDIR  320  330  340  350
 RE GRIDPOLR POLR1 END
 ** BOUNDARY
```

```
RE DISCCART  -18.55  1.33
RE DISCCART  -38.55  1.33
RE DISCCART  -58.55  1.33
RE DISCCART  -78.55  1.33
RE DISCCART  -89.33  1.33
RE DISCCART  -89.33  21.33
RE DISCCART  -89.33  41.33
RE DISCCART  -89.33  61.33
RE DISCCART  -89.33  81.33
RE DISCCART  -89.33  100.4
RE DISCCART  -69.33  100.34
RE DISCCART  -49.33  100.34
RE DISCCART  -29.33  100.34
RE DISCCART  -9.33  100.34
RE DISCCART  1.45  100.4
RE DISCCART  1.45  80.34
RE DISCCART  1.45  60.34
RE DISCCART  1.45  40.34
RE DISCCART  1.45  20.34
RE DISCCART  1.45  1.33
RE FINISHED

ME STARTING
ME INPUTFIL  C:\TRINITY\SUITE\MET\PHXTUS92.BIN  UNFORM
ME ANEMHGHT  10.0  METERS
ME SURFDATA  23183  1992
ME UAIRDATA  23160  1992
ME STARTEND  92  01  01  1  92  12  31  24
ME FINISHED

OU STARTING
OU RECTABLE  1  FIRST
OU RECTABLE  ALLAVE  FIRST
OU FINISHED

************************************
*** SETUP Finishes Successfully ***
************************************

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1992MET DATA                                              ***        15:20:21
                                                                                                                    PAGE   1
**MODELOPTs: CONC                            URBAN  FLAT           DFAULT

                                         ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
```

```
**Model Uses NO DRY DEPLETION.  DDPLETE = F
**Model Uses NO WET DEPLETION.  WDPLETE = F
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
           1. Final Plume Rise.
           2. Stack-tip Downwash.
           3. Buoyancy-induced Dispersion.
           4. Use Calms Processing Routine.
           5. Not Use Missing Data Processing Routine.
           6. Default Wind Profile Exponents.
           7. Default Vertical Potential Temperature Gradients.
           8. "Upper Bound" Values for Supersquat Buildings.
           9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR
    and Calculates ANNUAL Averages

**This Run Includes:     1 Source(s);       1 Source Group(s); and     416 Receptor(s)

**The Model Assumes A Pollutant Type of:  TCE

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    .0000     ;    Rot. Angle =       .0
                 Emission Units = GRAMS/SEC                               ;  Emission Rate Unit Factor =    .10000E+07
                 Output Units   = MICROGRAMS/M**3

**Input Runstream File: C:\TRINITY\SUITE\EM72096.DAT          ;  **Output Print File: C:\TRINITY\SUITE\EM72096.LST

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1992MET DATA                                                  ***          15:20:21
                                                                                                                         PAGE   2
**MODELOPTs: CONC                          URBAN  FLAT          DFAULT
```

```
                                          *** POINT SOURCE DATA ***

             NUMBER EMISSION RATE                          BASE     STACK   STACK    STACK     STACK    BUILDING EMISSION RATE
   SOURCE     PART. (USER UNITS)       X         Y         ELEV.    HEIGHT  TEMP.   EXIT VEL. DIAMETER   EXISTS   SCALAR VARY
     ID       CATS.                 (METERS)  (METERS)   (METERS)  (METERS) (DEG.K)  (M/SEC)  (METERS)                 BY
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  STACK1        0    .15750E-01      -4.7      12.7        .0      4.88   299.82    18.29      .28      YES
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                       PAGE   3
 **MODELOPTs: CONC                          URBAN  FLAT          DFAULT


                                      *** SOURCE IDs DEFINING SOURCE GROUPS ***

 GROUP ID                                                SOURCE IDs


  ALL        STACK1  ,
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                       PAGE   4
 **MODELOPTs: CONC                          URBAN  FLAT          DFAULT
                                      *** DIRECTION SPECIFIC BUILDING DIMENSIONS ***


 SOURCE ID: STACK1
  IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK
    1   4.3,   20.9, 0     2   4.3,   24.1, 0     3   4.3,   26.6, 0     4   4.3,   28.2, 0     5   4.3,   29.0, 0     6   4.3,   28.9, 0
    7   4.3,   28.0, 0     8   4.3,   26.2, 0     9   4.3,   23.6, 0    10   4.3,   26.2, 0    11   4.3,   28.0, 0    12   4.3,   29.0, 0
   13   4.3,   29.1, 0    14   4.3,   28.3, 0    15   4.3,   26.7, 0    16   4.3,   24.2, 0    17   4.3,   21.0, 0    18   4.3,   17.2, 0
   19   4.3,   20.9, 0    20   4.3,   24.1, 0    21   4.3,   26.6, 0    22   4.3,   28.2, 0    23   4.3,   29.0, 0    24   4.3,   28.9, 0
   25   4.3,   28.0, 0    26   4.3,   26.2, 0    27   4.3,   23.6, 0    28   4.3,   26.2, 0    29   4.3,   28.0, 0    30   4.3,   29.0, 0
   31   7.6,   63.6, 0    32   7.6,   55.7, 0    33   7.6,   46.1, 0    34   7.6,   35.2, 0    35   7.6,   23.1, 0    36   4.3,   17.2, 0


*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                       PAGE   5
 **MODELOPTs: CONC                          URBAN  FLAT          DFAULT

                                     *** GRIDDED RECEPTOR NETWORK SUMMARY ***
```

```
                        *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                              *** ORIGIN FOR POLAR NETWORK ***
                        X-ORIG =       .00 ;   Y-ORIG =        .00  (METERS)

                              *** DISTANCE RANGES OF NETWORK ***
                                          (METERS)

      50.0,      100.0,      150.0,      200.0,      250.0,      300.0,      400.0,      500.0,      600.0,      800.0,
    1000.0,

                              *** DIRECTION RADIALS OF NETWORK ***
                                          (DEGREES)

     360.0,       10.0,       20.0,       30.0,       40.0,       50.0,       60.0,       70.0,       80.0,       90.0,
     100.0,      110.0,      120.0,      130.0,      140.0,      150.0,      160.0,      170.0,      180.0,      190.0,
     200.0,      210.0,      220.0,      230.0,      240.0,      250.0,      260.0,      270.0,      280.0,      290.0,
     300.0,      310.0,      320.0,      330.0,      340.0,      350.0,

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                     ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                        PAGE   6
 **MODELOPTs: CONC                             URBAN  FLAT            DFAULT


                                 *** DISCRETE CARTESIAN RECEPTORS ***
                                  (X-COORD, Y-COORD, ZELEV, ZFLAG)
                                              (METERS)

    (     -18.5,        1.3,         .0,          .0);          (     -38.5,        1.3,         .0,          .0);
    (     -58.5,        1.3,         .0,          .0);          (     -78.6,        1.3,         .0,          .0);
    (     -89.3,        1.3,         .0,          .0);          (     -89.3,       21.3,         .0,          .0);
    (     -89.3,       41.3,         .0,          .0);          (     -89.3,       61.3,         .0,          .0);
    (     -89.3,       81.3,         .0,          .0);          (     -89.3,      100.4,         .0,          .0);
    (     -69.3,      100.3,         .0,          .0);          (     -49.3,      100.3,         .0,          .0);
    (     -29.3,      100.3,         .0,          .0);          (      -9.3,      100.3,         .0,          .0);
    (       1.4,      100.4,         .0,          .0);          (       1.4,       80.3,         .0,          .0);
    (       1.4,       60.3,         .0,          .0);          (       1.4,       40.3,         .0,          .0);
    (       1.4,       20.3,         .0,          .0);          (       1.4,        1.3,         .0,          .0);
*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                     ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                        PAGE   7
 **MODELOPTs: CONC                             URBAN  FLAT            DFAULT

                         * SOURCE-RECEPTOR COMBINATIONS FOR WHICH CALCULATIONS MAY NOT BE PERFORMED *
                            LESS THAN 1.0 METER OR 3*ZLB IN DISTANCE, OR WITHIN OPEN PIT SOURCE


                                 SOURCE         - - RECEPTOR LOCATION - -          DISTANCE
                                   ID           XR (METERS)   YR (METERS)          (METERS)
                                 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
                     STACK1                    1.4          20.3             9.81

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                   ***   RUN3-1992MET DATA                                                 ***      :  15:20:21
                                                                                                                       PAGE  8
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                                     *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                        (1=YES; 0=NO)

          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1

                 METEOROLOGICAL DATA PROCESSED BETWEEN START DATE:  92  1  1  1
                                                     AND END DATE:  92 12 31 24

            NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                              *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                       (METERS/SEC)

                                            1.54,    3.09,    5.14,    8.23,   10.80,

                                                *** WIND PROFILE EXPONENTS ***

            STABILITY                               WIND SPEED CATEGORY
            CATEGORY          1               2               3               4               5               6
                A        .15000E+00      .15000E+00      .15000E+00      .15000E+00      .15000E+00      .15000E+00
                B        .15000E+00      .15000E+00      .15000E+00      .15000E+00      .15000E+00      .15000E+00
                C        .20000E+00      .20000E+00      .20000E+00      .20000E+00      .20000E+00      .20000E+00
                D        .25000E+00      .25000E+00      .25000E+00      .25000E+00      .25000E+00      .25000E+00
                E        .30000E+00      .30000E+00      .30000E+00      .30000E+00      .30000E+00      .30000E+00
                F        .30000E+00      .30000E+00      .30000E+00      .30000E+00      .30000E+00      .30000E+00

                                   *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                                                (DEGREES KELVIN PER METER)

            STABILITY                               WIND SPEED CATEGORY
```

```
   CATEGORY        1              2              3              4              5              6
      A       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
      B       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
      C       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
      D       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
      E       .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01
      F       .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                   ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                       PAGE   9
 **MODELOPTs: CONC                             URBAN  FLAT          DFAULT


                  *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

          FILE: C:\TRINITY\SUITE\MET\PHXTUS92.BIN          FORMAT: UNFORM
          SURFACE STATION NO.:  23183                      UPPER AIR STATION NO.:  23160
                         NAME: UNKNOWN                                      NAME: UNKNOWN
                         YEAR:    1992                                      YEAR:    1992

                                  FLOW    SPEED   TEMP     STAB   MIXING HEIGHT (M)     USTAR  M-O LENGTH    Z-0 IPCODE PRATE
          YEAR  MONTH  DAY  HOUR  VECTOR  (M/S)    (K)     CLASS   RURAL    URBAN       (M/S)     (M)        (M)        (mm/HR)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - -

          92     1     1     1    321.0   1.54   282.0       7    1501.2    173.0      .0000        .0   .0000   0     .00
          92     1     1     2    318.0   1.00   280.9       7    1465.8    173.0      .0000        .0   .0000   0     .00
          92     1     1     3    324.0   1.00   280.4       7    1430.4    173.0      .0000        .0   .0000   0     .00
          92     1     1     4    323.0   1.00   279.8       7    1395.0    173.0      .0000        .0   .0000   0     .00
          92     1     1     5    223.0   1.54   279.3       7    1359.6    173.0      .0000        .0   .0000   0     .00
          92     1     1     6    222.0   1.00   279.3       7    1324.2    173.0      .0000        .0   .0000   0     .00
          92     1     1     7    315.0   1.54   279.8       7    1288.8    173.0      .0000        .0   .0000   0     .00
          92     1     1     8    313.0   1.00   278.7       6      63.0    225.5      .0000        .0   .0000   0     .00
          92     1     1     9    307.0   1.00   280.9       5     226.0    361.4      .0000        .0   .0000   0     .00
          92     1     1    10    311.0   1.00   284.3       4     389.0    497.4      .0000        .0   .0000   0     .00
          92     1     1    11    224.0   2.06   286.5       3     552.0    633.3      .0000        .0   .0000   0     .00
          92     1     1    12    206.0   2.57   288.7       3     715.0    769.2      .0000        .0   .0000   0     .00
          92     1     1    13    233.0   2.06   289.3       3     878.0    905.1      .0000        .0   .0000   0     .00
          92     1     1    14    219.0   3.09   290.4       3    1041.0   1041.0      .0000        .0   .0000   0     .00
          92     1     1    15    222.0   3.09   291.5       3    1041.0   1041.0      .0000        .0   .0000   0     .00
          92     1     1    16    264.0   2.57   291.5       4    1041.0   1041.0      .0000        .0   .0000   0     .00
          92     1     1    17    231.0   2.57   290.9       4    1041.0   1041.0      .0000        .0   .0000   0     .00
          92     1     1    18    247.0   3.09   289.8       5    1044.5    973.8      .0000        .0   .0000   0     .00
          92     1     1    19    244.0   3.60   288.7       5    1050.6    854.8      .0000        .0   .0000   0     .00
          92     1     1    20    247.0   3.09   288.2       6    1056.7    735.9      .0000        .0   .0000   0     .00
          92     1     1    21    240.0   2.57   286.5       6    1062.8    616.9      .0000        .0   .0000   0     .00
          92     1     1    22    242.0   3.09   285.4       6    1069.0    497.9      .0000        .0   .0000   0     .00
          92     1     1    23    220.0   2.57   284.8       6    1075.1    379.0      .0000        .0   .0000   0     .00
          92     1     1    24    240.0   3.09   285.4       6    1081.2    260.0      .0000        .0   .0000   0     .00
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*** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
            FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 96113 ***     ***  WIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1992MET DATA                                                    ***        15:20:21
                                                                                                                         PAGE  10
**MODELOPTs: CONC                                 URBAN  FLAT          DFAULT

                               *** THE ANNUAL (  8784 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL        ***
                                   INCLUDING SOURCE(S):       STACK1  ,

                                   *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                       ** CONC OF TCE       IN MICROGRAMS/M**3                          **

 DIRECTION |                                          DISTANCE (METERS)
 (DEGREES) |        50.00       100.00       150.00       200.00       250.00       300.00       400.00       500.00       600.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.00 |        .32409       .11330       .06201       .03916       .02672       .01932       .01144       .00758       .00541
    10.00 |        .27741       .09834       .05574       .03582       .02467       .01793       .01065       .00706       .00504
    20.00 |        .32261       .11108       .06059       .03857       .02669       .01950       .01172       .00784       .00564
    30.00 |        .42965       .16092       .08549       .05225       .03496       .02495       .01452       .00951       .00674
    40.00 |        .61527       .23169       .12699       .08014       .05476       .03965       .02354       .01566       .01123
    50.00 |        .84296       .34689       .18648       .11600       .07876       .05684       .03366       .02235       .01600
    60.00 |       1.07431       .46873       .26014       .16395       .11228       .08157       .04876       .03261       .02348
    70.00 |       1.22114       .57905       .32803       .20802       .14283       .10399       .06234       .04176       .03009
    80.00 |       1.14099       .62253       .36940       .24185       .16951       .12511       .07629       .05164       .03749
    90.00 |        .89666       .54362       .33773       .22798       .16351       .12280       .07670       .05274       .03873
   100.00 |        .70136       .41092       .25585       .17223       .12323       .09243       .05764       .03957       .02901
   110.00 |        .58931       .33859       .20955       .14039       .09992       .07457       .04615       .03151       .02299
   120.00 |        .50849       .30257       .19015       .12838       .09179       .06872       .04272       .02927       .02142
   130.00 |        .40508       .24468       .15717       .10765       .07776       .05866       .03686       .02545       .01874
   140.00 |        .30215       .17488       .11113       .07551       .05427       .04079       .02548       .01750       .01283
   150.00 |        .24165       .13854       .08763       .05910       .04216       .03150       .01951       .01332       .00972
   160.00 |        .21537       .12586       .08066       .05502       .03947       .02962       .01848       .01270       .00932
   170.00 |        .20936       .11984       .07582       .05123       .03659       .02736       .01697       .01159       .00846
   180.00 |        .22195       .13239       .08478       .05764       .04134       .03102       .01936       .01330       .00976
   190.00 |        .22955       .13172       .08260       .05556       .03958       .02957       .01834       .01255       .00918
   200.00 |        .23455       .12907       .07784       .05130       .03610       .02673       .01637       .01110       .00806
   210.00 |        .24010       .12617       .07657       .05143       .03671       .02746       .01705       .01166       .00852
   220.00 |        .24787       .13993       .09050       .06290       .04578       .03468       .02187       .01511       .01111
   230.00 |        .28702       .18648       .12347       .08572       .06214       .04689       .02938       .02019       .01480
   240.00 |        .38777       .27199       .17735       .12191       .08829       .06670       .04191       .02886       .02118
   250.00 |        .60548       .44990       .29146       .19923       .14363       .10813       .06760       .04643       .03402
   260.00 |       1.02684       .73623       .45463       .30350       .21613       .16151       .10013       .06844       .05000
   270.00 |       1.68217      1.13412       .68578       .45453       .32276       .24084       .14915       .10189       .07442
   280.00 |       2.58266      1.65636       .98840       .64896       .45693       .33872       .20807       .14171       .10349
   290.00 |       3.32543      1.69911       .87585       .52528       .34863       .24782       .14380       .09425       .06686
   300.00 |       2.72418       .90255       .41997       .24469       .16094       .11390       .06576       .04295       .03037
   310.00 |       1.65169       .56149       .27611       .16460       .10932       .07187       .04542       .02992       .02132
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  320.00 |      1.43093      .45663      .22077      .12972      .08526      .06035      .03499      .02299      .01636
  330.00 |      1.03276      .31786      .15158      .08852      .05793      .04087      .02357      .01541      .01092
  340.00 |       .69712      .22316      .10679      .06244      .04087      .02884      .01662      .01086      .00768
  350.00 |       .48517      .17139      .08679      .05190      .03436      .02440      .01417      .00929      .00660

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1992MET DATA                                                ***         15:20:21
                                                                                                                      PAGE  11
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                                  *** THE ANNUAL (  8784 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                                      INCLUDING SOURCE(S):       STACK1  ,

                                       *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                             ** CONC OF TCE       IN MICROGRAMS/M**3                            **

   DIRECTION |                                                  DISTANCE (METERS)
   (DEGREES) |          800.00      1000.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     360.00 |           .00319       .00212
      10.00 |           .00296       .00196
      20.00 |           .00337       .00226
      30.00 |           .00392       .00259
      40.00 |           .00667       .00448
      50.00 |           .00949       .00635
      60.00 |           .01404       .00947
      70.00 |           .01800       .01212
      80.00 |           .02265       .01537
      90.00 |           .02378       .01633
     100.00 |           .01773       .01211
     110.00 |           .01397       .00949
     120.00 |           .01307       .00893
     130.00 |           .01154       .00794
     140.00 |           .00783       .00534
     150.00 |           .00590       .00400
     160.00 |           .00571       .00392
     170.00 |           .00513       .00348
     180.00 |           .00598       .00410
     190.00 |           .00560       .00382
     200.00 |           .00486       .00328
     210.00 |           .00518       .00353
     220.00 |           .00682       .00468
     230.00 |           .00903       .00616
     240.00 |           .01294       .00883
     250.00 |           .02078       .01419
     260.00 |           .03041       .02071
     270.00 |           .04528       .03084
     280.00 |           .06325       .04340
     290.00 |           .03911       .02595
     300.00 |           .01767       .01167
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      310.00 |          .01256         .00838
      320.00 |          .00963         .00643
      330.00 |          .00639         .00424
      340.00 |          .00448         .00296
      350.00 |          .00386         .00256

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***         03/27/97
                                      ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                          PAGE  12
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                *** THE ANNUAL (  8784 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                                    INCLUDING SOURCE(S):        STACK1   ,

                                                *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                          ** CONC OF TCE       IN MICROGRAMS/M**3                            **

        X-COORD (M)   Y-COORD (M)         CONC                        X-COORD (M)   Y-COORD (M)         CONC
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
            -18.55          1.33          .71011                         -38.55          1.33          1.79026
            -58.55          1.33         1.73815                         -78.55          1.33          1.48114
            -89.33          1.33         1.31820                         -89.33         21.33          1.97795
            -89.33         41.33         1.35072                         -89.33         61.33           .59033
            -89.33         81.33          .38815                         -89.33        100.40           .28273
            -69.33        100.34          .26686                         -49.33        100.34           .22281
            -29.33        100.34          .18796                          -9.33        100.34           .14076
              1.45        100.40          .10932                           1.45         80.34           .15206
              1.45         60.34          .23448                           1.45         40.34           .39084
              1.45         20.34          .00000                           1.45          1.33           .29117

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***         03/27/97
                                      ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                          PAGE  13
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                    INCLUDING SOURCE(S):        STACK1   ,

                                     *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                          ** CONC OF TCE       IN MICROGRAMS/M**3                            **

 DIRECTION |                                              DISTANCE (METERS)
 (DEGREES) |           50.00                  100.00                 150.00                 200.00                 250.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     360.0 |      23.93862 (92032818)    11.05402 (92020119)    10.19956 (92042504)     7.90927 (92042504)     5.91048 (92042504)
      10.0 |      22.91048 (92121411)    13.21677 (92080620)     9.57458 (92040101)     7.33779 (92040101)     5.41818 (92040101)
      20.0 |      22.55613 (92033016)    12.90279 (92030205)     9.79216 (92040821)     7.76588 (92102821)     5.87833 (92102821)
      30.0 |      23.16134 (92030317)    14.01574 (92032524)     9.87655 (92042722)     7.71342 (92051323)     5.79264 (92051323)
      40.0 |      22.18618 (92072719)    13.40991 (92050122)     9.96344 (92022722)     7.43778 (92022722)     5.70509 (92071621)
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   50.0 |     21.48029 (92060919)     13.40407 (92032601)      9.85559 (92032921)      7.52400 (92082804)      5.69485 (92041503)
   60.0 |     21.03777 (92121117)     13.03499 (92041523)      9.72657 (92050802)      7.46540 (92022620)      5.61987 (92050803)
   70.0 |     20.74988 (92121911)     12.94456 (92101521)     11.64643 (92101521)      8.37386 (92101620)      6.92207 (92101620)
   80.0 |     20.04541 (92122014)     13.08440 (92101621)     11.40362 (92101621)      7.96159 (92101621)      5.56493 (92101621)
   90.0 |     19.24623 (92113017)     12.58142 (92101622)      9.98239 (92101622)      7.12353 (92071720)      5.59298 (92101621)
  100.0 |     18.80901 (92122013)     12.02793 (92071001)      9.33191 (92111319)      7.78035 (92101622)      6.39191 (92101622)
  110.0 |     18.35824 (92041901)     11.83102 (92051320)      9.25139 (92110919)      6.98167 (92061202)      5.28628 (92101819)
  120.0 |     18.38168 (92041902)     11.76661 (92041323)      9.15527 (92050624)      6.90976 (92080822)      5.24674 (92080822)
  130.0 |     17.63732 (92031109)     11.75154 (92040523)      9.06561 (92070802)      6.86808 (92070802)      5.19619 (92091802)
  140.0 |     16.88647 (92071419)     11.64458 (92061902)      9.06212 (92102523)      6.83012 (92101221)      5.18596 (92101221)
  150.0 |     17.28687 (92122818)     11.67817 (92102823)      8.89309 (92052302)      6.66150 (92052302)      5.02463 (92052302)
  160.0 |     17.02065 (92122913)     11.61861 (92061120)      8.92593 (92041923)      6.73227 (92041923)      5.10390 (92041923)
  170.0 |     17.50991 (92011510)     11.53924 (92090920)      8.60731 (92040221)      6.60249 (92040221)      5.02650 (92040221)
  180.0 |     17.36402 (92082418)     11.64718 (92050424)      9.02129 (92102622)      6.84454 (92102622)      5.19473 (92102622)
  190.0 |     18.17504 (92022401)     11.67618 (92070704)      9.13679 (92031922)      6.90580 (92031922)      5.21334 (92031922)
  200.0 |     18.38447 (92022404)     11.79359 (92101401)      8.99142 (92042321)      6.91112 (92042321)      5.24955 (92042321)
  210.0 |     18.21652 (92060819)     11.91247 (92050601)      9.22806 (92100805)      7.02463 (92100805)      5.28839 (92050323)
  220.0 |     19.03459 (92123005)     11.59335 (92081121)      9.24000 (92071321)      7.05738 (92072104)      5.33828 (92072104)
  230.0 |     17.97979 (92110403)     12.07297 (92091004)      9.42510 (92102824)      6.97172 (92102824)      5.16374 (92092002)
  240.0 |     20.06619 (92010413)     12.48800 (92061606)      9.50022 (92053102)      7.18250 (92050301)      5.47475 (92050301)
  250.0 |     20.36465 (92041607)     12.76432 (92101102)      9.59303 (92100622)      7.37381 (92022221)      5.54366 (92062701)
  260.0 |     21.15989 (92021021)     13.03503 (92062705)      9.69425 (92080404)      7.43611 (92071601)      5.61985 (92100723)
  270.0 |     21.49194 (92021106)     13.33267 (92081824)      9.66422 (92071402)      7.27913 (92101705)      5.63373 (92101705)
  280.0 |     22.55508 (92103007)     13.74330 (92101503)      9.90843 (92101103)      7.64814 (92103104)      5.76947 (92103104)
  290.0 |     23.34802 (92030722)     14.03073 (92101005)      9.93825 (92102524)      7.72882 (92102123)      5.81849 (92040724)
  300.0 |     23.90673 (92021609)     14.23668 (92042705)     10.11188 (92031923)      7.82456 (92031323)      5.82627 (92031323)
  310.0 |     31.71622 (92020303)     23.36451 (92052106)     14.87927 (92022724)      9.81831 (92022121)      6.88803 (92022121)
  320.0 |     51.49532 (92082822)     24.18864 (92080721)     15.35984 (92050602)      9.98833 (92050602)      6.89226 (92050602)
  330.0 |     52.65505 (92042404)     24.44474 (92052105)     15.11473 (92092121)      9.94948 (92033101)      6.92066 (92033101)
  340.0 |     50.90215 (92012822)     24.14794 (92082002)     15.22292 (92060906)      9.95152 (92060906)      6.90447 (92060906)
  350.0 |     49.81834 (92080704)     22.68073 (92080704)     14.55799 (92080904)      9.64886 (92022919)      6.74468 (92022919)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH B ***        03/27/97
                                  ***  RUN3-1992MET DATA                                                     ***        15:20:21
                                                                                                                        PAGE  14
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                              *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                  *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                      ** CONC OF TCE       IN MICROGRAMS/M**3                          **

DIRECTION |                                            DISTANCE (METERS)
(DEGREES) |        300.00                 400.00                 500.00                 600.00                 800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  360.0 |      4.51016 (92042504)      2.85719 (92042504)      1.98504 (92031103)      1.49251 (92031103)       .95252 (92031103)
   10.0 |      4.21871 (92022606)      2.78447 (92022606)      1.97751 (92022606)      1.48813 (92022606)       .95066 (92022606)
   20.0 |      4.51403 (92102821)      2.89197 (92082004)      2.02931 (92082004)      1.51565 (92082004)       .95945 (92082004)
   30.0 |      4.42027 (92051323)      2.78759 (92051323)      1.95076 (92122406)      1.47204 (92122406)       .94203 (92122406)
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    40.0 |       4.42675 (92071621)       2.85022 (92071621)       2.00304 (92013018)       1.50183 (92013018)        .95465 (92013018)
    50.0 |       4.37469 (92041503)       2.80560 (92031822)       1.98781 (92031822)       1.49319 (92031822)        .95117 (92031822)
    60.0 |       4.32927 (92050803)       2.80395 (92080402)       1.97121 (92080402)       1.47216 (92080402)        .94024 (92031023)
    70.0 |       5.63465 (92101620)       3.85084 (92101620)       2.79059 (92101620)       2.12706 (92101620)       1.37932 (92101620)
    80.0 |       4.60565 (92101521)       3.23981 (92101521)       2.38867 (92101521)       1.84101 (92101521)       1.20896 (92101521)
    90.0 |       4.63436 (92101621)       3.24746 (92101621)       2.39105 (92101621)       1.84182 (92101621)       1.20909 (92101621)
   100.0 |       5.20962 (92101622)       3.58523 (92101622)       2.61550 (92101622)       2.00416 (92101622)       1.30906 (92101622)
   110.0 |       4.11269 (92101819)       2.68121 (92051524)       1.91034 (92051524)       1.44220 (92051524)        .92557 (92051524)
   120.0 |       4.07250 (92080822)       2.67086 (92061903)       1.90151 (92061903)       1.43538 (92061903)        .98248 (92120417)
   130.0 |       4.05374 (92091802)       2.65921 (92091802)       2.15577 (92120417)       1.83862 (92120417)       1.43353 (92120417)
   140.0 |       4.03716 (92101221)       2.64470 (92101221)       1.88155 (92101221)       1.42056 (92101221)        .91282 (92101221)
   150.0 |       3.91657 (92090819)       2.57878 (92090819)       1.84115 (92090819)       1.39362 (92090819)        .89859 (92090819)
   160.0 |       3.97344 (92041923)       2.60624 (92041923)       1.85682 (92041923)       1.40360 (92041923)        .90358 (92041923)
   170.0 |       3.92346 (92040221)       2.58145 (92040221)       1.84240 (92040221)       1.39429 (92040221)        .89882 (92040221)
   180.0 |       4.04285 (92102622)       2.64750 (92102622)       1.88315 (92102622)       1.42157 (92102622)        .91332 (92102622)
   190.0 |       4.06324 (92111420)       2.66365 (92111420)       1.89457 (92111420)       1.42977 (92111420)        .91857 (92022521)
   200.0 |       4.07519 (92042321)       2.65026 (92042321)       1.87297 (92042321)       1.40610 (92042321)        .89544 (92042321)
   210.0 |       4.11497 (92050323)       2.67880 (92050323)       1.89237 (92050323)       1.42138 (92042824)        .91860 (92042824)
   220.0 |       4.15110 (92061203)       2.70529 (92061203)       1.92247 (92022222)       1.45094 (92022222)        .93047 (92022222)
   230.0 |       4.08618 (92092002)       2.70773 (92092002)       1.93078 (92092002)       1.45724 (92092002)        .93414 (92092002)
   240.0 |       4.23297 (92012819)       2.75849 (92012819)       1.94463 (92012819)       1.45540 (92012819)        .92188 (92012819)
   250.0 |       4.27873 (92062701)       2.78014 (92101122)       1.95796 (92101122)       1.47344 (92081624)        .94242 (92060503)
   260.0 |       4.32962 (92100723)       2.80551 (92071404)       1.97204 (92071404)       1.48351 (92061505)        .94701 (92061505)
   270.0 |       4.38515 (92101705)       2.83406 (92101705)       1.98648 (92101705)       1.49234 (92081507)        .95083 (92081507)
   280.0 |       4.43714 (92102822)       2.85422 (92102822)       2.00266 (92071604)       1.50160 (92071604)       1.01707 (92120414)
   290.0 |       4.48759 (92040724)       2.87089 (92040724)       2.01949 (92102501)       1.51074 (92102501)        .95796 (92102501)
   300.0 |       4.49095 (92042603)       2.89560 (92042603)       2.03100 (92042603)       1.51655 (92042603)        .95978 (92042603)
   310.0 |       5.08431 (92022121)       3.11971 (92022121)       2.13690 (92022121)       1.57442 (92022121)        .98251 (92022121)
   320.0 |       5.06544 (92012520)       3.11358 (92012520)       2.13681 (92012520)       1.57709 (92012520)        .98701 (92012520)
   330.0 |       5.08684 (92033101)       3.10995 (92033101)       2.12746 (92033101)       1.56669 (92033101)        .97751 (92033101)
   340.0 |       5.06969 (92060906)       3.09765 (92060906)       2.11908 (92060906)       1.56733 (92052406)        .98308 (92052406)
   350.0 |       4.97479 (92022919)       3.05658 (92021623)       2.10231 (92021623)       1.55291 (92021623)        .97201 (92021623)

*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                         ***  RUN3-1992MET DATA                                                 ***        15:20:21
                                                                                                                            PAGE  15
 **MODELOPTs: CONC                             URBAN  FLAT           DEFAULT

                                  *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                      INCLUDING SOURCE(S):      STACK1  ,

                                        *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                             ** CONC OF TCE      IN MICROGRAMS/M**3                          **

 DIRECTION |                                                   DISTANCE (METERS)
 (DEGREES) |         1000.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |        .67604 (92031103)
    10.0 |        .67507 (92022606)
    20.0 |        .67755 (92082004)
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     30.0 |          .66890 (92122406)
     40.0 |          .67558 (92013018)
     50.0 |          .67388 (92031822)
     60.0 |          .66823 (92031023)
     70.0 |          .98762 (92101620)
     80.0 |          .87090 (92101521)
     90.0 |          .87096 (92101621)
    100.0 |          .94146 (92101622)
    110.0 |          .65903 (92051524)
    120.0 |          .77863 (92120417)
    130.0 |         1.18535 (92120417)
    140.0 |          .65082 (92101221)
    150.0 |          .64208 (92090819)
    160.0 |          .64505 (92041923)
    170.0 |          .64218 (92040221)
    180.0 |          .65111 (92102622)
    190.0 |          .65669 (92022521)
    200.0 |          .63396 (92042321)
    210.0 |          .65708 (92042824)
    220.0 |          .66208 (92022222)
    230.0 |          .66439 (92092002)
    240.0 |          .65813 (92032705)
    250.0 |          .66923 (92061624)
    260.0 |          .67173 (92061505)
    270.0 |          .67370 (92081507)
    280.0 |          .83807 (92120414)
    290.0 |          .67706 (92102501)
    300.0 |          .67770 (92042603)
    310.0 |          .69132 (92073102)
    320.0 |          .69366 (92012520)
    330.0 |          .68548 (92033101)
    340.0 |          .69166 (92052406)
    350.0 |          .68272 (92021623)
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                       ***  RUN3-1992MET DATA                                                  ***       15:20:21
                                                                                                                         PAGE  16
 **MODELOPTs: CONC                               URBAN  FLAT          DFAULT

                               *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                   INCLUDING SOURCE(S):      STACK1   ,

                                                *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                            ** CONC OF TCE       IN MICROGRAMS/M**3                        **

       X-COORD (M)  Y-COORD (M)         CONC     (YYMMDDHH)              X-COORD (M)  Y-COORD (M)         CONC     (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
           -18.55         1.33       30.64226  (92010016)                 -38.55         1.33       24.66322  (92120513)
           -58.55         1.33       19.41630  (92081407)                 -78.55         1.33       16.45088  (92051505)
           -89.33         1.33       14.92949  (92020323)                 -89.33        21.33       15.02007  (92101104)
           -89.33        41.33       14.37185  (92040904)                 -89.33        61.33       13.22653  (92060802)
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        -89.33        81.33         19.68938  (92022121)                      -89.33        100.40         17.45222  (92061004)
        -69.33       100.34         19.39051  (92082704)                      -49.33        100.34         21.26512  (92050605)
        -29.33       100.34         22.57400  (92022619)                       -9.33        100.34         22.96228  (92020419)
          1.45       100.40         11.75029  (92020119)                        1.45         80.34         14.08943  (92032818)
          1.45        60.34         21.27530  (92032818)                        1.45         40.34         28.11027  (92121411)
          1.45        20.34           .00009  (92101620)                        1.45          1.33         26.85549  (92040212)

 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1992MET DATA                                                       ***       15:20:21
                                                                                                                           PAGE  17
 **MODELOPTs: CONC                                   URBAN  FLAT         DFAULT

                               *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                   INCLUDING SOURCE(S):      STACK1  ,

                                    *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                        ** CONC OF TCE       IN MICROGRAMS/M**3                                 **

 DIRECTION |                                              DISTANCE (METERS)
 (DEGREES) |          50.00                  100.00                  150.00                  200.00                  250.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.0 |     2.83831c(92080124)     1.13530c(92080724)     1.01082c(92042524)      .77900c(92042524)      .57987c(92042524)
     10.0 |     3.49695c(92080124)     1.01277c(92080624)      .70561c(92012824)      .59978c(92012824)      .47236c(92012824)
     20.0 |     2.78248c(92012524)      .84203 (92102824)      .73875 (92102824)      .53222 (92102824)      .39521 (92102824)
     30.0 |     3.72613c(92020224)     1.16985c(92050724)      .76069c(92050724)      .48328c(92012424)      .37897c(92012424)
     40.0 |     3.96655c(92020224)     2.89570c(92032424)     1.87652c(92032424)     1.30578c(92032424)      .90605c(92032424)
     50.0 |     5.19234c(92071524)     2.83114c(92042024)     2.13091c(92042024)     1.61817c(92032424)     1.29160c(92032424)
     60.0 |     5.69270 (92103124)     3.35470c(92071524)     2.13227c(92071524)     1.34057c(92071524)      .89349c(92071524)
     70.0 |     7.58713 (92103124)     2.90081 (92091724)     1.74794 (92091724)     1.09264c(92071524)      .82915c(92071524)
     80.0 |     7.86593c(92122024)     5.14020 (92113024)     3.09632 (92113024)     2.00139 (92113024)     1.37223 (92113024)
     90.0 |     4.77684c(92122024)     4.70003 (92113024)     3.82649 (92113024)     2.99038 (92113024)     2.32960 (92113024)
    100.0 |     2.84900c(92112024)     1.99058c(92070124)     1.21916c(92070124)      .93784 (92113024)      .75078 (92113024)
    110.0 |     3.23332c(92051124)     1.81233 (92091624)     1.13887c(92092524)      .84151 (92121324)      .64533 (92121324)
    120.0 |     2.95408c(92051124)     2.07913 (92091624)     1.47283 (92091624)     1.02494 (92091624)      .74200 (92091624)
    130.0 |     2.70575 (92070724)     1.80275 (92070724)     1.19269 (92070724)      .82062 (92070724)      .59372 (92070724)
    140.0 |     1.75859 (92041924)     1.46396c(92070224)     1.11397c(92070224)      .79686c(92070224)      .58517c(92070224)
    150.0 |     1.45691c(92101824)     1.23532c(92051224)     1.00689 (92062024)      .75027 (92062024)      .56557 (92062024)
    160.0 |     2.26294c(92112924)     1.14935 (92101324)      .83111 (92110424)      .63037 (92110424)      .47885 (92110424)
    170.0 |     2.91307c(92112924)     1.16784c(92112924)      .83323c(92100824)      .60273c(92100824)      .44659c(92100824)
    180.0 |     2.51424c(92112924)     1.23479c(92022524)      .93738c(92022524)      .68047c(92022524)      .50191c(92022524)
    190.0 |     4.27722c(92022424)     2.32031c(92022424)     1.28997c(92022424)      .81855c(92022424)      .56829c(92022424)
    200.0 |     5.07547c(92022424)     2.18654 (92110324)     1.13329 (92110324)      .68538 (92110324)      .45943 (92110324)
    210.0 |     5.05119 (92110324)     1.30886 (92110324)      .83618c(92100724)      .55811c(92100724)      .39107c(92100724)
    220.0 |     2.18495c(92010824)     1.42112c(92010824)      .92210c(92010824)      .69056c(92010824)      .52318c(92010824)
    230.0 |     3.54034c(92010124)     2.19709c(92010824)     1.29546c(92010824)      .86165c(92010824)      .59884c(92010824)
    240.0 |     4.39719c(92010124)     2.24254c(92010124)     1.43402c(92010124)     1.01975c(92010124)      .76269c(92010124)
    250.0 |     5.84272 (92011024)     3.93193c(92010124)     2.03753c(92010124)     1.23074c(92010124)      .82481c(92010124)
    260.0 |     8.99848 (92011024)     3.10214c(92012024)     1.96349 (92093024)     1.34007 (92093024)      .95274 (92093024)
    270.0 |     8.38372c(92012024)     4.25766 (92093024)     2.45422c(92122724)     1.87055c(92122724)     1.43154c(92122724)
    280.0 |     8.53348c(92020724)     5.52330c(92102724)     3.57672c(92102724)     2.33784c(92102724)     1.66206c(92102724)
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  290.0 |     13.04172c(92120824)      5.48908c(92102724)      3.02364 (92090324)      1.79598 (92090324)      1.18544c(92111624)
  300.0 |     11.97298c(92071124)      3.69467c(92012524)      2.10199c(92012524)      1.49665c(92012524)      1.09161c(92012524)
  310.0 |      7.47713 (92011124)      3.11706c(92042824)      1.71728c(92042824)      1.05243c(92042824)       .70957c(92042824)
  320.0 |      8.50866 (92010524)      3.29538c(92080724)      1.66440c(92080724)       .98713c(92080724)       .68162c(92011324)
  330.0 |      7.60688c(92021324)      2.30506 (92010524)      1.24141c(92081024)       .75231c(92081024)       .60060c(92081024)
  340.0 |      6.41078 (92010524)      2.23322c(92012624)      1.27159c(92012624)       .81253c(92012624)       .56401c(92012624)
  350.0 |      5.36493c(92080724)      1.89523c(92080724)      1.00665c(92080924)       .63960c(92022924)       .43979c(92022924)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***         03/27/97
                                        ***  RUN3-1992MET DATA                                                    ***        15:20:21
                                                                                                                             PAGE  18
**MODELOPTs: CONC                                 URBAN  FLAT         DFAULT

                              *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                   *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                       ** CONC OF TCE       IN MICROGRAMS/M**3                                 **

DIRECTION |                                             DISTANCE (METERS)
(DEGREES) |          300.00                  400.00                  500.00                  600.00                  800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  360.0 |       .44125c(92042524)       .27844c(92042524)       .19286c(92042524)       .14276c(92042524)       .08926c(92042524)
   10.0 |       .37260c(92012824)       .24539c(92012824)       .17418c(92012824)       .13102c(92012824)       .08355c(92012824)
   20.0 |       .30132 (92102824)       .19033 (92102824)       .13180 (92102824)       .09753 (92102824)       .06093 (92102824)
   30.0 |       .29863c(92012424)       .19654c(92012424)       .13933c(92012424)       .10458c(92012424)       .06631c(92012424)
   40.0 |       .65259c(92032424)       .37832c(92032424)       .24534c(92032424)       .17187c(92032424)       .09800c(92032424)
   50.0 |      1.02902c(92032424)       .68519c(92032424)       .48854c(92032424)       .36797c(92032424)       .23437c(92032424)
   60.0 |       .63122c(92071524)       .39770c(92042024)       .28194c(92042024)       .21146c(92042024)       .13356c(92042024)
   70.0 |       .64487c(92071524)       .42008c(92071524)       .29639c(92071524)       .22172c(92071524)       .13985c(92071524)
   80.0 |       .98725 (92113024)       .57431 (92113024)       .37460c(92111224)       .27777c(92111224)       .17295c(92111224)
   90.0 |      1.83590 (92113024)      1.20928 (92113024)       .85726 (92113024)       .64313 (92113024)       .40731 (92113024)
  100.0 |       .60801 (92113024)       .41628 (92113024)       .30117 (92113024)       .22788 (92113024)       .14392 (92113024)
  110.0 |       .50378 (92121324)       .32818 (92121324)       .23070 (92121324)       .17172 (92121324)       .10708 (92121324)
  120.0 |       .56003 (92091624)       .35256 (92091624)       .24432 (92091624)       .18083 (92091624)       .11276 (92091624)
  130.0 |       .44877 (92070724)       .28328 (92070724)       .19647 (92070724)       .14530 (92070724)       .09021 (92070724)
  140.0 |       .44555c(92070224)       .28345c(92070224)       .19765c(92070224)       .14690c(92070224)       .09206c(92070224)
  150.0 |       .43867 (92062024)       .28613 (92062024)       .20285 (92062024)       .15260 (92062024)       .09733 (92062024)
  160.0 |       .37292 (92110424)       .24428 (92110424)       .17360 (92110424)       .13084 (92110424)       .08370 (92110424)
  170.0 |       .34262c(92100824)       .22066c(92100824)       .15538c(92100824)       .11643c(92100824)       .07396c(92100824)
  180.0 |       .38237c(92022524)       .25019c(92012424)       .17836c(92012424)       .13455c(92012424)       .08604c(92012424)
  190.0 |       .42103c(92022424)       .26397c(92022424)       .18329c(92022424)       .13580c(92022424)       .08467c(92022424)
  200.0 |       .33047 (92110324)       .19747 (92110324)       .13328 (92110324)       .09859c(92100724)       .06134c(92100724)
  210.0 |       .28747c(92100724)       .17370c(92100724)       .11663c(92100724)       .08409c(92100724)       .05024c(92100724)
  220.0 |       .40648c(92010824)       .26491c(92010824)       .18874c(92010124)       .14216c(92010124)       .09044c(92010124)
  230.0 |       .43678c(92010824)       .26246c(92010824)       .17911c(92011524)       .13332c(92011524)       .08322c(92011524)
  240.0 |       .59047c(92010124)       .38429c(92010124)       .27139c(92010124)       .20329c(92010124)       .12853c(92010124)
  250.0 |       .59207c(92010124)       .34736c(92010124)       .22885c(92010124)       .16293c(92010124)       .09841c(92040624)
  260.0 |       .70934 (92093024)       .43876 (92093024)       .30096 (92093024)       .22230c(92112324)       .13893c(92112324)
  270.0 |      1.11174c(92122724)       .71896c(92122724)       .50289c(92122724)       .37348c(92122724)       .23309c(92122724)
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   280.0 |     1.23912c(92102724)     .81272c(92121624)     .57874c(92121624)     .43506c(92121624)     .27612c(92121624)
   290.0 |      .85240c(92111624)     .49972c(92111624)     .32945c(92111624)     .23600c(92012224)     .14673c(92072724)
   300.0 |      .82050c(92012524)     .50830c(92012524)     .34659c(92012524)     .25291c(92012524)     .15409c(92012524)
   310.0 |      .51273c(92042824)     .30771c(92042824)     .20829c(92042824)     .15226c(92042824)     .09400c(92042824)
   320.0 |      .50823c(92011324)     .31347c(92011324)     .21410c(92011324)     .15679c(92011324)     .09631c(92011324)
   330.0 |      .35722c(92081024)     .20969c(92081024)     .13929c(92081024)     .10018c(92081024)     .06018c(92081024)
   340.0 |      .41386c(92012624)     .25190c(92012624)     .17137c(92012624)     .12544c(92012624)     .07730c(92012624)
   350.0 |      .32114c(92022924)     .19475c(92022924)     .13247c(92022924)     .09711c(92022924)     .06014c(92022924)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***      03/27/97
                                   ***  RUN3-1992MET DATA                                                  ***       15:20:21
                                                                                                                     PAGE  19
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                               *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                   INCLUDING SOURCE(S):      STACK1   ,

                                  *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                     ** CONC OF TCE      IN MICROGRAMS/M**3                              **

DIRECTION |                                              DISTANCE (METERS)
(DEGREES) |        1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |      .06245c(92042524)
    10.0 |      .05918c(92012824)
    20.0 |      .04261 (92102824)
    30.0 |      .04663c(92012424)
    40.0 |      .06339c(92032424)
    50.0 |      .16545c(92032424)
    60.0 |      .09344c(92042024)
    70.0 |      .09797c(92071524)
    80.0 |      .12000c(92111224)
    90.0 |      .20630 (92113024)
   100.0 |      .09949 (92113024)
   110.0 |      .07414 (92121324)
   120.0 |      .07857 (92091624)
   130.0 |      .06244 (92070724)
   140.0 |      .06430c(92070224)
   150.0 |      .06886 (92062024)
   160.0 |      .05935 (92110424)
   170.0 |      .05223c(92100824)
   180.0 |      .06096c(92012424)
   190.0 |      .05887c(92022424)
   200.0 |      .04247c(92100724)
   210.0 |      .03426c(92042824)
   220.0 |      .06371c(92010124)
   230.0 |      .05771c(92011524)
   240.0 |      .09021c(92010124)
   250.0 |      .06897c(92040624)
   260.0 |      .09635c(92112324)
```

```
     270.0 |       .16210c(92122724)
     280.0 |       .19437c(92121624)
     290.0 |       .10263c(92072724)
     300.0 |       .10535c(92012524)
     310.0 |       .06540c(92042824)
     320.0 |       .06637c(92011324)
     330.0 |       .04093c(92081024)
     340.0 |       .05356c(92012624)
     350.0 |       .04192c(92022924)
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                     PAGE  20
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                    INCLUDING SOURCE(S):      STACK1  ,

                                                  *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                              ** CONC OF TCE      IN MICROGRAMS/M**3                         **

      X-COORD (M)  Y-COORD (M)         CONC      (YYMMDDHH)              X-COORD (M)  Y-COORD (M)        CONC      (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
          -18.55         1.33         6.63574  (92050524)                  -38.55         1.33       10.92086c (92012024)
          -58.55         1.33         7.11781  (92021124)                  -78.55         1.33        5.68248  (92093024)
          -89.33         1.33         4.89287  (92093024)                  -89.33        21.33        6.87251c (92102724)
          -89.33        41.33         3.77458c (92071124)                  -89.33        61.33        2.48081c (92012524)
          -89.33        81.33         2.47312c (92042824)                  -89.33       100.40        1.95122c (92080724)
          -69.33       100.34         1.98049c (92080724)                  -49.33       100.34        2.02066  (92010524)
          -29.33       100.34         1.88971  (92021024)                   -9.33       100.34        1.84078c (92080724)
            1.45       100.40         1.06288c (92020124)                    1.45        80.34        1.36179c (92080724)
            1.45        60.34         2.01131c (92012524)                    1.45        40.34        4.30092c (92080124)
            1.45        20.34          .00000c (92101624)                    1.45         1.33        3.88983  (92041924)
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***       03/27/97
                                    ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                     PAGE  21
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT
                                                   *** THE SUMMARY OF MAXIMUM PERIOD (  8784 HRS) RESULTS ***

                                              ** CONC OF TCE      IN MICROGRAMS/M**3                         **

                                                                                                           NETWORK
 GROUP ID                             AVERAGE CONC               RECEPTOR  (XR, YR, ZELEV, ZFLAG)   OF TYPE  GRID-ID
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 ALL      1ST HIGHEST VALUE IS        3.32543 AT (      -46.98,        17.10,         .00,          .00)  GP   POLR1
          2ND HIGHEST VALUE IS        2.72418 AT (      -43.30,        25.00,         .00,          .00)  GP   POLR1
```

```
 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                       PAGE  22
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                                  *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***

                                        ** CONC OF TCE       IN MICROGRAMS/M**3                          **

                                                               DATE                                                     NETWORK
 GROUP ID                                  AVERAGE CONC      (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 ALL      HIGH  1ST HIGH VALUE IS      52.65505  ON 92042404: AT (     -25.00,        43.30,        .00,        .00)  GP    POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***        03/27/97
                                    ***  RUN3-1992MET DATA                                                ***          15:20:21
                                                                                                                       PAGE  23
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                                  *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

                                        ** CONC OF TCE       IN MICROGRAMS/M**3                          **

                                                               DATE                                                     NETWORK
 GROUP ID                                  AVERAGE CONC      (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 ALL      HIGH  1ST HIGH VALUE IS      13.04172c ON 92120824: AT (     -46.98,        17.10,        .00,        .00)  GP    POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

```
*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16 FT. STACK HT. & 11 INCH S ***     03/27/97
                                   ***  RUN3-1992MET DATA                                                 ***      15:20:21
                                                                                                                    PAGE  24
**MODELOPTs: CONC                          URBAN  FLAT          DFAULT

*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           0 Warning Message(s)
A Total of         842 Informational Message(s)

A Total of         842 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
              ***  NONE  ***

   ***********************************
   *** ISCST3 Finishes Successfully ***
   ***********************************
```

APPENDIX V

ISC Model Output Files - Stack Parameter Variations

```
1                      ISCST3 - (DATED 96113)

                 IBM-PC VERSION (3.05)     ISCST3R
        (C) COPYRIGHT 1992-1996, TRINITY CONSULTANTS, INC.

 Run Bogan on  3/27/1997 at 17:14:31

 ** BREEZE AIR SUITE (ISCST3) - C:\TRINITY\SUITE\EM72096.DAT
 ** Trinity Consultants Incorporated, Dallas, TX

 CO STARTING
 CO TITLEONE  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S
 CO TITLETWO  RUN3-1989MET DATA
 CO MODELOPT  DFAULT  CONC  URBAN
 CO AVERTIME  1  24  ANNUAL
 CO POLLUTID  TCE
 CO TERRHGTS  FLAT
 CO RUNORNOT  RUN
 CO FINISHED

 SO STARTING
 SO ELEVUNIT  METERS
 SO LOCATION  STACK1  POINT  -4.7  12.7  0
 ** SRCDESCR  AIR STRIPPER EXHAUST
 SO SRCPARAM  STACK1  1.574974E-02  4.88  299.82  22.47931  0.254
 SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
 SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
 SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
 SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
 SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
 SO BUILDHGT  STACK1  7.62  7.62  7.62  7.62  7.62  4.27
 SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
 SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
 SO BUILDWID  STACK1  29.1  28.31  26.66  24.2  21.0  17.17
 SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
 SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
BUILDWID  STACK1  63.61  55.73  46.15  35.17  23.12  17.17                                SO
 SO EMISUNIT  1.0E+06  GRAMS/SEC  MICROGRAMS/M**3
 SO SRCGROUP  ALL
 SO FINISHED

 RE STARTING
 RE GRIDPOLR POLR1 STA
 RE GRIDPOLR POLR1 ORIG  0  0
 RE GRIDPOLR POLR1 DIST 50  100  150  200  250  300  400  500  600  800
 RE GRIDPOLR POLR1 DIST 1000
 RE GRIDPOLR POLR1 DDIR  0  10  20  30  40  50  60  70  80  90  100  110
 RE GRIDPOLR POLR1 DDIR  120  130  140  150  160  170  180  190  200  210
 RE GRIDPOLR POLR1 DDIR  220  230  240  250  260  270  200  290  300  310
 RE GRIDPOLR POLR1 DDIR  320  330  340  350
```

```
RE GRIDPOLR POLR1 END
** BOUNDARY
RE DISCCART  -18.55  1.33
RE DISCCART  -38.55  1.33
RE DISCCART  -58.55  1.33
RE DISCCART  -78.55  1.33
RE DISCCART  -89.33  1.33
RE DISCCART  -89.33  21.33
RE DISCCART  -89.33  41.33
RE DISCCART  -89.33  61.33
RE DISCCART  -89.33  81.33
RE DISCCART  -89.33  100.4
RE DISCCART  -69.33  100.34
RE DISCCART  -49.33  100.34
RE DISCCART  -29.33  100.34
RE DISCCART  -9.33  100.34
RE DISCCART  1.45  100.4
RE DISCCART  1.45  80.34
RE DISCCART  1.45  60.34
RE DISCCART  1.45  40.34
RE DISCCART  1.45  20.34
RE DISCCART  1.45  1.33
RE FINISHED

ME STARTING
ME INPUTFIL  C:\TRINITY\SUITE\MET\PHXTUS89.BIN  UNFORM
ME ANEMHGHT  10.0  METERS
ME SURFDATA  23183  1989
ME UAIRDATA  23160  1989
ME STARTEND  89  01  01  1  89  12  31  24
ME FINISHED

OU STARTING
OU RECTABLE  1  FIRST
OU RECTABLE  ALLAVE  FIRST
OU FINISHED

***********************************
*** SETUP Finishes Successfully ***
***********************************


*** ISCST3 - VERSION 96113 ***    ***  NIBN REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***        03/27/97
                                    ***  RUN3-1989MET DATA                                                   ***         17:14:31
                                                                                                                         PAGE   1
**MODELOPTs: CONC                           URBAN  FLAT          DEFAULT

                                             ***     MODEL SETUP OPTIONS SUMMARY      ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE = F
**Model Uses NO WET DEPLETION.  WDPLETE = F
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
          1. Final Plume Rise.
          2. Stack-tip Downwash.
          3. Buoyancy-induced Dispersion.
          4. Use Calms Processing Routine.
          5. Not Use Missing Data Processing Routine.
          6. Default Wind Profile Exponents.
          7. Default Vertical Potential Temperature Gradients.
          8. "Upper Bound" Values for Supersquat Buildings.
          9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR
   and Calculates ANNUAL Averages

**This Run Includes:    1 Source(s);      1 Source Group(s); and    416 Receptor(s)

**The Model Assumes A Pollutant Type of:  TCE

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
        Model Outputs Tables of ANNUAL Averages by Receptor
        Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    .0000      ;    Rot. Angle =        .0
                 Emission Units = GRAMS/SEC                                  ;  Emission Rate Unit Factor =    .10000E+07
                 Output Units   = MICROGRAMS/M**3

**Input Runstream File: C:\TRINITY\SUITE\EM72096.DAT            ;  **Output Print File: C:\TRINITY\SUITE\EM72096.LST
```

```
*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***         03/27/97
                                    ***  RUN3-1989MET DATA                                                  ***          17:14:31
                                                                                                                          PAGE   2
 **MODELOPTs: CONC                              URBAN  FLAT           DFAULT



                                                    *** POINT SOURCE DATA ***

               NUMBER EMISSION RATE                          BASE      STACK   STACK     STACK      STACK     BUILDING EMISSION RATE
    SOURCE      PART. (USER UNITS)      X          Y         ELEV.     HEIGHT  TEMP.   EXIT VEL.  DIAMETER     EXISTS   SCALAR VARY
      ID        CATS.                (METERS)  (METERS)   (METERS)  (METERS) (DEG.K)   (M/SEC)   (METERS)                    BY
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   STACK1         0    .15750E-01     -4.7       12.7       .0      4.88   299.82     22.48       .25        YES
*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***         03/27/97
                                    ***  RUN3-1989MET DATA                                                  ***          17:14:31
                                                                                                                          PAGE   3
 **MODELOPTs: CONC                              URBAN  FLAT           DFAULT



                                             *** SOURCE IDs DEFINING SOURCE GROUPS ***

 GROUP ID                                                      SOURCE IDs



  ALL         STACK1  ,
*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***         03/27/97
                                    ***  RUN3-1989MET DATA                                                  ***          17:14:31
                                                                                                                          PAGE   4
 **MODELOPTs: CONC                              URBAN  FLAT           DFAULT
                                             *** DIRECTION SPECIFIC BUILDING DIMENSIONS ***


 SOURCE ID: STACK1
  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK
    1   4.3,   20.9, 0      2   4.3,   24.1, 0      3   4.3,   26.6, 0      4   4.3,   28.2, 0      5   4.3,   29.0, 0      6   4.3,   28.9, 0
    7   4.3,   28.0, 0      8   4.3,   26.2, 0      9   4.3,   23.6, 0     10   4.3,   26.2, 0     11   4.3,   28.0, 0     12   4.3,   29.0, 0
   13   4.3,   29.1, 0     14   4.3,   28.3, 0     15   4.3,   26.7, 0     16   4.3,   24.2, 0     17   4.3,   21.0, 0     18   4.3,   17.2, 0
   19   4.3,   20.9, 0     20   4.3,   24.1, 0     21   4.3,   26.6, 0     22   4.3,   28.2, 0     23   4.3,   29.0, 0     24   4.3,   28.9, 0
   25   4.3,   28.0, 0     26   4.3,   26.2, 0     27   4.3,   23.6, 0     28   4.3,   26.2, 0     29   4.3,   28.0, 0     30   4.3,   29.0, 0
   31   7.6,   63.6, 0     32   7.6,   55.7, 0     33   7.6,   46.1, 0     34   7.6,   35.2, 0     35   7.6,   23.1, 0     36   4.3,   17.2, 0
```

```
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***        03/27/97
                                    ***  RUN3-1989MET DATA                                                  ***         17:14:31
                                                                                                                        PAGE   5
 **MODELOPTs: CONC                         URBAN  FLAT          DFAULT


                                         *** GRIDDED RECEPTOR NETWORK SUMMARY ***

                                    *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                            *** ORIGIN FOR POLAR NETWORK ***
                                   X-ORIG =        .00 ;   Y-ORIG =        .00  (METERS)

                                            *** DISTANCE RANGES OF NETWORK ***
                                                      (METERS)

            50.0,      100.0,     150.0,     200.0,     250.0,     300.0,     400.0,     500.0,     600.0,     800.0,
          1000.0,

                                            *** DIRECTION RADIALS OF NETWORK ***
                                                      (DEGREES)

           360.0,       10.0,      20.0,      30.0,      40.0,      50.0,      60.0,      70.0,      80.0,      90.0,
           100.0,      110.0,     120.0,     130.0,     140.0,     150.0,     160.0,     170.0,     180.0,     190.0,
           200.0,      210.0,     220.0,     230.0,     240.0,     250.0,     260.0,     270.0,     280.0,     290.0,
           300.0,      310.0,     320.0,     330.0,     340.0,     350.0,
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***        03/27/97
                                    ***  RUN3-1989MET DATA                                                  ***         17:14:31
                                                                                                                        PAGE   6
 **MODELOPTs: CONC                         URBAN  FLAT          DFAULT


                                              *** DISCRETE CARTESIAN RECEPTORS ***
                                               (X-COORD, Y-COORD, ZELEV, ZFLAG)
                                                          (METERS)

      (     -18.5,         1.3,         .0,         .0);          (     -38.5,         1.3,         .0,         .0);
      (     -58.5,         1.3,         .0,         .0);          (     -78.6,         1.3,         .0,         .0);
      (     -89.3,         1.3,         .0,         .0);          (     -89.3,        21.3,         .0,         .0);
      (     -89.3,        41.3,         .0,         .0);          (     -89.3,        61.3,         .0,         .0);
      (     -89.3,        81.3,         .0,         .0);          (     -89.3,       100.4,         .0,         .0);
      (     -69.3,       100.3,         .0,         .0);          (     -49.3,       100.3,         .0,         .0);
      (     -29.3,       100.3,         .0,         .0);          (      -9.3,       100.3,         .0,         .0);
      (       1.4,       100.4,         .0,         .0);          (       1.4,        80.3,         .0,         .0);
      (       1.4,        60.3,         .0,         .0);          (       1.4,        40.3,         .0,         .0);
      (       1.4,        20.3,         .0,         .0);          (       1.4,         1.3,         .0,         .0);

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***        03/27/97
```

```
                         ***  RUN3-1989MET DATA                                                ***        17:14:31
                                                                                                          PAGE   7
**MODELOPTs: CONC                        URBAN  FLAT          DFAULT

                 * SOURCE-RECEPTOR COMBINATIONS FOR WHICH CALCULATIONS MAY NOT BE PERFORMED *
                      LESS THAN 1.0 METER OR 3*ZLB IN DISTANCE, OR WITHIN OPEN PIT SOURCE

                        SOURCE          - - RECEPTOR LOCATION - -          DISTANCE
                          ID         XR (METERS)    YR (METERS)            (METERS)
                        - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

                        STACK1            1.4            20.3                9.81
*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S ***       03/27/97
                         ***  RUN3-1989MET DATA                                                ***        17:14:31
                                                                                                          PAGE   8
**MODELOPTs: CONC                        URBAN  FLAT          DFAULT

                              *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                               (1=YES; 0=NO)

          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1

              METEOROLOGICAL DATA PROCESSED BETWEEN START DATE:  89  1  1  1
                                                  AND END DATE:  89 12 31 24

          NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                         *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                               (METERS/SEC)

                                   1.54,    3.09,    5.14,    8.23,   10.80,


                                         *** WIND PROFILE EXPONENTS ***

          STABILITY                              WIND SPEED CATEGORY
          CATEGORY         1           2           3           4           5           6
```

```
   A          .15000E+00    .15000E+00    .15000E+00    .15000E+00    .15000E+00    .15000E+00
   B          .15000E+00    .15000E+00    .15000E+00    .15000E+00    .15000E+00    .15000E+00
   C          .20000E+00    .20000E+00    .20000E+00    .20000E+00    .20000E+00    .20000E+00
   D          .25000E+00    .25000E+00    .25000E+00    .25000E+00    .25000E+00    .25000E+00
   E          .30000E+00    .30000E+00    .30000E+00    .30000E+00    .30000E+00    .30000E+00
   F          .30000E+00    .30000E+00    .30000E+00    .30000E+00    .30000E+00    .30000E+00

                    *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                               (DEGREES KELVIN PER METER)

STABILITY                            WIND SPEED CATEGORY
CATEGORY          1             2             3             4             5             6
   A          .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
   B          .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
   C          .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
   D          .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00    .00000E+00
   E          .20000E-01    .20000E-01    .20000E-01    .20000E-01    .20000E-01    .20000E-01
   F          .35000E-01    .35000E-01    .35000E-01    .35000E-01    .35000E-01    .35000E-01

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***       03/27/97
                                   ***  RUN3-1989MET DATA                                                   ***       17:14:31
                                                                                                                      PAGE   9
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                    *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

           FILE: C:\TRINITY\SUITE\MET\PHXTUS89.BIN         FORMAT: UNFORM
           SURFACE STATION NO.:  23183                     UPPER AIR STATION NO.:  23160
                         NAME: UNKNOWN                                      NAME: UNKNOWN
                         YEAR:    1989                                      YEAR:    1989

                                  FLOW    SPEED   TEMP     STAB   MIXING HEIGHT (M)    USTAR  M-O LENGTH   Z-0 IPCODE PRATE
           YEAR  MONTH  DAY  HOUR  VECTOR  (M/S)    (K)     CLASS   RURAL    URBAN      (M/S)     (M)       (M)         (mm/HR)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - -

            89     1     1     1    281.0    2.06   278.2      6     1933.0     81.0     .0000         .0   .0000   0     .00
            89     1     1     2    288.0    2.57   277.6      6     1933.0     81.0     .0000         .0   .0000   0     .00
            89     1     1     3    304.0    2.57   276.5      6     1933.0     81.0     .0000         .0   .0000   0     .00
            89     1     1     4    293.0    2.57   275.9      6     1933.0     81.0     .0000         .0   .0000   0     .00
            89     1     1     5    293.0    1.00   275.4      7     1933.0     81.0     .0000         .0   .0000   0     .00
            89     1     1     6    202.0    2.06   274.8      6     1933.0     81.0     .0000         .0   .0000   0     .00
            89     1     1     7    205.0    1.00   274.8      7     1933.0     81.0     .0000         .0   .0000   0     .00
            89     1     1     8    283.0    2.06   275.9      6      117.0    193.1     .0000         .0   .0000   0     .00
            89     1     1     9    297.0    2.06   278.2      5      419.7    403.1     .0000         .0   .0000   0     .00
            89     1     1    10    261.0    3.60   279.8      4      722.3    773.1     .0000         .0   .0000   0     .00
            89     1     1    11    274.0    3.09   283.2      3     1025.0   1063.0     .0000         .0   .0000   0     .00
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 89    1    1    12      316.0   3.09   285.4      3     1327.7   1353.0     .0000        .0  .0000  0   .00
 89    1    1    13      343.0   2.57   288.2      3     1630.3   1643.0     .0000        .0  .0000  0   .00
 89    1    1    14      339.0   1.00   289.8      2     1933.0   1933.0     .0000        .0  .0000  0   .00
 89    1    1    15      342.0   1.00   290.9      2     1933.0   1933.0     .0000        .0  .0000  0   .00
 89    1    1    16       74.0   2.06   291.5      3     1933.0   1933.0     .0000        .0  .0000  0   .00
 89    1    1    17      121.0   2.06   289.8      4     1933.0   1933.0     .0000        .0  .0000  0   .00
 89    1    1    18      117.0   2.06   288.2      5     1897.8   1778.0     .0000        .0  .0000  0   .00
 89    1    1    19       94.0   2.06   285.9      6     1835.5   1503.7     .0000        .0  .0000  0   .00
 89    1    1    20       87.0   1.00   284.3      7     1773.2   1229.4     .0000        .0  .0000  0   .00
 89    1    1    21       70.0   1.54   283.2      7     1710.9    955.0     .0000        .0  .0000  0   .00
 89    1    1    22      132.0   1.54   282.6      7     1648.7    680.7     .0000        .0  .0000  0   .00
 89    1    1    23      210.0   2.06   281.5      6     1586.4    406.3     .0000        .0  .0000  0   .00
 89    1    1    24      320.0   2.57   280.9      6     1524.1    132.0     .0000        .0  .0000  0   .00


*** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
            FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***      03/27/97
                                      *** RUN3-1989MET DATA                                                ***      17:14:31
                                                                                                                    PAGE  10
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                           *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL      ***
                               INCLUDING SOURCE(S):      STACK1  ,

                             *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                 ** CONC OF TCE      IN MICROGRAMS/M**3                        **

  DIRECTION |                                            DISTANCE (METERS)
  (DEGREES) |      50.00       100.00       150.00      200.00      250.00      300.00      400.00      500.00      600.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     360.00 |      .44563      .16737      .09119      .05690      .03861      .02783      .01642      .01086      .00774
      10.00 |      .38733      .14858      .08597      .05567      .03864      .02826      .01696      .01133      .00813
      20.00 |      .40465      .15692      .08916      .05776      .04025      .02955      .01783      .01196      .00861
      30.00 |      .53909      .19664      .10425      .06525      .04462      .03236      .01925      .01279      .00916
      40.00 |      .82938      .32964      .17246      .10563      .07108      .05099      .02990      .01971      .01403
      50.00 |     1.16149      .52988      .28460      .17629      .11956      .08625      .05103      .03387      .02425
      60.00 |     1.35202      .67430      .38282      .24593      .17072      .12526      .07583      .05111      .03701
      70.00 |     1.36131      .70548      .40314      .26052      .18210      .13451      .08235      .05594      .04073
      80.00 |     1.19090      .67013      .38856      .25093      .17483      .12876      .07846      .05311      .03855
      90.00 |      .94423      .55185      .33501      .22167      .15661      .11643      .07182      .04900      .03578
     100.00 |      .75282      .41997      .25387      .16819      .11909      .08869      .05481      .03742      .02731
     110.00 |      .60764      .34238      .20416      .13388      .09405      .06963      .04267      .02895      .02103
     120.00 |      .48049      .28926      .17962      .12017      .08534      .06358      .03926      .02676      .01950
     130.00 |      .36041      .22602      .14672      .10113      .07330      .05542      .03491      .02412      .01775
     140.00 |      .26445      .15559      .09830      .06695      .04818      .03624      .02264      .01553      .01136
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   150.00 |       .21869     .12162     .07554     .05078     .03624     .02710     .01679     .01146     .00835
   160.00 |       .19908     .11020     .06930     .04700     .03378     .02538     .01584     .01086     .00795
   170.00 |       .19129     .10843     .06927     .04747     .03432     .02588     .01621     .01113     .00815
   180.00 |       .19810     .12160     .07922     .05490     .03995     .03027     .01911     .01321     .00973
   190.00 |       .19747     .12005     .07670     .05259     .03793     .02855     .01784     .01225     .00897
   200.00 |       .18698     .11165     .07133     .04887     .03523     .02652     .01657     .01137     .00832
   210.00 |       .18612     .12013     .07994     .05564     .04047     .03062     .01927     .01329     .00977
   220.00 |       .19402     .13070     .08658     .06030     .04394     .03328     .02095     .01444     .01061
   230.00 |       .21637     .16060     .10911     .07653     .05581     .04225     .02656     .01829     .01343
   240.00 |       .27449     .20935     .14121     .09920     .07271     .05533     .03506     .02426     .01786
   250.00 |       .39967     .34405     .24098     .17148     .12659     .09677     .06167     .04284     .03164
   260.00 |       .68032     .61533     .40742     .27965     .20195     .15222     .09541     .06566     .04821
   270.00 |      1.15973     .92705     .56082     .36768     .25896     .19208     .11806     .08032     .05853
   280.00 |      1.65713    1.06247     .60761     .38865     .26989     .19838     .12052     .08144     .05910
   290.00 |      1.78117     .96717     .52443     .32746     .22434     .16342     .09802     .06564     .04729
   300.00 |      1.53050     .74910     .41132     .25973     .17874     .13041     .07835     .05254     .03792
   310.00 |      1.29578     .57048     .29673     .18041     .12081     .08639     .05051     .03324     .02364
   320.00 |      1.37286     .49965     .25409     .15282     .10183     .07277     .04273     .02833     .02032
   330.00 |      1.10344     .35289     .17405     .10264     .06746     .04768     .02753     .01800     .01274
   340.00 |       .78675     .25614     .12422     .07304     .04798     .03393     .01960     .01282     .00908
   350.00 |       .60543     .20896     .10195     .06019     .03965     .02808     .01623     .01061     .00751

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***        03/27/97
                                    ***  RUN3-1989MET DATA                                                  ***         17:14:31
                                                                                                                         PAGE  11
**MODELOPTs: CONC                                 URBAN  FLAT          DFAULT

                                *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                                    INCLUDING SOURCE(S):       STACK1  ,

                                     *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                          ** CONC OF TCE       IN MICROGRAMS/M**3                          **

  DIRECTION |                                                  DISTANCE (METERS)
  (DEGREES) |       800.00      1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.00 |       .00455      .00303
     10.00 |       .00482      .00323
     20.00 |       .00513      .00345
     30.00 |       .00541      .00361
     40.00 |       .00824      .00548
     50.00 |       .01438      .00963
     60.00 |       .02230      .01513
     70.00 |       .02471      .01682
     80.00 |       .02326      .01576
     90.00 |       .02178      .01485
    100.00 |       .01660      .01129
    110.00 |       .01268      .00857
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             120.00 |        .01182       .00802
             130.00 |        .01092       .00750
             140.00 |        .00691       .00469
             150.00 |        .00505       .00342
             160.00 |        .00484       .00329
             170.00 |        .00496       .00337
             180.00 |        .00599       .00411
             190.00 |        .00547       .00373
             200.00 |        .00506       .00344
             210.00 |        .00599       .00411
             220.00 |        .00649       .00443
             230.00 |        .00821       .00561
             240.00 |        .01095       .00748
             250.00 |        .01953       .01342
             260.00 |        .02956       .02026
             270.00 |        .03556       .02424
             280.00 |        .03574       .02430
             290.00 |        .02827       .01905
             300.00 |        .02277       .01542
             310.00 |        .01384       .00918
             320.00 |        .01212       .00818
             330.00 |        .00743       .00491
             340.00 |        .00530       .00351
             350.00 |        .00437       .00288

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***          03/27/97
                                   ***  RUN3-1989MET DATA                                                         ***          17:14:31
                                                                                                                               PAGE  12
**MODELOPTs: CONC                              URBAN  FLAT           DFAULT

                                 *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL        ***
                                     INCLUDING SOURCE(S):       STACK1  ,

                                                 *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                              ** CONC OF TCE       IN MICROGRAMS/M**3                              **

        X-COORD (M)  Y-COORD (M)          CONC                             X-COORD (M)  Y-COORD (M)         CONC
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
             -18.55         1.33         .44011                              -38.55         1.33         1.15982
             -58.55         1.33        1.25549                              -78.55         1.33         1.14989
             -89.33         1.33        1.04991                              -89.33        21.33         1.16908
             -89.33        41.33         .87210                              -89.33        61.33          .60039
             -89.33        81.33         .39785                              -89.33       100.40          .31104
             -69.33       100.34         .31462                              -49.33       100.34          .24701
             -29.33       100.34         .22243                               -9.33       100.34          .18300
               1.45       100.40         .16439                                1.45        80.34          .22277
               1.45        60.34         .33179                                1.45        40.34          .54796
               1.45        20.34         .00001                                1.45         1.33          .23824
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*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***        03/27/97
                                    ***  RUN3-1989MET DATA                                                ***           17:14:31
                                                                                                                      PAGE  13
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                  *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL        ***
                                      INCLUDING SOURCE(S):       STACK1  ,

                                     *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                        ** CONC OF TCE       IN MICROGRAMS/M**3                              **

DIRECTION |                                               DISTANCE (METERS)
(DEGREES) |           50.00                 100.00                 150.00                 200.00                 250.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.0 |     22.19517 (89121614)    12.07793 (89082023)     8.56556 (89091801)     7.01996 (89091801)     5.43454 (89091801)
     10.0 |     21.45013 (89010316)    12.51881 (89071902)     9.49950 (89031822)     7.56086 (89031822)     5.74263 (89031822)
     20.0 |     20.76622 (89011413)    12.41248 (89081405)     8.79329 (89071822)     7.22071 (89031220)     5.85749 (89012805)
     30.0 |     19.74040 (89032709)    12.03534 (89103122)     8.23783 (89080704)     6.97682 (89080704)     5.47881 (89080704)
     40.0 |     20.22344 (89032808)    12.23042 (89103124)     9.34219 (89080504)     7.30357 (89062501)     5.57974 (89062501)
     50.0 |     19.53523 (89122217)    11.94498 (89021020)     9.21295 (89030822)     7.22561 (89062223)     5.43813 (89062223)
     60.0 |     18.80327 (89081619)    11.69703 (89031924)     9.17258 (89062724)     7.15629 (89052404)     5.86612 (89013101)
     70.0 |     18.12888 (89022318)    11.44037 (89022724)     8.93216 (89081824)     7.04824 (89081824)     5.32327 (89081824)
     80.0 |     17.72952 (89042607)    11.24464 (89112618)     9.02320 (89041523)     6.83282 (89041523)     5.24371 (89073001)
     90.0 |     17.14212 (89122416)    11.01696 (89092002)     8.73357 (89050323)     6.84907 (89062424)     5.25389 (89062424)
    100.0 |     17.03871 (89012515)    10.74574 (89070501)     8.78421 (89052524)     6.79089 (89071801)     5.18622 (89071801)
    110.0 |     16.61399 (89010117)    10.61406 (89080621)     8.70381 (89082524)     6.73185 (89082524)     5.14203 (89060721)
    120.0 |     16.51969 (89102908)    10.51901 (89090623)     8.68368 (89062723)     6.65904 (89071802)     5.10479 (89071802)
    130.0 |     16.54123 (89011121)    10.44640 (89042019)     8.63901 (89071102)     6.63058 (89071102)     5.07269 (89031923)
    140.0 |     15.10937 (89012815)    10.34722 (89082220)     8.62133 (89040603)     6.61791 (89040603)     5.06483 (89040603)
    150.0 |     15.93289 (89121317)    10.23746 (89040302)     8.57737 (89070202)     6.56058 (89070202)     5.01736 (89070202)
    160.0 |     15.61201 (89092218)    10.36040 (89062102)     8.13797 (89050602)     6.22463 (89050602)     4.79308 (89080703)
    170.0 |     15.82978 (89051608)    10.18976 (89071120)     8.57060 (89072301)     6.55914 (89072301)     5.01748 (89072301)
    180.0 |     16.16358 (89011222)    10.28320 (09031520)     8.65056 (89051401)     6.50662 (89092820)     5.04908 (89092820)
    190.0 |     16.00153 (89020618)    10.34629 (89110519)     8.41904 (89070301)     6.56582 (09070301)     5.05024 (89070301)
    200.0 |     15.89620 (89022024)    10.55118 (89111921)     8.67093 (89111021)     6.52553 (89051901)     5.05970 (89051901)
    210.0 |     16.46027 (89081607)    10.69564 (89051403)     8.79234 (89100623)     6.69393 (09052804)     5.15891 (89052804)
    220.0 |     16.83319 (89010215)    10.33000 (89020819)     8.78123 (89101320)     6.68471 (89040323)     5.18709 (89040323)
    230.0 |     16.99662 (89062007)    10.57907 (89102124)     8.95716 (89031122)     6.87536 (89100923)     5.21139 (89061203)
    240.0 |     17.57829 (89012509)    11.16925 (89091706)     8.51875 (89040607)     6.69813 (89060301)     5.25473 (89060301)
    250.0 |     18.18665 (89122709)    11.40481 (89050901)     9.12433 (89101401)     7.05164 (89070804)     5.32639 (89070804)
    260.0 |     19.21035 (89120609)    11.78044 (89031106)     9.26009 (89040507)     7.15586 (89100922)     5.45665 (89070304)
    270.0 |     19.26299 (89090508)    11.99955 (89032723)     9.35057 (89050202)     7.21658 (89092806)     5.53495 (89092806)
    280.0 |     20.28293 (89111408)    12.23692 (89102201)     9.32001 (89062706)     7.31432 (89062503)     5.56500 (89062503)
    290.0 |     20.57962 (89030608)    12.44773 (89031505)     9.49966 (89051006)     7.43055 (89050401)     5.63424 (89050401)
    300.0 |     21.36102 (89012209)    12.66052 (89040408)     9.46919 (89050603)     7.47527 (89050603)     5.69675 (89092524)
    310.0 |     29.49294 (89010601)    22.14768 (89101704)    13.24943 (89022124)     8.83457 (89022124)     6.38598 (89020222)
    320.0 |     46.25023 (89050404)    22.49594 (89031107)    13.48221 (89112219)     9.27170 (89112219)     6.61088 (89092124)
    330.0 |     45.34123 (89011408)    22.60964 (89021902)    13.35552 (89120401)     9.27343 (89120401)     6.60726 (89120401)
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    340.0 |     47.72895 (89091407)     22.78453 (89110901)     13.37031 (89050704)      9.24328 (89050704)      6.57695 (89050704)
    350.0 |     47.40989 (89041406)     22.55248 (89111423)     12.66294 (89101323)      8.78618 (89010422)      6.34127 (89010422)

*** ISCST3 - VERSION 96113 ***     *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. 6 10 INCH S  ***          03/27/97
                                    ***  RUN3-1989MET DATA                                                    ***          17:14:31
                                                                                                                           PAGE  14
**MODELOPTs: CONC                                  URBAN  FLAT           DFAULT

                                *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL        ***
                                    INCLUDING SOURCE(S):        STACK1  ,

                                    *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                         ** CONC OF TCE       IN MICROGRAMS/M**3                                **

DIRECTION |                                              DISTANCE (METERS)
(DEGREES) |        300.00                  400.00                  500.00                  600.00                  800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.0 |      4.24470 (89091801)      2.76635 (89091801)      1.95385 (89091801)      1.46596 (89091801)       .93350 (89091801)
     10.0 |      4.43592 (89092923)      2.86929 (89092923)      2.01634 (89092923)      1.50740 (89092923)       .95532 (89092923)
     20.0 |      5.00018 (89012805)      3.56764 (89012805)      2.62795 (89012805)      2.01626 (89012805)      1.31087 (89012805)
     30.0 |      4.30869 (89080704)      2.82272 (89080704)      1.99603 (89080704)      1.49748 (89080704)       .95251 (89080704)
     40.0 |      4.30421 (89062501)      2.77570 (89032003)      1.95688 (89032003)      1.46362 (89032003)       .93916 (89051501)
     50.0 |      4.15056 (89062223)      2.65666 (89081005)      1.90944 (89081005)      1.44778 (89081005)       .93300 (89081005)
     60.0 |      4.86731 (89013101)      3.35099 (89013101)      2.41182 (89013101)      1.81855 (89013101)      1.15155 (89013101)
     70.0 |      4.07757 (89081824)      2.70901 (89022622)      1.93636 (89022622)      1.46270 (89022622)       .93787 (89022622)
     80.0 |      4.13131 (89073001)      2.71498 (89073001)      1.92255 (89073001)      1.45323 (89050422)       .93324 (89050422)
     90.0 |      4.09842 (89091901)      2.69231 (89091901)      2.08094 (89020701)      1.65688 (89020701)      1.12770 (89020701)
    100.0 |      4.02407 (89071801)      2.80131 (89013006)      2.15127 (89013006)      1.69921 (89013006)      1.14669 (89013006)
    110.0 |      4.02601 (89060721)      2.64018 (89060721)      1.87249 (89060721)      1.40816 (89060721)       .89799 (89060721)
    120.0 |      3.98737 (89071802)      2.61210 (89071802)      1.85772 (89053022)      1.41161 (89053022)       .91383 (89053022)
    130.0 |      3.97891 (89031923)      2.62684 (89031923)      1.87553 (89031923)      1.41867 (89031923)       .91378 (89091403)
    140.0 |      3.96390 (89040603)      2.61303 (89040603)      1.86530 (89040603)      1.41116 (89040603)       .90882 (89040603)
    150.0 |      3.92729 (89070202)      2.59115 (89070202)      1.85134 (89070202)      1.40165 (89070202)       .90370 (89070202)
    160.0 |      3.78797 (89080703)      2.52684 (89080703)      1.81618 (89080703)      1.38008 (89080703)       .89356 (89080703)
    170.0 |      3.92784 (89072301)      2.59174 (89072301)      1.85181 (89072301)      1.40200 (89072301)       .90391 (89072301)
    180.0 |      3.95523 (89092820)      2.60980 (89092820)      1.86385 (89092820)      1.41042 (89092820)       .90858 (89092820)
    190.0 |      3.97108 (89070301)      2.62403 (89070301)      1.87431 (89070301)      1.41808 (89070301)       .91393 (89060604)
    200.0 |      3.98368 (89051901)      2.63763 (89051901)      1.88470 (89051901)      1.42577 (89051901)       .91748 (89051901)
    210.0 |      4.03693 (89052804)      2.64545 (89052804)      1.87545 (89052804)      1.41074 (89080304)       .91406 (89080304)
    220.0 |      4.06991 (89040323)      2.67063 (89040323)      1.89284 (89040323)      1.42226 (89040323)       .91561 (89042924)
    230.0 |      4.09955 (89061203)      2.69338 (89061203)      1.90846 (89061203)      1.43318 (89061203)       .91157 (89061203)
    240.0 |      4.13854 (89060301)      2.71847 (89060301)      1.92449 (89060301)      1.44393 (89060301)       .91803 (89042302)
    250.0 |      4.17624 (89080705)      2.74103 (89080705)      1.93831 (89080705)      1.46251 (89091002)       .93783 (89091002)
    260.0 |      4.23337 (89070304)      2.73428 (89050804)      1.95095 (89050804)      1.47182 (89050804)       .94212 (89050804)
    270.0 |      4.28080 (89092806)      2.79059 (89052701)      1.96485 (89052701)      1.46858 (89052701)       .92823 (89052701)
    280.0 |      4.33227 (89090106)      2.81086 (89090106)      1.98432 (89052605)      1.49117 (89052605)       .95021 (89052605)
    290.0 |      4.32743 (89050401)      2.82684 (89040801)      1.99802 (89040801)      1.49858 (89040801)       .95293 (89040801)
    300.0 |      4.40826 (89092524)      2.85469 (89041902)      2.01068 (89041902)      1.50507 (89041902)       .95505 (89041902)
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       310.0 |        4.80837 (89020222)       3.01547 (89020222)       2.08971 (89020222)       1.55090 (89020222)       .97636 (89020222)
       320.0 |        4.92975 (89092124)       3.05687 (89092124)       2.10481 (89092124)       1.55812 (89071206)       .97933 (89071206)
       330.0 |        4.92006 (89120401)       3.04762 (89120401)       2.09789 (89120401)       1.55038 (89120401)       .97575 (89121902)
       340.0 |        4.89558 (89050704)       3.03263 (89050704)       2.08823 (89050704)       1.54375 (89050704)       .97249 (89020805)
       350.0 |        4.75893 (89010422)       2.97416 (89010422)       2.05742 (89010422)       1.52520 (89010422)       .95871 (89010422)

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***        03/27/97
                                      ***  RUN3-1989MET DATA                                                   ***       17:14:31
                                                                                                                         PAGE  15
 **MODELOPTs: CONC                             URBAN  FLAT           DEFAULT

                                   *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                       INCLUDING SOURCE(S):       STACK1  ,

                                        *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                            ** CONC OF TCE       IN MICROGRAMS/M**3                             **

 DIRECTION |                                              DISTANCE (METERS)
 (DEGREES) |          1000.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

       360.0 |         .66166 (89091801)
        10.0 |         .67656 (89040706)
        20.0 |         .93657 (89012805)
        30.0 |         .67428 (89080704)
        40.0 |         .66900 (89051501)
        50.0 |         .66571 (89081005)
        60.0 |         .80577 (89013101)
        70.0 |         .66687 (89022622)
        80.0 |         .66423 (89050422)
        90.0 |         .82769 (89020701)
       100.0 |         .83801 (89013006)
       110.0 |         .63604 (89060721)
       120.0 |         .65437 (89053022)
       130.0 |         .65417 (89091403)
       140.0 |         .64874 (89040603)
       150.0 |         .64556 (89070202)
       160.0 |         .63981 (89080703)
       170.0 |         .64570 (89072301)
       180.0 |         .64864 (89092820)
       190.0 |         .65425 (89060604)
       200.0 |         .65434 (89051901)
       210.0 |         .65470 (89080304)
       220.0 |         .65574 (89042924)
       230.0 |         .64728 (89111604)
       240.0 |         .65744 (89042302)
       250.0 |         .66686 (89091002)
       260.0 |         .66920 (89050804)
       270.0 |         .66118 (89030102)
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        280.0 |        .67339 (89052605)
        290.0 |        .67448 (89040801)
        300.0 |        .67528 (89041902)
        310.0 |        .68823 (89020222)
        320.0 |        .68975 (89071206)
        330.0 |        .68792 (89121902)
        340.0 |        .68626 (89020805)
        350.0 |        .67499 (89010422)
 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***        03/27/97
                                     ***  RUN3-1989MET DATA                                                  ***          17:14:31
                                                                                                                          PAGE  16
  **MODELOPTs: CONC                           URBAN  FLAT          DFAULT

                                 *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                     INCLUDING SOURCE(S):       STACK1  ,

                                                  *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                              ** CONC OF TCE       IN MICROGRAMS/M**3                            **

      X-COORD (M)  Y-COORD (M)        CONC      (YYMMDDHH)              X-COORD (M)  Y-COORD (M)        CONC      (YYMMDDHH)
  - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
          -18.55         1.33       26.56294  (89020213)                 -38.55         1.33       22.96120  (89051209)
          -58.55         1.33       17.78110  (89010309)                 -78.55         1.33       14.76468  (89120203)
          -89.33         1.33       13.37589  (89020824)                 -89.33        21.33       13.45276  (89032207)
          -89.33        41.33       12.80845  (89112121)                 -89.33        61.33       12.28559  (89101704)
          -89.33        81.33       16.57599  (89031701)                 -89.33       100.40       15.07699  (89112006)
          -69.33       100.34       17.49701  (89033103)                 -49.33       100.34       19.83029  (89112223)
          -29.33       100.34       21.35494  (89101620)                  -9.33       100.34       21.22205  (89031901)
            1.45       100.40       12.46867  (89082023)                   1.45        80.34       13.66582  (89112516)
            1.45        60.34       18.66570  (89112516)                   1.45        40.34       26.70233  (89102615)
            1.45        20.34         .00381  (89050612)                   1.45         1.33       23.48797  (89080609)
 *** ISCST3 - VERSION 96113 ***  . ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***        03/27/97
                                     ***  RUN3-1989MET DATA                                                  ***          17:14:31
                                                                                                                          PAGE  17
  **MODELOPTs: CONC                           URBAN  FLAT          DEFAULT

                                 *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                     INCLUDING SOURCE(S):       STACK1  ,

                                       *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                              ** CONC OF TCE       IN MICROGRAMS/M**3                            **

  DIRECTION |                                                DISTANCE (METERS)
  (DEGREES) |         50.00                  100.00                 150.00                 200.00                 250.00
  - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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 360.0 |     2.94230c(89112524)     1.36666c(89082024)      .75707c(89082024)      .45637c(89082024)      .31763c(89011324)
  10.0 |     2.37203c(89033024)     1.13717c(89100724)      .82411c(89042824)      .57328c(89042824)      .40536c(89042824)
  20.0 |     2.45509c(89020424)     1.22701c(89100724)      .87852c(89042824)      .73086c(89042824)      .57204c(89042824)
  30.0 |     3.82689c(89020424)     1.58263c(89110324)      .85400c(89110324)      .57453c(89010924)      .44655c(89010924)
  40.0 |     4.16845c(89072324)     1.63293c(89063024)      .95446c(89063024)      .58581c(89063024)      .42431c(89011324)
  50.0 |     4.83526c(89061324)     3.09850c(89103024)     1.61434c(89103024)     1.00521c(89103024)      .67997c(89103024)
  60.0 |     4.55105c(89042624)     3.71251 (89090824)     2.36937 (89090824)     1.50414 (89090824)     1.09601c(89103024)
  70.0 |     5.31431c(89081324)     2.92625c(89052424)     1.76615 (89090824)     1.27687 (89090824)      .94693 (89090824)
  80.0 |     4.91040 (89081224)     2.50015c(89103124)     1.54973c(89103124)     1.04827c(89103124)      .76858c(89041524)
  90.0 |     4.74391 (89071524)     2.83679 (89081224)     1.50672 (89081224)      .90539c(89082924)      .62635c(89082924)
 100.0 |     4.51114 (89090224)     2.07232 (89071524)     1.28159 (89081224)      .87506 (89081224)      .62845 (89081224)
 110.0 |     4.19207 (89090224)     2.01492 (89090224)     1.25701c(89083124)      .86355c(89083124)      .61980c(89083124)
 120.0 |     2.62488 (89080324)     1.48181 (89080324)      .82490 (89090224)      .57965c(89110324)      .43880c(89110324)
 130.0 |     2.04927c(89082424)     1.18817 (89080324)      .97521c(89030524)      .76339c(89030524)      .58678c(89030524)
 140.0 |     1.70130 (89072924)     1.05169 (89072924)      .65384c(89121924)      .52023c(89121924)      .40795c(89121924)
 150.0 |     1.70753c(89121324)     1.13970c(89041924)      .74744c(89070224)      .53443c(89070224)      .39390c(89070224)
 160.0 |     2.06210c(89081124)     1.25275c(89081124)      .74183c(89081124)      .49611c(89070224)      .36200c(89070224)
 170.0 |     2.00901c(89070624)     1.05042c(89070624)      .66810c(89102224)      .46949c(89100624)      .36360c(89030524)
 180.0 |     3.15514c(89011224)     1.64880c(89070624)     1.01441c(89070624)      .66947c(89070624)      .52831c(89011124)
 190.0 |     3.72817c(89011224)     1.56224c(89081924)     1.06989c(89081924)      .74122c(89081924)      .53727c(89081924)
 200.0 |     2.44368 (89121124)     1.10365 (89121124)      .63794c(89101324)      .44230c(89101324)      .31961c(89101324)
 210.0 |     2.46639 (89121124)     1.30286 (89121124)      .74329 (89121124)      .54411c(89082724)      .41330c(89082724)
 220.0 |     2.61324 (89121124)     1.26090 (89121124)      .77251c(89082724)      .51064c(89040324)      .40821c(89040324)
 230.0 |     3.40119c(89112824)     1.33026 (89112924)      .82016c(89022524)      .62172c(89022524)      .46099c(89022524)
 240.0 |     3.07864 (89112924)     1.68778 (89112924)     1.02382c(89042224)      .71638c(89040624)      .53934c(89040624)
 250.0 |     3.88436 (89112924)     2.01858c(89111924)     1.69045c(89040524)     1.40958c(89040524)     1.12986c(89040524)
 260.0 |     4.58550c(89111924)     4.08591c(89040524)     2.79050c(89040524)     1.81434c(89040524)     1.23477c(89040524)
 270.0 |     5.20328 (89101924)     3.38295c(89111324)     2.09035c(89111324)     1.36030c(89111324)      .94096c(89111324)
 280.0 |     6.60454c(89012124)     3.17490c(89083024)     2.33302c(89090424)     1.66734c(89090424)     1.21299c(89090424)
 290.0 |     7.17689c(89012124)     3.46644c(89110524)     2.24100c(89121724)     1.65697c(89121724)     1.23282c(89121724)
 300.0 |     6.15415 (89102124)     3.19882 (89102124)     1.64997c(89112224)     1.12089c(89112324)      .84026c(89112324)
 310.0 |     6.50118 (89102024)     2.73749c(89102224)     1.48600c(89102224)     1.08762c(89111524)      .81622c(89111524)
 320.0 |     7.62045 (89102024)     2.81186c(89042924)     1.57541c(89111524)     1.01199c(89111524)      .68488c(89111524)
 330.0 |     5.31684c(89010724)     2.38004c(89112224)     1.27016c(89112124)      .79704c(89112124)      .54816c(89112124)
 340.0 |     5.15013c(89091524)     2.47742c(89110924)     1.31166c(89110924)      .83393c(89110924)      .57270c(89110924)
 350.0 |     5.68371 (89051524)     2.04009 (89051524)     1.16647c(89010424)      .75738c(89010424)      .53177c(89010424)

*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S ***        03/27/97
                                   ***  RUN3-1989MET DATA                                                     ***        17:14:31
                                                                                                                           PAGE  18
**MODELOPTs: CONC                                  URBAN  FLAT          DFAULT

                              *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                   *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                        ** CONC OF TCE       IN MICROGRAMS/M**3                          **

DIRECTION |                                            DISTANCE (METERS)
```

```
(DEGREES) |          300.00                  400.00                  500.00                  600.00                  800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |     .24784c(89011324)       .16024c(89011324)       .11205c(89011324)       .08324c(89011324)       .05204c(89011324)
    10.0 |     .29809c(89042824)       .17925c(89042824)       .11969c(89042824)       .08589c(89042824)       .05287c(89052624)
    20.0 |     .44926c(89042824)       .29356c(89042824)       .20693c(89042824)       .15472c(89042824)       .09773c(89042824)
    30.0 |     .34731c(89010924)       .22302c(89010924)       .15496c(89010924)       .11441c(89010924)       .07070c(89010924)
    40.0 |     .32475c(89011324)       .20482c(89010924)       .14540c(89010924)       .10876c(89122624)       .06888c(89122624)
    50.0 |     .48529c(89103024)       .27954c(89103024)       .18107c(89103024)       .12692c(89103024)       .07258c(89103024)
    60.0 |     .84660c(89103024)       .54420c(89103024)       .38022c(89103024)       .28242c(89103024)       .17646c(89103024)
    70.0 |     .72611 (89090824)       .46584 (89090824)       .32619 (89090824)       .24293 (89090824)       .15240 (89090824)
    80.0 |     .58518c(89041524)       .37050c(89041524)       .26305c(89012624)       .19899c(89012624)       .12669c(89012624)
    90.0 |     .48236c(89013024)       .32319c(89013024)       .23017c(89013024)       .17264c(89013024)       .10864c(89013024)
   100.0 |     .47247 (89081224)       .30386c(89110224)       .21380c(09110224)       .15994c(89110224)       .10132c(89110224)
   110.0 |     .46535c(89083124)       .29153c(89083124)       .20175c(89083124)       .14935c(89083124)       .09328c(89083124)
   120.0 |     .34032c(89110324)       .22119c(89110324)       .15623c(89110324)       .11719c(89110324)       .07448c(89110324)
   130.0 |     .45851c(89030524)       .29952c(89030524)       .21145c(89030524)       .15820c(89030524)       .09977c(89030524)
   140.0 |     .32435c(89121924)       .21747c(89121924)       .15632c(89121924)       .11851c(89121924)       .07613c(89121924)
   150.0 |     .30086c(89070224)       .19208c(89070224)       .13409c(89070224)       .09967c(89070224)       .06240c(89070224)
   160.0 |     .27475c(89070224)       .17407c(89070224)       .12228c(89121324)       .09244c(89121324)       .05920c(89121324)
   170.0 |     .29439c(89030524)       .20129c(89030524)       .14611c(89030524)       .11139c(89030524)       .07196c(89030524)
   180.0 |     .43243c(89011124)       .29976c(89011124)       .21959c(89011124)       .16860c(89011124)       .11018c(89011124)
   190.0 |     .40647c(89081924)       .25709c(89081924)       .17883c(89081924)       .13276c(89081924)       .08314c(89081924)
   200.0 |     .24095c(89101324)       .15138c(89101324)       .10465c(89101324)       .07723c(89101324)       .04865c(89092224)
   210.0 |     .32201c(89082724)       .21079c(89082724)       .14949c(89082724)       .11236c(89082724)       .07145c(89082724)
   220.0 |     .32699c(89040324)       .22036c(89040324)       .15873c(89040324)       .12055c(89040324)       .07775c(89040324)
   230.0 |     .34931c(89022524)       .21782c(89022524)       .14919c(89120724)       .11282c(89020424)       .07401c(89020424)
   240.0 |     .41524c(89040624)       .26572c(89040624)       .18494c(89040624)       .13687c(89040624)       .08494c(89040624)
   250.0 |     .90775c(89040524)       .61380c(89040524)       .44256c(89040524)       .33601c(89040524)       .21623c(89040524)
   260.0 |     .88379c(89040524)       .51204c(89040524)       .33346c(89040524)       .23493c(89040524)       .13566c(89040524)
   270.0 |     .68811c(89111324)       .41846c(89111324)       .29576c(89122224)       .22318c(89122224)       .14185c(89122224)
   280.0 |     .91462c(89090424)       .57283c(89090424)       .39515c(89090424)       .29148c(89090424)       .18660c(89121724)
   290.0 |     .94120c(89121724)       .58997c(89121724)       .40344c(89121724)       .29444c(89121724)       .17905c(89121724)
   300.0 |     .64279c(89112324)       .40626c(89112324)       .28008c(89112324)       .20585c(89112324)       .12661c(89112324)
   310.0 |     .62718c(89111524)       .40227c(89111524)       .28188c(89111524)       .21037c(89111524)       .13287c(89111524)
   320.0 |     .49080c(89111524)       .28716c(89111524)       .19418c(89040424)       .14324c(89040424)       .08944c(89040424)
   330.0 |     .39988c(89112124)       .24077c(89112124)       .16212c(89112124)       .11750c(89112124)       .07107c(89112124)
   340.0 |     .41856c(89110924)       .25475c(89110924)       .17399c(89110924)       .12804c(89110924)       .07983c(89110924)
   350.0 |     .39431c(89010424)       .24346c(89010424)       .16734c(89010424)       .12353c(89010424)       .07721c(89010424)

*** ISCST3 - VERSION 96113 ***     *** NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S ***       03/27/97
                                    *** RUN3-1989MET DATA                                                   ***       17:14:31
                                                                                                                      PAGE  19
**MODELOPTs: CONC                          URBAN  FLAT           DFAULT

                               *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                   INCLUDING SOURCE(S):      STACK1  ,

                                *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***
```

```
                                   ** CONC OF TCE       IN MICROGRAMS/M**3                       **

DIRECTION |                                            DISTANCE (METERS)
(DEGREES) |         1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.0 |       .03629c(89011324)
     10.0 |       .03707c(89052624)
     20.0 |       .06874c(89042824)
     30.0 |       .04876c(89010924)
     40.0 |       .04843c(89122624)
     50.0 |       .04715c(89103024)
     60.0 |       .12285c(89103024)
     70.0 |       .10636 (89090824)
     80.0 |       .08887c(89012624)
     90.0 |       .07563c(89013024)
    100.0 |       .07148c(89110224)
    110.0 |       .06510c(89083124)
    120.0 |       .05261c(89110324)
    130.0 |       .06985c(89030524)
    140.0 |       .05399c(89121924)
    150.0 |       .04355c(89070224)
    160.0 |       .04195c(89121324)
    170.0 |       .05116c(89030524)
    180.0 |       .07910c(89011124)
    190.0 |       .05808c(89081924)
    200.0 |       .03496c(89092224)
    210.0 |       .05040c(89082724)
    220.0 |       .05539c(89040324)
    230.0 |       .05314c(89020424)
    240.0 |       .05903c(89013024)
    250.0 |       .15359c(89040524)
    260.0 |       .08892c(89040524)
    270.0 |       .09959c(89122224)
    280.0 |       .13171c(89121724)
    290.0 |       .12214c(89121724)
    300.0 |       .08715c(89112324)
    310.0 |       .09348c(89111524)
    320.0 |       .06266c(89040424)
    330.0 |       .04838c(89112124)
    340.0 |       .05594c(89110924)
    350.0 |       .05414c(89010424)

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***        03/27/97
                                    ***  RUN3-1989MET DATA                                                   ***       | 17:14:31
                                                                                                                          PAGE  20
 **MODELOPTs: CONC                             URBAN  FLAT            DFAULT

                                 *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                     INCLUDING SOURCE(S):       STACK1  ,
```

```
                                    *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                               ** CONC OF TCE      IN MICROGRAMS/M**3                              **

    X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)              X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        -18.55         1.33        3.95479c (89110224)                  -38.55         1.33        6.25312c (89012024)
        -58.55         1.33        5.11146  (89101924)                  -78.55         1.33        3.98056  (89101924)
        -89.33         1.33        3.72162c (89111324)                  -89.33        21.33        4.30015c (89083024)
        -89.33        41.33        3.79525  (89102124)                  -89.33        61.33        2.93799c (89112224)
        -89.33        81.33        2.13924c (89111524)                  -89.33       100.40      . 2.17374c (89111524)
        -69.33       100.34        1.94502c (89120824)                  -49.33       100.34        1.80339c (89112124)
        -29.33       100.34        2.06990c (89110924)                   -9.33       100.34        1.48222  (89051524)
          1.45       100.40        1.34064c (89082024)                    1.45        80.34        1.56769c (89082024)
          1.45        60.34        2.34597c (89112524)                    1.45        40.34        3.53875c (89033024)
          1.45        20.34         .00039c (89100824)                    1.45         1.33        2.90400  (89072924)
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***       03/27/97
                                    ***   RUN3-1989MET DATA                                              ***        17:14:31
                                                                                                                    PAGE  21
 **MODELOPTs: CONC                         URBAN  FLAT          DFAULT

                                   *** THE SUMMARY OF MAXIMUM PERIOD (  8760 HRS) RESULTS ***


                                ** CONC OF TCE      IN MICROGRAMS/M**3                             **

                                                                                                    NETWORK
 GROUP ID                    AVERAGE CONC              RECEPTOR  (XR, YR, ZELEV, ZFLAG)   OF TYPE  GRID-ID
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 ALL      1ST HIGHEST VALUE IS      1.78117 AT (     -46.98,     17.10,        .00,       .00)  GP    POLR1
          2ND HIGHEST VALUE IS      1.65713 AT (     -49.24,      8.68,        .00,       .00)  GP    POLR1


  *** RECEPTOR TYPES:  GC = GRIDCART
                       GP = GRIDPOLR
                       DC = DISCCART
                       DP = DISCPOLR
                       BD = BOUNDARY
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***       03/27/97
                                    ***   RUN3-1989MET DATA                                              ***        17:14:31
                                                                                                                    PAGE  22
 **MODELOPTs: CONC                         URBAN  FLAT          DFAULT

                                      *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***
```

```
                                 ** CONC OF TCE       IN MICROGRAMS/M**3                        **

                                                           DATE                                                     NETWORK
GROUP ID                                  AVERAGE CONC    (YYMMDDHH)          RECEPTOR  (XR, YR, ZELEV, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS        47.72895  ON 89091407: AT (     -17.10,       46.98,       .00,        .00)  GP   POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***          03/27/97
                                    ***  RUN3-1989MET DATA                                                  ***          17:14:31
                                                                                                                          PAGE  23
**MODELOPTs: CONC                          URBAN  FLAT          DFAULT

                                              *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

                                 ** CONC OF TCE       IN MICROGRAMS/M**3                        **

                                                           DATE                                                     NETWORK
GROUP ID                                  AVERAGE CONC    (YYMMDDHH)          RECEPTOR  (XR, YR, ZELEV, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS         7.62045  ON 89102024: AT (     -32.14,       38.30,       .00,        .00)  GP   POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-16FT. STACK HT. & 10 INCH S  ***          03/27/97
                                    ***  RUN3-1989MET DATA                                                  ***          17:14:31
                                                                                                                          PAGE  24
**MODELOPTs: CONC                          URBAN  FLAT          DFAULT

*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of          0 Fatal Error Message(s)
A Total of          2 Warning Message(s)
```

```
A Total of        1158 Informational Message(s)

A Total of        1158 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
MX W430  4431 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    89070415
MX W430  4432 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    89070416

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
1                          ISCST3 - (DATED 96113)

                  IBM-PC VERSION (3.05)     ISCST3R
         (C) COPYRIGHT 1992-1996, TRINITY CONSULTANTS, INC.

Run Began on  3/26/1997 at  9:08:07

** BREEZE AIR SUITE (ISCST3) - C:\TRINITY\SUITE\EM72096.DAT
** Trinity Consultants Incorporated, Dallas, TX

CO STARTING
CO TITLEONE  NIBW REMEDIATION SITE-SHORT TERM MODEL-10 FT. STACK HT. & 11 INCH ST
CO TITLETWO  RUN3-1989MET DATA
CO MODELOPT  DFAULT  CONC  URBAN
CO AVERTIME  1  24  ANNUAL
CO POLLUTID  TCE
CO TERRHGTS  FLAT
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
SO ELEVUNIT  METERS
SO LOCATION  STACK1  POINT  -4.66  12.7  0
** SRCDESCR  AIR STRIPPER EXHAUST
SO SRCPARAM  STACK1  1.574974E-02  5.4865  299.82  18.29  0.28
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  7.62  7.62  7.62  7.62  7.62  4.27
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  29.1  28.31  26.66  24.2  21.0  17.17
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  63.61  55.73  46.15  35.17  23.12  17.17
SO EMISUNIT  1.0E+06  GRAMS/SEC  MICROGRAMS/M**3
SO SRCGROUP  ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POLR1 STA
RE GRIDPOLR POLR1 ORIG  0  0
RE GRIDPOLR POLR1 DIST 50  150  200  250  300  400  500  600  800  1000
RE GRIDPOLR POLR1 DDIR  0  10  20  30  40  50  60  70  80  90  100  110
RE GRIDPOLR POLR1 DDIR  120  130  140  150  160  170  180  190  200  210
RE GRIDPOLR POLR1 DDIR  220  230  240  250  260  270  280  290  300  310
RE GRIDPOLR POLR1 DDIR  320  330  340  350  0
RE GRIDPOLR POLR1 END
** BOUNDARY
RE DISCCART  -18.55  1.33
RE DISCCART  -38.55  1.33
```

```
RE DISCCART  -58.55  1.33
RE DISCCART  -78.55  1.33
RE DISCCART  -89.33  1.33
RE DISCCART  -89.33  21.33
RE DISCCART  -89.33  41.33
RE DISCCART  -89.33  61.33
RE DISCCART  -89.33  81.33
RE DISCCART  -89.33  100.4
RE DISCCART  -69.33  100.34
RE DISCCART  -49.33  100.34
RE DISCCART  -29.33  100.34
RE DISCCART  -9.33  100.34
RE DISCCART  1.45  100.4
RE DISCCART  1.45  80.34
RE DISCCART  1.45  60.34
RE DISCCART  1.45  40.34
RE DISCCART  1.45  20.34
RE DISCCART  1.45  1.33
RE FINISHED

ME STARTING
ME INPUTFIL  C:\TRINITY\SUITE\MET\PHXTUS89.BIN  UNFORM
ME ANEMHGHT  10.0  METERS
ME SURFDATA  23183  1989
ME UAIRDATA  23160  1989
ME STARTEND  89  01  01  1  89  12  31  24
ME FINISHED

OU STARTING
OU RECTABLE  1  FIRST
OU RECTABLE  ALLAVE  FIRST
OU FINISHED

**********************************
*** SETUP Finishes Successfully ***
**********************************

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-10 FT. STACK HT. & 11 INCH S ***      03/26/97
                                   ***  RUN3-1989MET DATA                                            ***         09:08:07
                                                                                                                 PAGE   1
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                                          ***      MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONCentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
**Model Uses NO DRY DEPLETION.  DDPLETE = F
**Model Uses NO WET DEPLETION.  WDPLETE = F
```

```
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
         1. Final Plume Rise.
         2. Stack-tip Downwash.
         3. Buoyancy-induced Dispersion.
         4. Use Calms Processing Routine.
         5. Not Use Missing Data Processing Routine.
         6. Default Wind Profile Exponents.
         7. Default Vertical Potential Temperature Gradients.
         8. "Upper Bound" Values for Supersquat Buildings.
         9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR
    and Calculates ANNUAL Averages

**This Run Includes:     1 Source(s);      1 Source Group(s); and    390 Receptor(s)

**The Model Assumes A Pollutant Type of:  TCE

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    .0000     ;    Rot. Angle =       .0
                 Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =    .10000E+07
                 Output Units   = MICROGRAMS/M**3

**Input Runstream File: C:\TRINITY\SUITE\EM72096.DAT           ;  **Output Print File: C:\TRINITY\SUITE\EM72096.LST

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***        03/26/97
                                   ***  RUN3-1989MET DATA                                                  ***          09:08:07
                                                                                                                        PAGE   2
**MODELOPTs: CONC                         URBAN  FLAT          DFAULT


                                          *** POINT SOURCE DATA ***
```

```
                NUMBER EMISSION RATE                        BASE     STACK   STACK    STACK     STACK    BUILDING EMISSION RATE
  SOURCE         PART. (USER UNITS)     X         Y        ELEV.    HEIGHT  TEMP.   EXIT VEL. DIAMETER   EXISTS   SCALAR VARY
    ID           CATS.               (METERS) (METERS) (METERS) (METERS) (DEG.K)  (M/SEC)  (METERS)                 BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  STACK1          0    .15750E-01     -4.7      12.7       .0     5.49   299.02    18.29       .28      YES

*** ISCST3 - VERSION 96113 ***     *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***        03/26/97
                                     ***  RUN3-1989MET DATA                                                ***          09:08:07
                                                                                                                        PAGE   3
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT


                                           *** SOURCE IDs DEFINING SOURCE GROUPS ***

GROUP ID                                                  SOURCE IDs


 ALL        STACK1   ,
*** ISCST3 - VERSION 96113 ***     *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***        03/26/97
                                     ***  RUN3-1989MET DATA                                                ***          09:08:07
                                                                                                                        PAGE   4
**MODELOPTs: CONC                             URBAN  FLAT          DEAULT

                                          *** DIRECTION SPECIFIC BUILDING DIMENSIONS ***


SOURCE ID: STACK1
 IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK  IFV   BH      BW  WAK
   1   4.3,  20.9, 0      2   4.3,  24.1, 0      3   4.3,  26.6, 0      4   4.3,  28.2, 0      5   4.3,  29.0, 0      6   4.3,  28.9, 0
   7   4.3,  28.0, 0      8   4.3,  26.2, 0      9   4.3,  23.6, 0     10   4.3,  26.2, 0     11   4.3,  28.0, 0     12   4.3,  29.0, 0
  13   4.3,  29.1, 0     14   4.3,  28.3, 0     15   4.3,  26.7, 0     16   4.3,  24.2, 0     17   4.3,  21.0, 0     18   4.3,  17.2, 0
  19   4.3,  20.9, 0     20   4.3,  24.1, 0     21   4.3,  26.6, 0     22   4.3,  28.2, 0     23   4.3,  29.0, 0     24   4.3,  28.9, 0
  25   4.3,  28.0, 0     26   4.3,  26.2, 0     27   4.3,  23.6, 0     28   4.3,  26.2, 0     29   4.3,  28.0, 0     30   4.3,  29.0, 0
  31   7.6,  63.6, 0     32   7.6,  55.7, 0     33   7.6,  46.1, 0     34   7.6,  35.2, 0     35   7.6,  23.1, 0     36   4.3,  17.2, 0


*** ISCST3 - VERSION 96113 ***     *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***        03/26/97
                                     ***  RUN3-1989MET DATA                                                ***          09:08:07
                                                                                                                        PAGE   5
**MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                                      *** GRIDDED RECEPTOR NETWORK SUMMARY ***

                                 *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                         *** ORIGIN FOR POLAR NETWORK ***
                               X-ORIG =        .00 ;   Y-ORIG =        .00  (METERS)
```

```
                              *** DISTANCE RANGES OF NETWORK ***
                                          (METERS)

         50.0,     150.0,     200.0,     250.0,     300.0,     400.0,     500.0,     600.0,     800.0,    1000.0,

                              *** DIRECTION RADIALS OF NETWORK ***
                                          (DEGREES)

        360.0,      10.0,      20.0,      30.0,      40.0,      50.0,      60.0,      70.0,      80.0,      90.0,
        100.0,     110.0,     120.0,     130.0,     140.0,     150.0,     160.0,     170.0,     180.0,     190.0,
        200.0,     210.0,     220.0,     230.0,     240.0,     250.0,     260.0,     270.0,     280.0,     290.0,
        300.0,     310.0,     320.0,     330.0,     340.0,     350.0,     360.0,

 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***       03/26/97
                                     ***  RUN3-1989MET DATA                                                  ***         09:08:07
                                                                                                                        PAGE   6
  **MODELOPTs: CONC                          URBAN  FLAT           DFAULT


                                    *** DISCRETE CARTESIAN RECEPTORS ***
                                   (X-COORD, Y-COORD, ZELEV, ZFLAG)
                                               (METERS)

      (    -18.5,       1.3,        .0,         .0);          (    -38.5,       1.3,         .0,         .0);
      (    -58.5,       1.3,        .0,         .0);          (    -78.6,       1.3,         .0,         .0);
      (    -89.3,       1.3,        .0,         .0);          (    -89.3,      21.3,         .0,         .0);
      (    -89.3,      41.3,        .0,         .0);          (    -89.3,      61.3,         .0,         .0);
      (    -89.3,      81.3,        .0,         .0);          (    -89.3,     100.4,         .0,         .0);
      (    -69.3,     100.3,        .0,         .0);          (    -49.3,     100.3,         .0,         .0);
      (    -29.3,     100.3,        .0,         .0);          (     -9.3,     100.3,         .0,         .0);
      (      1.4,     100.4,        .0,         .0);          (      1.4,      80.3,         .0,         .0);
      (      1.4,      60.3,        .0,         .0);          (      1.4,      40.3,         .0,         .0);
      (      1.4,      20.3,        .0,         .0);          (      1.4,       1.3,         .0,         .0);
 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***       03/26/97
                                     ***  RUN3-1989MET DATA                                                  ***         09:08:07
                                                                                                                        PAGE   7
  **MODELOPTs: CONC                          URBAN  FLAT           DFAULT

                        * SOURCE-RECEPTOR COMBINATIONS FOR WHICH CALCULATIONS MAY NOT BE PERFORMED *
                             LESS THAN 1.0 METER OR 3*ZLB IN DISTANCE, OR WITHIN OPEN PIT SOURCE

                                 SOURCE       - - RECEPTOR LOCATION - -        DISTANCE
                                   ID         XR (METERS)   YR (METERS)        (METERS)
                               - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

                                 STACK1              1.4          20.3             9.78

 *** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***       03/26/97
                                     ***  RUN3-1989MET DATA                                                  ***         09:08:07
```

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                                                                                                                PAGE   8
**MODELOPTs: CONC                         URBAN  FLAT          DFAULT

                                   . *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                         (1=YES; 0=NO)

            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
            1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1

                METEOROLOGICAL DATA PROCESSED BETWEEN START DATE:  89  1  1  1
                                                    AND END DATE:  89 12 31 24

             NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                                 *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                         (METERS/SEC)

                                            1.54,   3.09,   5.14,   8.23,  10.80,

                                               *** WIND PROFILE EXPONENTS ***

             STABILITY                                 WIND SPEED CATEGORY
             CATEGORY          1              2              3              4              5              6
                 A        .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00
                 B        .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00
                 C        .20000E+00     .20000E+00     .20000E+00     .20000E+00     .20000E+00     .20000E+00
                 D        .25000E+00     .25000E+00     .25000E+00     .25000E+00     .25000E+00     .25000E+00
                 E        .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00
                 F        .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00

                                    *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                                                (DEGREES KELVIN PER METER)

             STABILITY                                 WIND SPEED CATEGORY
             CATEGORY          1              2              3              4              5              6
                 A        .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
                 B        .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
                 C        .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
                 D        .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
                 E        .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01
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          F          .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01

*** ISCST3 - VERSION 96113 ***     *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***         03/26/97
                                    *** RUN3-1989MET DATA                                                  ***           09:08:07
                                                                                                                         PAGE   9
 **MODELOPTs: CONC                          URBAN  FLAT            DFAULT


                    *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

               FILE: C:\TRINITY\SUITE\MET\PHXTUS89.BIN        FORMAT: UNFORM
               SURFACE STATION NO.:  23183                    UPPER AIR STATION NO.:  23160
                         NAME: UNKNOWN                                  NAME: UNKNOWN
                         YEAR:    1989                                  YEAR:    1989

                                    FLOW    SPEED   TEMP     STAB   MIXING HEIGHT (M)    USTAR  M-O LENGTH    Z-0 IPCODE PRATE
               YEAR  MONTH  DAY  HOUR    VECTOR  (M/S)    (K)     CLASS   RURAL    URBAN      (M/S)     (M)       (M)       (mm/HR)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - -

                89     1     1     1     281.0    2.06   278.2      6     1933.0     81.0     .0000        .0   .0000   0     .00
                89     1     1     2     288.0    2.57   277.6      6     1933.0     81.0     .0000        .0   .0000   0     .00
                89     1     1     3     304.0    2.57   276.5      6     1933.0     81.0     .0000        .0   .0000   0     .00
                89     1     1     4     293.0    2.57   275.9      6     1933.0     81.0     .0000        .0   .0000   0     .00
                89     1     1     5     293.0    1.00   275.4      7     1933.0     81.0     .0000        .0   .0000   0     .00
                89     1     1     6     202.0    2.06   274.8      6     1933.0     81.0     .0000        .0   .0000   0     .00
                89     1     1     7     205.0    1.00   274.8      7     1933.0     81.0     .0000        .0   .0000   0     .00
                89     1     1     8     283.0    2.06   275.9      6      117.0    193.1     .0000        .0   .0000   0     .00
                89     1     1     9     297.0    2.06   278.2      5      419.7    483.1     .0000        .0   .0000   0     .00
                89     1     1    10     261.0    3.60   279.8      4      722.3    773.1     .0000        .0   .0000   0     .00
                89     1     1    11     274.0    3.09   283.2      3     1025.0   1063.0     .0000        .0   .0000   0     .00
                89     1     1    12     316.0    3.09   285.4      3     1327.7   1353.0     .0000        .0   .0000   0     .00
                89     1     1    13     343.0    2.57   288.2      3     1630.3   1643.0     .0000        .0   .0000   0     .00
                89     1     1    14     339.0    1.00   289.8      2     1933.0   1933.0     .0000        .0   .0000   0     .00
                89     1     1    15     342.0    1.00   290.9      2     1933.0   1933.0     .0000        .0   .0000   0     .00
                89     1     1    16      74.0    2.06   291.5      3     1933.0   1933.0     .0000        .0   .0000   0     .00
                89     1     1    17     121.0    2.06   289.8      4     1933.0   1933.0     .0000        .0   .0000   0     .00
                89     1     1    18     117.0    2.06   288.2      5     1897.8   1778.0     .0000        .0   .0000   0     .00
                89     1     1    19      94.0    2.06   285.9      6     1835.5   1503.7     .0000        .0   .0000   0     .00
                89     1     1    20      87.0    1.00   284.3      7     1773.2   1229.4     .0000        .0   .0000   0     .00
                89     1     1    21      70.0    1.54   283.2      7     1710.9    955.0     .0000        .0   .0000   0     .00
                89     1     1    22     132.0    1.54   282.6      7     1648.7    680.7     .0000        .0   .0000   0     .00
                89     1     1    23     210.0    2.06   281.5      6     1586.4    406.3     .0000        .0   .0000   0     .00
                89     1     1    24     320.0    2.57   280.9      6     1524.1    132.0     .0000        .0   .0000   0     .00

 *** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
             FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 96113 ***     *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***         03/26/97
                                    *** RUN3-1989MET DATA                                                  ***           09:08:07
                                                                                                                         PAGE  10
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**MODELOPTs: CONC                      URBAN  FLAT          DFAULT

                         *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                             INCLUDING SOURCE(S):       STACK1  ,

                             *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                 ** CONC OF TCE       IN MICROGRAMS/M**3                          **

 DIRECTION |                                          DISTANCE (METERS)
 (DEGREES) |      50.00        150.00        200.00       250.00       300.00       400.00       500.00       600.00       800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.00 |      .43570       .09136       .05714       .03878       .02794       .01647       .01088       .00775       .00456
     10.00 |      .38256       .08724       .05644       .03907       .02852       .01707       .01138       .00816       .00484
     20.00 |      .40316       .09094       .05890       .04091       .02995       .01800       .01204       .00866       .00515
     30.00 |      .53567       .10474       .06572       .04494       .03258       .01935       .01285       .00918       .00542
     40.00 |      .81100       .17271       .10595       .07130       .05113       .02996       .01974       .01405       .00825
     50.00 |     1.12435       .28349       .17615       .11959       .08630       .05106       .03389       .02426       .01438
     60.00 |     1.30986       .38116       .24574       .17078       .12534       .07589       .05115       .03703       .02231
     70.00 |     1.32161       .40047       .25977       .18188       .13445       .08235       .05595       .04074       .02472
     80.00 |     1.15824       .38516       .24953       .17417       .12841       .07834       .05305       .03852       .02328
     90.00 |      .92219       .33274       .22061       .15606       .11612       .07169       .04894       .03574       .02176
    100.00 |      .74030       .25272       .16777       .11890       .08859       .05478       .03740       .02731       .01659
    110.00 |      .60292       .20341       .13360       .09393       .06957       .04265       .02894       .02103       .01268
    120.00 |      .48050       .18031       .12063       .08562       .06375       .03933       .02679       .01952       .01183
    130.00 |      .36214       .14881       .10245       .07410       .05591       .03513       .02423       .01782       .01095
    140.00 |      .26734       .09939       .06765       .04860       .03651       .02276       .01560       .01140       .00692
    150.00 |      .22297       .07625       .05124       .03652       .02728       .01687       .01150       .00837       .00506
    160.00 |      .20448       .07045       .04773       .03423       .02567       .01597       .01093       .00799       .00485
    170.00 |      .19654       .07070       .04832       .03482       .02619       .01635       .01121       .00819       .00498
    180.00 |      .20367       .08054       .05569       .04042       .03056       .01924       .01328       .00977       .00601
    190.00 |      .20327       .07770       .05318       .03828       .02876       .01794       .01230       .00900       .00549
    200.00 |      .19241       .07200       .04924       .03545       .02665       .01662       .01140       .00833       .00507
    210.00 |      .19127       .08062       .05608       .04074       .03079       .01935       .01333       .00979       .00600
    220.00 |      .19977       .08674       .06044       .04403       .03334       .02098       .01446       .01061       .00649
    230.00 |      .22185       .10970       .07699       .05611       .04244       .02666       .01834       .01345       .00823
    240.00 |      .27720       .14174       .09962       .07298       .05550       .03514       .02430       .01788       .01096
    250.00 |      .39687       .23934       .17091       .12636       .09666       .06164       .04283       .03164       .01953
    260.00 |      .66583       .40198       .27736       .20085       .15162       .09518       .06555       .04815       .02954
    270.00 |     1.11759       .55256       .36449       .25751       .19132       .11779       .08020       .05847       .03554
    200.00 |     1.58229       .59883       .38520       .26829       .19753       .12021       .08130       .05902       .03570
    290.00 |     1.69700       .51623       .32448       .22303       .16276       .09780       .06554       .04724       .02825
    300.00 |     1.46121       .40631       .25821       .17017       .13016       .07828       .05252       .03791       .02276
    310.00 |     1.24241       .29413       .17960       .12048       .08623       .05045       .03322       .02362       .01384
    320.00 |     1.31969       .25147       .15178       .10133       .07249       .04262       .02028       .02029       .01210
    330.00 |     1.06769       .17271       .10211       .06721       .04755       .02747       .01797       .01273       .00742
    340.00 |      .76956       .12331       .07266       .04780       .03382       .01956       .01280       .00907       .00530
    350.00 |      .59167       .10124       .05996       .03955       .02803       .01621       .01060       .00750       .00436
    360.00 |      .43570       .09136       .05714       .03878       .02794       .01647       .01088       .00775       .00456
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***      03/26/97
                                   ***  RUN3-1989MET DATA                                                  ***       09:08:07
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**MODELOPTs: CONC                        URBAN  FLAT          DFAULT

                *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL      ***
                    INCLUDING SOURCE(S):       STACK1  ,

                 *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                    ** CONC OF TCE       IN MICROGRAMS/M**3                         **

  DIRECTION |                                      DISTANCE (METERS)
  (DEGREES) |      1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     360.00 |       .00303
      10.00 |       .00323
      20.00 |       .00346
      30.00 |       .00361
      40.00 |       .00548
      50.00 |       .00964
      60.00 |       .01513
      70.00 |       .01683
      80.00 |       .01576
      90.00 |       .01485
     100.00 |       .01129
     110.00 |       .00857
     120.00 |       .00802
     130.00 |       .00752
     140.00 |       .00470
     150.00 |       .00343
     160.00 1       .00330
     170.00 |       .00338
     180.00 |       .00412
     190.00 |       .00374
     200.00 |       .00345
     210.00 |       .00411
     220.00 |       .00443
     230.00 |       .00562
     240.00 |       .00748
     250.00 |       .01342
     260.00 |       .02025
     270.00 |       .02422
     280.00 |       .02429
     290.00 |       .01904
     300.00 |       .01541
     310.00 |       .00917
     320.00 |       .00817
     330.00 |       .00491
     340.00 |       .00351
     350.00 |       .00288
     360.00 |       .00303

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***       03/26/97
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                              ***  RUN3-1989MET DATA                                              ***        09:08:07
                                                                                                             PAGE  12
**MODELOPTs: CONC                          URBAN  FLAT          DFAULT

                          *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL      .***
                              INCLUDING SOURCE(S):       STACK1  ,

                                        *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                   ** CONC OF TCE      IN MICROGRAMS/M**3                             **

     X-COORD (M)  Y-COORD (M)        CONC                        X-COORD (M)  Y-COORD (M)        CONC
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
          -18.55         1.33         .38629                          -38.55         1.33        1.10251
          -58.55         1.33        1.21850                          -78.55         1.33        1.12449
          -89.33         1.33        1.02445                          -89.33        21.33        1.14037
          -89.33        41.33         .84921                          -89.33        61.33         .58919
          -89.33        81.33         .39252                          -89.33       100.40         .30724
          -69.33       100.34         .31101                          -49.33       100.34         .24487
          -29.33       100.34         .21972                           -9.33       100.34         .18228
            1.45       100.40         .16483                            1.45        80.34         .22358
            1.45        60.34         .32869                            1.45        40.34         .52336
            1.45        20.34         .00001                            1.45         1.33         .18552
*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***      03/26/97
                              ***  RUN3-1989MET DATA                                              ***        09:08:07
                                                                                                             PAGE  13
**MODELOPTs: CONC                          URBAN  FLAT          DFAULT

                          *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                              INCLUDING SOURCE(S):       STACK1  ,

                                 ***  NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                   ** CONC OF TCE      IN MICROGRAMS/M**3                             **

DIRECTION |                                           DISTANCE (METERS)
(DEGREES) |           50.00                  150.00                 200.00                 250.00                 300.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |     22.36944 (89121614)    8.52514 (89091801)    7.01050 (89091801)    5.43208 (89091801)    4.24408 (89091801)
    10.0 |     21.59138 (89103115)    9.44936 (89031822)    7.54579 (89031822)    5.73659 (89031822)    4.43428 (89092923)
    20.0 |     20.89490 (89011413)    9.12462 (89042801)    7.48242 (89042801)    5.73467 (89042801)    4.86396 (89012805)
    30.0 |     19.85966 (89032709)    8.23501 (89032321)    6.98275 (89111524)    5.47665 (89080704)    4.30802 (89080704)
    40.0 |     20.06542 (89032808)    9.29900 (89080504)    7.29310 (89062501)    5.57586 (89062501)    4.30235 (89062501)
    50.0 |     19.41838 (89122217)    9.16771 (89030822)    7.21517 (89062223)    5.43412 (89062223)    4.14857 (89062223)
    60.0 |     18.78691 (89123010)    9.13676 (89062724)    7.14567 (89052404)    5.66512 (89013101)    4.74320 (89013101)
    70.0 |     18.55620 (89011318)    8.89959 (89081024)    7.03944 (89081824)    5.32026 (89081824)    4.07628 (89081824)
    80.0 |     18.20741 (89042607)    8.99002 (89041523)    6.82351 (89041523)    5.24125 (89073001)    4.13050 (89073001)
    90.0 |     17.60303 (89122416)    8.70321 (89050323)    6.84120 (89062424)    5.25154 (89062424)    4.09734 (89091901)
   100.0 |     17.44378 (89012515)    8.75566 (89052524)    6.78356 (89071801)    5.18415 (89071801)    4.02351 (89071801)
   110.0 |     16.99094 (89010117)    8.67561 (89082524)    6.72452 (89082524)    5.13973 (89060721)    4.02532 (89060721)
   120.0 |     16.85942 (89102908)    8.65821 (89062723)    6.65178 (89071802)    5.10269 (89071802)    3.98679 (89071802)
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   130.0 |      15.89855 (89101717)       8.61215 (89071102)       6.62333 (89071102)       5.06900 (89031923)       3.97734 (89031923,
   140.0 |      15.39408 (89012815)       8.55768 (89060201)       6.59202 (89060201)       5.05243 (89060201)       3.95718 (89060201)
   150.0 |      16.24422 (89121317)       8.55323 (89070202)       6.55401 (89070202)       5.01532 (89070202)       3.92664 (89070202)
   160.0 |      15.94820 (89092218)       8.11831 (89050602)       6.22015 (89050602)       4.80296 (89080703)       3.79444 (89080703)
   170.0 |      16.13854 (89051608)       8.54558 (89072301)       6.55116 (89072301)       5.01422 (89072301)       3.92623 (89072301)
   180.0 |      16.25019 (89110618)       8.52951 (89092820)       6.57933 (89092820)       5.04614 (89092820)       3.95377 (89092820)
   190.0 |      14.79076 (89042508)       8.39693 (89070301)       6.55908 (89070301)       5.05556 (89070301)       3.96976 (89070301)
   200.0 |      16.10535 (89120410)       8.20876 (89051901)       6.51802 (89051901)       5.05657 (89051901)       3.98208 (89051901)
   210.0 |      16.84198 (89081607)       8.75994 (89100623)       6.77532 (89032401)       5.15457 (89052804)       4.03451 (89052804)
   220.0 |      17.22567 (89010215)       8.74843 (89101320)       6.67533 (89040323)       5.18285 (89040323)       4.06758 (89040323)
   230.0 |      17.15630 (89020810)       8.92068 (89031122)       6.89839 (89110422)       5.29246 (89110422)       4.10742 (89110422)
   240.0 |      17.66192 (89051606)       8.53294 (89110722)       6.95413 (89110722)       5.35491 (89110722)       4.15889 (89110722)
   250.0 |      18.68343 (89122709)       9.08565 (89101401)       7.04005 (89070804)       5.32123 (89070804)       4.17400 (89080705)
   260.0 |      19.05411 (89120609)       9.18783 (89092807)       7.14276 (89100922)       5.49140 (89042405)       4.25682 (89042405)
   270.0 |      19.14443 (89090508)       9.13042 (89100822)       7.20183 (89092806)       5.52870 (89092806)       4.27793 (89052701)
   280.0 |      20.10420 (89111408)       9.27400 (89062706)       7.34303 (89111124)       5.57928 (89062503)       4.32942 (89090106)
   290.0 |      20.37904 (89030608)       9.31033 (89061804)       7.41465 (89050401)       5.62801 (89050401)       4.32450 (89050401)
   300.0 |      20.91069 (89120710)       9.41755 (89050603)       7.46022 (89050603)       5.69101 (89092524)       4.40567 (89092524)
   310.0 |      26.87653 (89010601)      13.68534 (89092424)       9.00121 (89092424)       6.35458 (89020222)       4.79121 (89020222)
   320.0 |      42.31339 (89050404)      14.13090 (89041803)       9.52434 (89041803)       6.73949 (89092124)       4.99864 (89092124)
   330.0 |      41.45468 (89011408)      13.57043 (89111122)       9.27575 (89111122)       6.57257 (89111122)       4.88355 (89111122)
   340.0 |      43.66959 (89091407)      14.06015 (89050704)       9.51058 (89050704)       6.70109 (89050704)       4.96164 (89050704)
   350.0 |      43.41029 (89041406)      12.66798 (89031524)       8.72279 (89031524)       6.24290 (89010422)       4.70581 (89010422)
   360.0 |      22.36944 (89121614)       8.52514 (89091801)       7.01050 (89091801)       5.43208 (89091801)       4.24408 (89091801)

*** ISCST3 - VERSION 96113 ***    ***  NIBM REMEDIATION SITE-SHORT TERM MODEL-10 FT. STACK HT. & 11 INCH S ***        03/26/97
                                   ***  RUN3-1989MET DATA                                                   ***         09:08:07
                                                                                                                        PAGE  14
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                              *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL        ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                   ** CONC OF TCE       IN MICROGRAMS/M**3                                   **

DIRECTION |                                            DISTANCE (METERS)
(DEGREES) |          400.00                 500.00                 600.00                 800.00                 1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |       2.76644 (89091801)       1.95398 (89091801)       1.46606 (89091801)        .93357 (89091801)        .66170 (89091801)
    10.0 |       2.86878 (89092923)       2.01609 (89092923)       1.50725 (89092923)        .95524 (89092923)        .67503 (89092923)
    20.0 |       3.50685 (89012805)       2.59648 (89012805)       1.99801 (89012805)       1.30311 (89012805)        .93252 (89012805)
    30.0 |       2.82263 (89080704)       1.99600 (89080704)       1.49746 (89080704)        .95249 (89080704)        .67426 (89080704)
    40.0 |       2.74619 (89062501)       1.93985 (89032003)       1.46181 (89051501)        .93919 (89051501)        .66902 (89051501)
    50.0 |       2.65690 (89081005)       1.90963 (89081005)       1.44791 (89081005)        .93306 (89081005)        .66574 (89081005)
    60.0 |       3.29699 (89013101)       2.38434 (89013101)       1.80282 (89013101)       1.14500 (89013101)        .80242 (89013101)
    70.0 |       2.70877 (89022622)       1.93630 (89022622)       1.46268 (89022622)        .93787 (89022622)        .66687 (89022622)
    80.0 |       2.71490 (89073001)       1.92257 (89073001)       1.45328 (89050422)        .93327 (89050422)        .66425 (89050422)
    90.0 |       2.69214 (89091901)       2.05617 (89020701)       1.64190 (89020701)       1.12101 (89020701)        .82411 (89020701)
   100.0 |       2.75649 (89013006)       2.12686 (89013006)       1.68455 (89013006)       1.14019 (89013006)        .83454 (89013006)
   110.0 |       2.64021 (89060721)       1.87261 (89060721)       1.40827 (89060721)        .89806 (89060721)        .63608 (89060721)
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   120.0 |      2.61219 (89071802)       1.85753 (89053022)       1.41153 (89053022)        .91381 (89053022)        .65436 (89053022)
   130.0 |      2.62647 (89031923)       1.87544 (89031923)       1.41866 (89031923)        .91376 (89091403)        .65416 (89091403)
   140.0 |      2.61048 (89060201)       1.86410 (89060201)       1.41050 (89060201)        .90856 (89060201)        .64861 (89060201)
   150.0 |      2.59115 (89070202)       1.85143 (89070202)       1.40173 (89070202)        .90375 (89070202)        .64560 (89070202)
   160.0 |      2.52991 (89080703)       1.81783 (89080703)       1.38107 (89080703)        .89400 (89080703)        .64005 (89080703)
   170.0 |      2.59115 (89072301)       1.85151 (89072301)       1.40182 (89072301)        .90382 (89072301)        .64565 (89072301)
   180.0 |      2.60926 (89092820)       1.86357 (89092820)       1.41024 (89092820)        .90849 (89092820)        .65123 (89110103)
   190.0 |      2.62352 (89070301)       1.87404 (89070301)       1.41790 (89070301)        .91389 (89060604)        .65423 (89060604)
   200.0 |      2.63699 (89051901)       1.88435 (89051901)       1.42555 (89051901)        .91737 (89051901)        .65427 (89051901)
   210.0 |      2.64439 (89052804)       1.87486 (89052804)       1.41071 (89080304)        .91404 (89080304)        .65469 (89080304)
   220.0 |      2.66961 (89040323)       1.89227 (89040323)       1.42190 (89040323)        .91429 (89042924)        .65504 (89042924)
   230.0 |      2.69247 (89061203)       1.90795 (89061203)       1.43286 (89061203)        .91963 (89111604)        .65685 (89111604)
   240.0 |      2.71748 (89060301)       1.92395 (89060301)       1.44359 (89060301)        .92788 (89042703)        .66147 (89042703)
   250.0 |      2.74014 (89080705)       1.93784 (89080705)       1.46226 (89091002)        .93771 (89091002)        .66679 (89091002)
   260.0 |      2.73333 (89050804)       1.95048 (89050804)       1.47154 (89050804)        .94200 (89050804)        .66913 (89050804)
   270.0 |      2.78956 (89052701)       1.96435 (89052701)       1.47538 (89030102)        .94379 (89030102)        .67008 (89030102)
   280.0 |      2.80988 (89090106)       1.98264 (89062605)       1.49022 (89062605)        .94982 (89062605)        .67308 (89062605)
   290.0 |      2.82566 (89040801)       1.99747 (89040801)       1.49828 (89040801)        .95281 (89040801)        .67442 (89040801)
   300.0 |      2.85344 (89041902)       2.01011 (89041902)       1.50476 (89041902)        .95493 (89041902)        .67522 (89041902)
   310.0 |      3.00886 (89020222)       2.08652 (89020222)       1.54912 (89020222)        .97563 (89020222)        .68786 (89020222)
   320.0 |      3.08281 (89092124)       2.11716 (89092124)       1.56483 (89071206)        .98205 (89071206)        .69113 (89071206)
   330.0 |      3.02673 (89120401)       2.08797 (89120401)       1.54491 (89120401)        .97332 (89121902)        .68668 (89121902)
   340.0 |      3.05727 (89050704)       2.09989 (89050704)       1.55016 (89050704)        .97001 (89020805)        .68499 (89020805)
   350.0 |      2.95403 (89010422)       2.04782 (89010422)       1.51990 (89010422)        .95657 (89010422)        .67390 (89010422)
   360.0 |      2.76644 (89091801)       1.95398 (89091801)       1.46606 (89091801)        .93357 (89091801)        .66170 (89091801)

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***        03/26/97
                                        *** RUN3-1989MET DATA                                              ***          09:08:07
                                                                                                                         PAGE  15
**MODELOPTs: CONC                                 URBAN  FLAT           DFAULT

                                 *** THE  1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                     INCLUDING SOURCE(S):        STACK1   ,

                                             *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                        ** CONC OF TCE       IN MICROGRAMS/M**3                                 **

    X-COORD (M)  Y-COORD (M)         CONC      (YYMMDDHH)                X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        -18.55          1.33       24.45259  (89041013)                   -38.55          1.33       23.14310  (89051209)
        -58.55          1.33       18.20825  (89010309)                   -78.55          1.33       13.86895  (89032905)
        -89.33          1.33       12.61127  (89031306)                   -89.33         21.33       12.67139  (89033005)
        -89.33         41.33       12.25202  (89112121)                   -89.33         61.33       12.10141  (89101704)
        -89.33         81.33       16.41587  (89031701)                   -89.33        100.40       16.01377  (89112006)
        -69.33        100.34       17.25249  (89100924)                   -49.33        100.34       19.50038  (89072103)
        -29.33        100.34       21.18041  (89101620)                    -9.33        100.34       21.04521  (89031901)
          1.45        100.40       12.13685  (89082023)                     1.45         80.34       13.62832  (89112516)
          1.45         60.34       18.88446  (89112516)                     1.45         40.34       25.82250  (89102615)
          1.45         20.34         .00292  (89050612)                     1.45          1.33       18.63951  (89080609)

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***        03/26/97
                                        ***  RUN3-1989MET DATA                                             ***          09:08:07
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                                                                                                  PAGE  16
**MODELOPTs: CONC                               URBAN  FLAT          DFAULT

                                *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                    INCLUDING SOURCE(S):        STACK1  ,

                                    *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                        ** CONC OF TCE       IN MICROGRAMS/M**3                          **

DIRECTION |                                             DISTANCE (METERS)
(DEGREES) |          50.00               150.00               200.00               250.00               300.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.0 |     3.78311c(89011424)     .74503c(89082024)     .45206c(89082024)     .32803c(89123024)     .25481c(89123024)
     10.0 |     3.18748c(89011424)     .85705c(89042824)     .58806c(89042824)     .41242c(89042824)     .30182c(89042824)
     20.0 |     2.34375c(89110324)     .97368c(89042824)     .78480c(89042824)     .60180c(89042824)     .46664c(89042824)
     30.0 |     3.54279c(89020424)     .83247c(89110324)     .54913c(89010924)     .43329c(89010924)     .33981c(89010924)
     40.0 |     3.88488c(89072324)     .95618c(89063024)     .58645c(89063024)     .42435c(89122624)     .32793c(89122624)
     50.0 |     4.67230c(89020724)    1.52869c(89103024)     .96973c(89103024)     .66310c(89103024)     .47631c(89103024)
     60.0 |     4.25690c(89042624)    2.36907 (89090824)    1.50411 (89090824)    1.07255c(89103024)     .83300c(89103024)
     70.0 |     4.96198c(89081324)    1.76862 (89090824)    1.27078 (89090824)     .94813 (89090824)     .72688 (89090824)
     80.0 |     4.62253 (89081224)    1.54889c(89103124)    1.03980c(89103124)     .76625c(89041524)     .58380c(89041524)
     90.0 |     4.54598 (89071524)    1.49456 (89081224)     .89976c(89082924)     .62374c(89082924)     .47252c(89013024)
    100.0 |     4.31931 (89090224)    1.27375 (89081224)     .87182 (89081224)     .62687 (89081224)     .47160 (89081224)
    110.0 |     3.98471 (89090224)    1.25405c(89083124)     .86239c(89083124)     .61926c(89083124)     .46506c(89083124)
    120.0 |     2.70332 (89080324)     .81701 (89080324)     .58982c(89121224)     .43438c(89110324)     .33764c(89110324)
    130.0 |     1.97687c(89082424)    1.08889c(89030524)     .82237c(89030524)     .61895c(89030524)     .47738c(89030524)
    140.0 |     1.67002 (89072924)     .68559c(89121924)     .54051c(89121924)     .42036c(89121924)     .33218c(89121924)
    150.0 |     1.76486c(89121324)     .74917c(89070224)     .53540c(89070224)     .39446c(89070224)     .30121c(89070224)
    160.0 |     1.98680c(89081124)     .73637c(89081124)     .49905c(89070224)     .36350c(89070224)     .27560c(89070224)
    170.0 |     2.05194c(89070624)     .67651c(89102224)     .51412c(89030524)     .40169c(89030524)     .31802c(89030524)
    180.0 |     2.95048c(89011224)    1.01991c(89070624)     .70571c(89011124)     .56905c(89011124)     .45889c(89011124)
    190.0 |     3.47636c(89011224)    1.06947c(89081924)     .74115c(89081924)     .53724c(89081924)     .40645c(89081924)
    200.0 |     2.32256 (89121124)     .64201c(89101324)     .44432c(89101324)     .32070c(89101324)     .24159c(89101324)
    210.0 |     2.32406 (89121124)     .73069c(89082724)     .54775c(89082724)     .41518c(89082724)     .32309c(89082724)
    220.0 |     2.43938 (89121124)     .77518c(89082724)     .51008c(89082724)     .40797c(89040324)     .32688c(89040324)
    230.0 |     3.17117c(89112824)     .77263c(89022524)     .59906c(89022524)     .44926c(89022524)     .34266c(89022524)
    240.0 |     2.84724 (89112924)    1.02475c(89042224)     .70414c(89040624)     .53289c(89040624)     .41156c(89040624)
    250.0 |     3.57545 (89112924)    1.62729c(89040524)    1.37242c(89040524)    1.10870c(89040524)     .89497c(89040524)
    260.0 |     4.32249c(89111924)    2.68500c(89040524)    1.76793c(89040524)    1.21284c(89040524)     .87214c(89040524)
    270.0 |     4.81209 (89101924)    1.98072c(89111324)    1.31405c(89111324)     .91811c(89111324)     .67547c(89111324)
    280.0 |     6.18450c(89012124)    2.35968c(89090424)    1.68011c(89090424)    1.21958c(89090424)     .91835c(89090424)
    290.0 |     6.71362c(89012124)    2.23913c(89121724)    1.67084c(89121724)    1.24258c(89121724)     .94720c(89121724)
    300.0 |     5.74392c(89111724)    1.67739c(89112324)    1.22190c(89112324)     .89756c(89112324)     .67674c(89112324)
    310.0 |     5.88550 (89102024)    1.45730c(89102224)    1.06604c(89111524)     .80540c(89111524)     .62113c(89111524)
    320.0 |     7.01993 (89102024)    1.53036c(89111524)     .99569c(89111524)     .67773c(89111524)     .48718c(89111524)
    330.0 |     5.21491c(89010724)    1.23843c(89112124)     .78444c(89112124)     .54204c(89112124)     .39653c(89112124)
    340.0 |     5.02769c(89091524)    1.25586c(89110924)     .81132c(89110924)     .56169c(89110924)     .41245c(89110924)
    350.0 |     5.41646 (89051524)    1.12585c(89010424)     .74075c(89010424)     .52376c(89010424)     .38995c(89010424)
    360.0 |     3.78311c(89011424)     .74503c(89082024)     .45206c(89082024)     .32803c(89123024)     .25481c(89123024)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***      03/26/97
```

```
                             ***  RUN3-1989MET DATA                                                      ***         09:08:07
                                                                                                                     PAGE  17
**MODELOPTs: CONC                                URBAN  FLAT          DFAULT

                        *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                            INCLUDING SOURCE(S):        STACK1  ,

                              *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                  ** CONC OF TCE       IN MICROGRAMS/M**3                              **

DIRECTION |                                                    DISTANCE (METERS)
(DEGREES) |           400.00                  500.00                  600.00                  800.00                  1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |     .16335c(89123024)      .11342c(89123024)      .08374c(89123024)      .05180c(89011324)      .03617c(89011324)
    10.0 |     .18057c(89042824)      .12029c(89042824)      .08620c(89042824)      .05288c(89052624)      .03741c(89022224)
    20.0 |     .30067c(89042824)      .21044c(89042824)      .15669c(89042824)      .09854c(89042824)      .06916c(89042824)
    30.0 |     .22005c(89010924)      .15352c(89010924)      .11362c(89010924)      .07038c(89010924)      .04860c(89010924)
    40.0 |     .21198c(89122624)      .14888c(89122624)      .11106c(89122624)      .06988c(89122624)      .04895c(89122624)
    50.0 |     .27625c(89103024)      .17956c(89103024)      .12611c(89103024)      .07227c(89103024)      .04700c(89103024)
    60.0 |     .53863c(89103024)      .37745c(89103024)      .28086c(89103024)      .17581c(89103024)      .12252c(89103024)
    70.0 |     .46619 (89090824)      .32638 (89090824)      .24304 (89090824)      .15245 (89090824)      .10638 (89090824)
    80.0 |     .36991c(89041524)      .26395c(89012624)      .19963c(89012624)      .12702c(89012624)      .08905c(89012624)
    90.0 |     .31906c(89013024)      .22811c(89013024)      .17147c(89013024)      .10816c(89013024)      .07539c(89013024)
   100.0 |     .30195c(89110224)      .21283c(89110224)      .15939c(89110224)      .10109c(89110224)      .07136c(89110224)
   110.0 |     .29142c(89083124)      .20171c(89083124)      .14932c(89083124)      .09327c(89083124)      .06510c(89083124)
   120.0 |     .22003c(89110324)      .15563c(09110324)      .11685c(89110324)      .07433c(89110324)      .05253c(89110324)
   130.0 |     .30734c(89030524)      .21535c(89030524)      .16040c(89030524)      .10067c(89030524)      .07031c(89030524)
   140.0 |     .22102c(89121924)      .15818c(89121924)      .11960c(89121924)      .07659c(89121924)      .05423c(89121924)
   150.0 |     .19223c(89070224)      .13417c(89070224)      .09971c(89070224)      .06242c(89070224)      .04356c(89070224)
   160.0 |     .17824c(89121324)      .12614c(89121324)      .09470c(89121324)      .06018c(89121324)      .04246c(09121324)
   170.0 |     .21182c(89030524)      .15160c(89030524)      .11459c(89030524)      .07333c(89030524)      .05187c(89030524)
   180.0 |     .31216c(89011124)      .22623c(89011124)      .17255c(89011124)      .11192c(89011124)      .08002c(89011124)
   190.0 |     .25707c(89081924)      .17882c(89081924)      .13275c(89081924)      .08313c(89081924)      .05808c(89081924)
   200.0 |     .15165c(89101324)      .10479c(89101324)      .07731c(89101324)      .04867c(89092224)      .03497c(89092224)
   210.0 |     .21123c(89082724)      .14971c(89082724)      .11249c(89082724)      .07151c(89082724)      .05043c(89082724)
   220.0 |     .22032c(89040324)      .15871c(89040324)      .12054c(89040324)      .07774c(89040324)      .05538c(89040324)
   230.0 |     .21517c(89022524)      .15163c(89120724)      .11402c(89020424)      .07455c(89020424)      .05343c(89020424)
   240.0 |     .26424c(89040624)      .18422c(89040624)      .13647c(89040624)      .08477c(89040624)      .05955c(89013024)
   250.0 |     .60829c(89040524)      .43974c(89040524)      .33438c(89040524)      .21554c(89040524)      .15323c(89040524)
   260.0 |     .50779c(89040524)      .33151c(89040524)      .23389c(89040524)      .13526c(89040524)      .08873c(89040524)
   270.0 |     .41566c(89122224)      .29764c(09122224)      .22432c(89122224)      .14236c(89122224)      .09986c(89122224)
   280.0 |     .57432c(89090424)      .39587c(89090424)      .29444c(89121724)      .18823c(89121724)      .13257c(89121724)
   290.0 |     .59234c(89121724)      .40450c(89121724)      .29498c(89121724)      .17922c(89121724)      .12220c(89121724)
   300.0 |     .42035c(89112324)      .28707c(89112324)      .20980c(89112324)      .12823c(89112324)      .08798c(89112324)
   310.0 |     .39987c(89111524)      .28070c(89111524)      .20971c(89111524)      .13259c(89111524)      .09334c(89111524)
   320.0 |     .28592c(89111524)      .19419c(89040424)      .14324c(89040424)      .08943c(89040424)      .06265c(89040424)
   330.0 |     .23948c(89112124)      .16150c(89112124)      .11716c(89112124)      .07093c(89112124)      .04831c(89112124)
   340.0 |     .25232c(89110924)      .17279c(89110924)      .12735c(89110924)      .07954c(89110924)      .05579c(89110924)
   350.0 |     .24178c(89010424)      .16653c(89010424)      .12308c(89010424)      .07702c(89010424)      .05405c(89010424)
   360.0 |     .16335c(89123024)      .11342c(89123024)      .08374c(89123024)      .05180c(89011324)      .03617c(89011324)
```

```
*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***       03/26/97
                                    ***  RUN3-1989MET DATA                                            ***          09:08:07
                                                                                                                    PAGE  18
**MODELOPTs: CONC                           URBAN  FLAT          DFAULT

                               *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                   INCLUDING SOURCE(S):      STACK1   ,

                                                *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                             ** CONC OF TCE      IN MICROGRAMS/M**3                          **

     X-COORD (M)  Y-COORD (M)         CONC      (YYMMDDHH)              X-COORD (M)  Y-COORD (M)        CONC      (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
          -18.55         1.33         3.34713c (89110224)                -38.55         1.33         5.71708c (89012024)
          -58.55         1.33         4.77515  (89101924)                -78.55         1.33         3.82652  (89101924)
          -89.33         1.33         3.51264c (89111324)                -89.33        21.33         4.17870c (89083024)
          -89.33        41.33         3.73045  (89102124)                -89.33        61.33         2.68539c (89112224)
          -89.33        81.33         2.03195c (89111624)                -89.33       100.40         2.09375c (89111524)
          -69.33       100.34         1.92210c (89112224)                -49.33       100.34         1.74952c (89112124)
          -29.33       100.34         1.95280c (89110924)                 -9.33       100.34         1.45874c (89112124)
            1.45       100.40         1.29613c (89082024)                  1.45        80.34         1.74829c (89011424)
            1.45        60.34         2.95864c (89011424)                  1.45        40.34         4.10897c (89011424)
            1.45        20.34          .00029c (89100824)                  1.45         1.33         2.20326  (89072924)
*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***       03/26/97
                                    ***  RUN3-1989MET DATA                                            ***          09:08:07
                                                                                                                    PAGE  19
**MODELOPTs: CONC                           URBAN  FLAT          DFAULT

                                            *** THE SUMMARY OF MAXIMUM PERIOD (  8760 HRS) RESULTS ***


                                             ** CONC OF TCE      IN MICROGRAMS/M**3                          **

                                                                                                    NETWORK
GROUP ID                          AVERAGE CONC            RECEPTOR  (XR, YR, ZELEV, ZFLAG)   OF TYPE  GRID-ID
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      1ST HIGHEST VALUE IS       1.69700 AT (     -46.98,        17.10,        .00,        .00)  GP   POLR1
         2ND HIGHEST VALUE IS       1.58229 AT (     -49.24,         8.68,        .00,        .00)  GP   POLR1


  *** RECEPTOR TYPES:  GC = GRIDCART
                       GP = GRIDPOLR
                       DC = DISCCART
                       DP = DISCPOLR
                       BD = BOUNDARY
*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***       03/26/97
                                    ***  RUN3-1989MET DATA                                            ***          09:08:07
                                                                                                                    PAGE  20
**MODELOPTs: CONC                           URBAN  FLAT          DFAULT
```

```
                                        *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***

                                    ** CONC OF TCE       IN MICROGRAMS/M**3                              **

                                                               DATE                                                          NETWORK
GROUP ID                                       AVERAGE CONC     (YYMMDDHH)           RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       HIGH  1ST HIGH VALUE IS       43.66959  ON 89091407: AT (     -17.10,        46.98,        .00,        .00)  GP   POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***        03/26/97
                                    ***  RUN3-1989MET DATA                                                   ***          09:08:07
                                                                                                                          PAGE  21
**MODELOPTs: CONC                                 URBAN  FLAT           DFAULT
                                         *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

                                    ** CONC OF TCE       IN MICROGRAMS/M**3                              **

                                                               DATE                                                          NETWORK
GROUP ID                                       AVERAGE CONC     (YYMMDDHH)           RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       HIGH  1ST HIGH VALUE IS        7.01993  ON 89102024: AT (     -32.14,        38.30,        .00,        .00)  GP   POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 11 INCH S ***        03/26/97
                                    ***  RUN3-1989MET DATA                                                   ***          09:08:07
                                                                                                                          PAGE  22
**MODELOPTs: CONC                                 URBAN  FLAT           DFAULT

 *** Message Summary : ISCST3 Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
```

```
A Total of          2 Warning Message(s)
A Total of       1158 Informational Message(s)

A Total of       1158 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
MX W430  4431 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    89070415
MX W430  4432 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    89070416

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
                    ISCST3 - (DATED 96113)

                 IBM-PC VERSION (3.05)     ISCST3R
       (C) COPYRIGHT 1992-1996, TRINITY CONSULTANTS, INC.

Run Began on  3/27/1997 at 17:09:32

** BREEZE AIR SUITE (ISCST3) - C:\TRINITY\SUITE\EM72096.DAT
** Trinity Consultants Incorporated, Dallas, TX

CO STARTING
CO TITLEONE  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S
CO TITLETWO  RUN3-1989MET DATA
CO MODELOPT  DFAULT  CONC  URBAN
CO AVERTIME  1  24  ANNUAL
CO POLLUTID  TCE
CO TERRHGTS  FLAT
CO RUNORNOT  RUN
CO FINISHED

SO STARTING
SO ELEVUNIT  METERS
SO LOCATION  STACK1  POINT  -4.7  12.7  0
** SRCDESCR  AIR STRIPPER EXHAUST
SO SRCPARAM  STACK1  1.574974E-02  5.49  299.02  22.47931  0.254
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  4.27  4.27  4.27  4.27  4.27  4.27
SO BUILDHGT  STACK1  7.62  7.62  7.62  7.62  7.62  4.27
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  29.1  28.31  26.66  24.2  21.0  17.17
SO BUILDWID  STACK1  20.9  24.1  26.57  28.23  29.03  28.95
SO BUILDWID  STACK1  27.99  26.18  23.58  26.2  28.03  29.01
SO BUILDWID  STACK1  63.61  55.73  46.15  35.17  23.12  17.17
SO EMISUNIT  1.0E+06  GRAMS/SEC  MICROGRAMS/M**3
SO SRCGROUP  ALL
SO FINISHED

RE STARTING
RE GRIDPOLR POLR1 STA
RE GRIDPOLR POLR1 ORIG  0  0
RE GRIDPOLR POLR1 DIST 50  100  150  200  250  300  400  500  600  800
RE GRIDPOLR POLR1 DIST 1000
RE GRIDPOLR POLR1 DDIR  0  10  20  30  40  50  60  70  80  90  100  110
RE GRIDPOLR POLR1 DDIR  120  130  140  150  160  170  180  190  200  210
RE GRIDPOLR POLR1 DDIR  220  230  240  250  260  270  280  290  300  310
RE GRIDPOLR POLR1 DDIR  320  330  340  350
RE GRIDPOLR POLR1 END
** BOUNDARY
```

```
RE DISCCART  -18.55  1.33
RE DISCCART  -38.55  1.33
RE DISCCART  -58.55  1.33
RE DISCCART  -70.55  1.33
RE DISCCART  -89.33  1.33
RE DISCCART  -89.33  21.33
RE DISCCART  -89.33  41.33
RE DISCCART  -89.33  61.33
RE DISCCART  -89.33  81.33
RE DISCCART  -89.33  100.4
RE DISCCART  -69.33  100.34
RE DISCCART  -49.33  100.34
RE DISCCART  -29.33  100.34
RE DISCCART  -9.33  100.34
RE DISCCART  1.45  100.4
RE DISCCART  1.45  80.34
RE DISCCART  1.45  60.34
RE DISCCART  1.45  40.34
RE DISCCART  1.45  20.34
RE DISCCART  1.45  1.33
RE FINISHED

ME STARTING
ME INPUTFIL  C:\TRINITY\SUITE\MET\PHXTUS89.BIN  UNFORM
ME ANEMHGHT  10.0  METERS
ME SURFDATA  23183  1989
ME UAIRDATA  23160  1989
ME STARTEND  89  01  01  1  89  12  31  24
ME FINISHED

OU STARTING
OU RECTABLE  1  FIRST
OU RECTABLE  ALLAVE  FIRST
OU FINISHED

************************************
*** SETUP Finishes Successfully ***
************************************

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-10 FT. STACK HT. & 10 INCH S ***      03/27/97
                                   ***  RUN3-1989 MET DATA                                                ***        17:09:33
                                                                                                                     PAGE   1
**MODELOPTs: CONC                             URBAN  FLAT          DEFAULT

                                         ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

**Intermediate Terrain Processing is Selected

**Model Is Setup For Calculation of Average CONcentration Values.

  --  SCAVENGING/DEPOSITION LOGIC --
```

```
**Model Uses NO DRY DEPLETION.  DDPLETE = F
**Model Uses NO WET DEPLETION.  WDPLETE = F
**NO WET SCAVENGING Data Provided.
**Model Does NOT Use GRIDDED TERRAIN Data for Depletion Calculations

**Model Uses URBAN Dispersion.

**Model Uses Regulatory DEFAULT Options:
          1. Final Plume Rise.
          2. Stack-tip Downwash.
          3. Buoyancy-induced Dispersion.
          4. Use Calms Processing Routine.
          5. Not Use Missing Data Processing Routine.
          6. Default Wind Profile Exponents.
          7. Default Vertical Potential Temperature Gradients.
          8. "Upper Bound" Values for Supersquat Buildings.
          9. No Exponential Decay for URBAN/Non-SO2

**Model Assumes Receptors on FLAT Terrain.

**Model Assumes No FLAGPOLE Receptor Heights.

**Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR
    and Calculates ANNUAL Averages

**This Run Includes:    1 Source(s);      1 Source Group(s); and    416 Receptor(s)

**The Model Assumes A Pollutant Type of:  TCE

**Model Set To Continue RUNning After the Setup Testing.

**Output Options Selected:
          Model Outputs Tables of ANNUAL Averages by Receptor
          Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Anem. Hgt. (m) =    10.00 ;    Decay Coef. =    .0000     ;    Rot. Angle =      .0
                 Emission Units = GRAMS/SEC                                ;  Emission Rate Unit Factor =    .10000E+07
                 Output Units   = MICROGRAMS/M**3

**Input Runstream File: C:\TRINITY\SUITE\EM72096.DAT           ;  **Output Print File: C:\TRINITY\SUITE\EM72096.LST

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***      03/27/97
                                   ***  RUN3-1998MET DATA                                                  ***        17:09:33
                                                                                                                       PAGE   2
**MODELOPTs: CONC                        URBAN  FLAT          DFAULT
```

```
                                        *** POINT SOURCE DATA ***

              NUMBER EMISSION RATE                        BASE     STACK   STACK    STACK     STACK    BUILDING EMISSION RATE
   SOURCE     PART. (USER UNITS)     X         Y          ELEV.    HEIGHT  TEMP.   EXIT VEL. DIAMETER   EXISTS   SCALAR VARY
     ID       CATS.                (METERS) (METERS) (METERS) (METERS) (DEG.K)  (M/SEC)  (METERS)                  BY
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  STACK1         0   .15750E-01      -4.7      12.7       .0      5.49   299.02    22.48       .25       YES
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-10 FT. STACK HT. & 10 INCH S ***        03/27/97
                                    ***  RUN3-1990MET DATA                                                     ***        17:09:33
                                                                                                                          PAGE   3
 **MODELOPTs: CONC                          URBAN  FLAT           DFAULT



                                    *** SOURCE IDs DEFINING SOURCE GROUPS ***

 GROUP ID                                             SOURCE IDs



  ALL        STACK1  ,
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-10 FT. STACK HT. & 10 INCH S ***        03/27/97
                                    ***  RUN3-1989 MET DATA                                                     ***        17:09:33
                                                                                                                          PAGE   4
 **MODELOPTs: CONC                          URBAN  FLAT           DFAULT

                                    *** DIRECTION SPECIFIC BUILDING DIMENSIONS ***


 SOURCE ID: STACK1
  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK  IFV    BH      BW  WAK
    1   4.3,   20.9, 0      2   4.3,   24.1, 0      3   4.3,   26.6, 0      4   4.3,   28.2, 0      5   4.3,   29.0, 0      6   4.3,   28.9, 0
    7   4.3,   28.0, 0      8   4.3,   26.2, 0      9   4.3,   23.6, 0     10   4.3,   26.2, 0     11   4.3,   28.0, 0     12   4.3,   29.0, 0
   13   4.3,   29.1, 0     14   4.3,   28.3, 0     15   4.3,   26.7, 0     16   4.3,   24.2, 0     17   4.3,   21.0, 0     18   4.3,   17.2, 0
   19   4.3,   20.9, 0     20   4.3,   24.1, 0     21   4.3,   26.6, 0     22   4.3,   28.2, 0     23   4.3,   29.0, 0     24   4.3,   28.9, 0
   25   4.3,   28.0, 0     26   4.3,   26.2, 0     27   4.3,   23.6, 0     28   4.3,   26.2, 0     29   4.3,   28.0, 0     30   4.3,   29.0, 0
   31   7.6,   63.6, 0     32   7.6,   55.7, 0     33   7.6,   46.1, 0     34   7.6,   35.2, 0     35   7.6,   23.1, 0     36   4.3,   17.2, 0


*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-10 FT. STACK HT. & 10 INCH S ***        03/27/97
                                    ***  RUN3-1989 MET DATA                                                     ***        17:09:33
                                                                                                                          PAGE   5
 **MODELOPTs: CONC                          URBAN  FLAT           DFAULT

                                   *** GRIDDED RECEPTOR NETWORK SUMMARY ***
```

```
                         *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                  *** ORIGIN FOR POLAR NETWORK ***
                         X-ORIG =       .00 ;   Y-ORIG =        .00  (METERS)

                                  *** DISTANCE RANGES OF NETWORK ***
                                             (METERS)

         50.0,     100.0,     150.0,     200.0,     250.0,     300.0,     400.0,     500.0,     600.0,     800.0,
       1000.0,

                                  *** DIRECTION RADIALS OF NETWORK ***
                                             (DEGREES)

        360.0,      10.0,      20.0,      30.0,      40.0,      50.0,      60.0,      70.0,      80.0,      90.0,
        100.0,     110.0,     120.0,     130.0,     140.0,     150.0,     160.0,     170.0,     180.0,     190.0,
        200.0,     210.0,     220.0,     230.0,     240.0,     250.0,     260.0,     270.0,     280.0,     290.0,
        300.0,     310.0,     320.0,     330.0,     340.0,     350.0,

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***       03/27/97
                                     ***  RUN3-1998MET DATA                                                   ***         17:09:33
                                                                                                                          PAGE   6
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT


                                       *** DISCRETE CARTESIAN RECEPTORS ***
                                         (X-COORD, Y-COORD, ZELEV, ZFLAG)
                                                    (METERS)

     (     -18.5,        1.3,         .0,        .0);         (     -38.5,        1.3,         .0,        .0);
     (     -58.5,        1.3,         .0,        .0);         (     -78.6,        1.3,         .0,        .0);
     (     -89.3,        1.3,         .0,        .0);         (     -89.3,       21.3,         .0,        .0);
     (     -89.3,       41.3,         .0,        .0);         (     -89.3,       61.3,         .0,        .0);
     (     -89.3,       81.3,         .0,        .0);         (     -89.3,      100.4,         .0,        .0);
     (     -69.3,      100.3,         .0,        .0);         (     -49.3,      100.3,         .0,        .0);
     (     -29.3,      100.3,         .0,        .0);         (      -9.3,      100.3,         .0,        .0);
     (       1.4,      100.4,         .0,        .0);         (       1.4,       80.3,         .0,        .0);
     (       1.4,       60.3,         .0,        .0);         (       1.4,       40.3,         .0,        .0);
     (       1.4,       20.3,         .0,        .0);         (       1.4,        1.3,         .0,        .0);

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***       03/27/97
                                     ***  RUN3-1989 MET DATA                                                   ***         17:09:33
                                                                                                                          PAGE   7
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                        * SOURCE-RECEPTOR COMBINATIONS FOR WHICH CALCULATIONS MAY NOT BE PERFORMED *
                             LESS THAN 1.0 METER OR 3*ZLB IN DISTANCE, OR WITHIN OPEN PIT SOURCE


                              SOURCE          - - RECEPTOR LOCATION - -          DISTANCE
                                ID           XR (METERS)   YR (METERS)          (METERS)
                             - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
                STACK1                  1.4          20.3             9.81

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***       03/27/97
                                   ***  RUN3-1989 MET DATA                                                ***        17:09:33
                                                                                                                     PAGE   8
 **MODELOPTs: CONC                             URBAN  FLAT          DFAULT

                                      *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                       (1=YES; 0=NO)

          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1

              METEOROLOGICAL DATA PROCESSED BETWEEN START DATE:  89  1  1  1
                                                  AND END DATE:  89 12 31 24

       NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                            *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                    (METERS/SEC)

                                       1.54,    3.09,    5.14,    8.23,   10.80,

                                            *** WIND PROFILE EXPONENTS ***

       STABILITY                                  WIND SPEED CATEGORY
       CATEGORY          1              2              3              4              5              6
           A        .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00
           B        .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00     .15000E+00
           C        .20000E+00     .20000E+00     .20000E+00     .20000E+00     .20000E+00     .20000E+00
           D        .25000E+00     .25000E+00     .25000E+00     .25000E+00     .25000E+00     .25000E+00
           E        .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00
           F        .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00     .30000E+00

                                   *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                                               (DEGREES KELVIN PER METER)

       STABILITY                                  WIND SPEED CATEGORY
```

```
 CATEGORY        1              2              3              4              5              6
    A       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
    B       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
    C       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
    D       .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00     .00000E+00
    E       .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01     .20000E-01
    F       .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01     .35000E-01

*** ISCST3 - VERSION 96113 ***   *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***     03/27/97
                                   *** RUN3-1998MET DATA                                              ***       17:09:33
                                                                                                               PAGE   9
 **MODELOPTs: CONC                          URBAN  FLAT          DFAULT


                    *** THE FIRST  24 HOURS OF METEOROLOGICAL DATA ***

         FILE: C:\TRINITY\SUITE\MET\PHXTUS89.BIN         FORMAT: UNFORM
         SURFACE STATION NO.:  23183                     UPPER AIR STATION NO.:  23160
                       NAME: UNKNOWN                                       NAME: UNKNOWN
                       YEAR:    1989                                       YEAR:    1989

                                 FLOW    SPEED   TEMP    STAB   MIXING HEIGHT (M)    USTAR  M-O LENGTH   Z-0 IPCODE PRATE
        YEAR  MONTH  DAY  HOUR   VECTOR  (M/S)    (K)    CLASS   RURAL    URBAN      (M/S)     (M)       (M)        (mm/HR)
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - -

         89     1     1     1    281.0   2.06   278.2     6     1933.0     81.0      .0000        .0  .0000   0     .00
         89     1     1     2    288.0   2.57   277.6     6     1933.0     81.0      .0000        .0  .0000   0     .00
         89     1     1     3    304.0   2.57   276.5     6     1933.0     81.0      .0000        .0  .0000   0     .00
         89     1     1     4    293.0   2.57   275.9     6     1933.0     81.0      .0000        .0  .0000   0     .00
         89     1     1     5    293.0   1.00   275.4     7     1933.0     81.0      .0000        .0  .0000   0     .00
         89     1     1     6    202.0   2.06   274.8     6     1933.0     81.0      .0000        .0  .0000   0     .00
         89     1     1     7    205.0   1.00   274.8     7     1933.0     81.0      .0000        .0  .0000   0     .00
         89     1     1     8    283.0   2.06   275.9     6      117.0    193.1      .0000        .0  .0000   0     .00
         89     1     1     9    297.0   2.06   278.2     5      419.7    483.1      .0000        .0  .0000   0     .00
         89     1     1    10    261.0   3.60   279.8     4      722.3    773.1      .0000        .0  .0000   0     .00
         89     1     1    11    274.0   3.09   283.2     3     1025.0   1063.0      .0000        .0  .0000   0     .00
         89     1     1    12    316.0   3.09   285.4     3     1327.7   1353.0      .0000        .0  .0000   0     .00
         89     1     1    13    343.0   2.57   288.2     3     1630.3   1643.0      .0000        .0  .0000   0     .00
         89     1     1    14    339.0   1.00   289.8     2     1933.0   1933.0      .0000        .0  .0000   0     .00
         89     1     1    15    342.0   1.00   290.9     2     1933.0   1933.0      .0000        .0  .0000   0     .00
         89     1     1    16     74.0   2.06   291.5     3     1933.0   1933.0      .0000        .0  .0000   0     .00
         89     1     1    17    121.0   2.06   289.8     4     1933.0   1933.0      .0000        .0  .0000   0     .00
         89     1     1    18    117.0   2.06   288.2     5     1897.8   1778.0      .0000        .0  .0000   0     .00
         89     1     1    19     94.0   2.06   285.9     6     1835.5   1503.7      .0000        .0  .0000   0     .00
         89     1     1    20     87.0   1.00   284.3     7     1773.2   1229.4      .0000        .0  .0000   0     .00
         89     1     1    21     70.0   1.54   283.2     7     1710.9    955.0      .0000        .0  .0000   0     .00
         89     1     1    22    132.0   1.54   282.6     7     1648.7    680.7      .0000        .0  .0000   0     .00
         89     1     1    23    210.0   2.06   281.5     6     1586.4    406.3      .0000        .0  .0000   0     .00
         89     1     1    24    320.0   2.57   280.9     6     1524.1    132.0      .0000        .0  .0000   0     .00
```

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*** NOTES:  STABILITY CLASS 1=A, 2=B, 3=C, 4=D, 5=E AND 6=F.
            FLOW VECTOR IS DIRECTION TOWARD WHICH WIND IS BLOWING.

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***        03/27/97
                                   ***  RUN3-1989 MET DATA                                                  ***          17:09:33
                                                                                                                        PAGE  10
**MODELOPTs: CONC                           URBAN  FLAT          DFAULT

                                 *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                                     INCLUDING SOURCE(S):       STACK1  ,

                                      *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                         ** CONC OF TCE      IN MICROGRAMS/M**3                          **

 DIRECTION |                                             DISTANCE (METERS)
 (DEGREES) |        50.00       100.00       150.00       200.00      250.00       300.00       400.00       500.00       600.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.00 |       .40535       .15891       .08788       .05541      .03786       .02741       .01626       .01078       .00770
     10.00 |       .35514       .14094       .08261       .05406      .03780       .02778       .01677       .01123       .00808
     20.00 |       .37326       .14812       .08563       .05611      .03939       .02906       .01764       .01186       .00856
     30.00 |       .48934       .18473       .10025       .06355      .04378       .03190       .01907       .01271       .00911
     40.00 |       .73138       .30543       .16491       .10254      .06959       .05018       .02960       .01957       .01395
     50.00 |      1.01588       .48905       .27172       .17102      .11702       .08486       .05050       .03362       .02411
     60.00 |      1.19028       .62551       .36607       .23870      .16711       .12325       .07505       .05073       .03680
     70.00 |      1.20859       .65927       .38725       .25356      .17856       .13251       .08155       .05555       .04051
     80.00 |      1.06586       .62922       .37444       .24482      .17175       .12702       .07777       .05277       .03836
     90.00 |       .85335       .52031       .32348       .21657      .15401       .11496       .07123       .04871       .03561
    100.00 |       .68595       .39751       .24535       .16433      .11709       .08754       .05435       .03719       .02718
    110.00 |       .55660       .32478       .19761       .13092      .09252       .06875       .04232       .02877       .02093
    120.00 |       .44019       .27388       .17366       .11747      .08395       .06279       .03894       .02660       .01941
    130.00 |       .33041       .21364       .14158       .09870      .07201       .05466       .03460       .02396       .01767
    140.00 |       .24407       .14762       .09506       .06543      .04737       .03577       .02245       .01544       .01131
    150.00 |       .20250       .11564       .07313       .04966      .03565       .02676       .01665       .01139       .00831
    160.00 |       .18503       .10489       .06707       .04594      .03322       .02506       .01570       .01079       .00791
    170.00 |       .17762       .10287       .06679       .04625      .03366       .02549       .01605       .01105       .00810
    100.00 |       .18110       .11443       .07611       .05340      .03914       .02979       .01891       .01311       .00968
    190.00 |       .17923       .11285       .07376       .05121      .03721       .02813       .01767       .01216       .00892
    200.00 |       .17058       .10516       .06860       .04756      .03453       .02610       .01640       .01128       .00827
    210.00 |       .16947       .11260       .07664       .05405      .03962       .03013       .01907       .01319       .00971
    220.00 |       .17580       .12227       .08306       .05865      .04307       .03278       .02075       .01434       .01055
    230.00 |       .19598       .14986       .10450       .07440      .05469       .04160       .02630       .01816       .01335
    240.00 |       .24779       .19547       .13542       .09646      .07125       .05449       .03472       .02409       .01776
    250.00 |       .35976       .31985       .23049       .16645      .12391       .09521       .06103       .04252       .03146
    260.00 |       .60013       .56734       .38854       .27099      .19746       .14965       .09438       .06516       .04793
    270.00 |       .99783       .85135       .53440       .35620      .25318       .18884       .11679       .07971       .05819
    280.00 |      1.41435       .97347       .57820       .37616      .26367       .19492       .11918       .08080       .05874
    290.00 |      1.52745       .88353       .49815       .31655      .21900       .16049       .09691       .06511       .04700
    300.00 |      1.32996       .68590       .39124       .25145      .17473       .12824       .07753       .05216       .03771
    310.00 |      1.13763       .52646       .28404       .17565      .11868       .08530       .05014       .03308       .02355
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  320.00 |     1.18298     .46254     .24414     .14935     .10037     .07205     .04250     .02824     .0202,
  330.00 |      .95263     .32716     .16730     .10028     .06646     .04719     .02736   . .01793     .01271
  340.00 |      .69815     .24097     .12046     .07180     .04749     .03370     .01953     .01280     .00907
  350.00 |      .54288     .19824     .09912     .05917     .03921     .02786     .01616     .01058     .00749

*** ISCST3 - VERSION 96113 ***   ***  HIGH REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***     03/27/97
                                   ***  RUN3-1989 MET DATA                                            ***     17:09:33
                                                                                                               PAGE  11
 **MODELOPTs: CONC                           URBAN  FLAT          DFAULT

                          *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                              INCLUDING SOURCE(S):      STACK1  ,

                               *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                  ** CONC OF TCE      IN MICROGRAMS/M**3                           **

 DIRECTION |                                          DISTANCE (METERS)
 (DEGREES) |        800.00       1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  360.00 |       .00453      .00302
   10.00 |       .00480      .00322
   20.00 |       .00511      .00344
   30.00 |       .00539      .00360
   40.00 |       .00821      .00547
   50.00 |       .01432      .00961
   60.00 |       .02222      .01508
   70.00 |       .02462      .01678
   80.00 |       .02319      .01572
   90.00 |       .02171      .01482
  100.00 |       .01654      .01126
  110.00 |       .01264      .00855
  120.00 |       .01178      .00800
  130.00 |       .01089      .00748
  140.00 |       .00689      .00468
  150.00 |       .00504      .00342
  160.00 |       .00482      .00329
  170.00 |       .00494      .00336
  180.00 |       .00597      .00410
  190.00 |       .00545      .00372
  200.00 |       .00504      .00343
  210.00 |       .00597      .00410
  220.00 |       .00647      .00442
  230.00 |       .00818      .00560
  240.00 |       .01091      .00746
  250.00 |       .01945      .01339
  260.00 |       .02945      .02020
  270.00 |       .03543      .02417
  280.00 |       .03559      .02423
  290.00 |       .02015      .01899
  300.00 |       .02268      .01537
```

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   310.00 |          .01381        .00916
   320.00 |          .01210        .00817
   330.00 |          .00742        .00491
   340.00 |          .00530        .00351
   350.00 |          .00436        .00288

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***        03/27/97
                                    ***  RUN3-1989 MET DATA                                             ***         17:09:33
                                                                                                                    PAGE  12
 **MODELOPTs: CONC                               URBAN  FLAT           DFAULT

                                 *** THE ANNUAL (  8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL       ***
                                     INCLUDING SOURCE(S):       STACK1   ,

                                                *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                           ** CONC OF TCE       IN MICROGRAMS/M**3                          **

      X-COORD (M)   Y-COORD (M)        CONC                       X-COORD (M)   Y-COORD (M)        CONC
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
         -18.55          1.33         .32296                          -38.55          1.33         .99773
         -58.55          1.33        1.08249                          -78.55          1.33        1.02362
         -89.33          1.33         .95072                          -89.33         21.33        1.05824
         -89.33         41.33         .79586                          -89.33         61.33         .55567
         -89.33         81.33         .37515                          -89.33        100.40         .29638
         -69.33        100.34         .29705                          -49.33        100.34         .23278
         -29.33        100.34         .21091                           -9.33        100.34         .17408
           1.45        100.40         .15606                            1.45         80.34         .20942
           1.45         60.34         .30859                            1.45         40.34         .47533
           1.45         20.34         .00000                            1.45          1.33         .14599
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***        03/27/97
                                    ***  RUN3-1989 MET DATA                                             ***         17:09:33
                                                                                                                    PAGE  13
 **MODELOPTs: CONC                               URBAN  FLAT           DFAULT

                                 *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                     INCLUDING SOURCE(S):       STACK1   ,

                                      *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                          ** CONC OF TCE       IN MICROGRAMS/M**3                          **

 DIRECTION |                                           DISTANCE (METERS)
 (DEGREES) |         50.00              100.00              150.00              200.00              250.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    360.0 |    20.28376 (89121614)   10.39134 (89082024)    7.93206 (89091801)    6.71231 (89091801)    5.27473 (89091801)
     10.0 |    19.66193 (89103115)   10.60886 (89071902)    8.80859 (89031822)    7.23369 (89031822)    5.57547 (89031822)
     20.0 |    19.22944 (89011413)   10.57407 (89081405)    8.23268 (89071822)    6.91132 (89031220)    5.61874 (89012805)
     30.0 |    18.40979 (89032709)   10.28839 (89103122)    7.75432 (89032321)    6.68202 (89080704)    5.32217 (89080704)
     40.0 |    17.88867 (89020709)   10.51260 (89103124)    8.70235 (89080504)    7.00085 (89062501)    5.42257 (89062501)
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```
   50.0 |     17.41505 (89122217)     10.37690 (89102524)      8.59993 (89030822)      6.93156 (89062223)      5.28706 (89062223)
   60.0 |     16.93206 (89081619)     10.23520 (89032719)      8.57591 (89062724)      6.87146 (89052404)      5.64463 (89013101)
   70.0 |     16.47384 (89022318)     10.08906 (89031921)      8.36624 (89081824)      6.77262 (89081824)      5.17999 (89081824)
   80.0 |     15.99177 (89042607)      9.98587 (89080220)      8.46715 (89041523)      6.57117 (89041523)      5.10481 (89073001)
   90.0 |     15.56447 (89122416)      9.92821 (89022819)      8.20785 (89050323)      6.59124 (89062424)      5.11675 (89062424)
  100.0 |     15.57490 (89012515)      9.76354 (89062620)      8.26715 (89052524)      6.53944 (89071801)      5.05259 (89071801)
  110.0 |     15.25969 (89010117)      9.71218 (89080621)      8.20104 (89082524)      6.48658 (89082524)      5.01116 (89060721)
  120.0 |     15.23623 (89102908)      9.64676 (89090623)      8.18976 (89062723)      6.41924 (89071802)      4.97620 (89071802)
  130.0 |     14.37698 (89101717)      9.59671 (89042019)      8.15483 (89071102)      6.39462 (89071102)      4.94661 (89031923)
  140.0 |     13.99434 (89012815)      9.51715 (89082220)      8.14444 (89040603)      6.38506 (89040603)      4.93977 (89040603)
  150.0 |     14.77715 (89121317)      9.29396 (89040302)      8.10344 (89070202)      6.32962 (89070202)      4.89328 (89070202)
  160.0 |     14.47344 (89092218)      9.53846 (89062102)      7.68910 (89050602)      6.00581 (89050602)      4.66809 (89080703)
  170.0 |     14.67781 (89051608)      9.24710 (89071120)      8.09656 (89072301)      6.32799 (89072301)      4.89327 (89072301)
  180.0 |     14.73746 (89110618)      9.33942 (89090919)      8.17183 (89051401)      6.35351 (89092820)      4.92366 (89092820)
  190.0 |     12.89627 (89012624)      9.37063 (89110519)      7.94611 (89070301)      6.33173 (89070301)      4.93186 (89070301)
  200.0 |     13.51202 (89012624)      9.67682 (89111921)      8.17983 (89111021)      6.29111 (89051901)      4.93261 (89051901)
  210.0 |     15.10294 (89081607)      9.78936 (89051403)      8.28516 (89100623)      6.45066 (89052804)      5.02814 (89052804)
  220.0 |     15.38421 (89010215)      9.41090 (89020819)      8.26319 (89101320)      6.43789 (89040323)      5.05391 (89040323)
  230.0 |     15.65656 (89062007)      9.51952 (89110821)      8.41863 (89031122)      6.61670 (89100923)      5.07545 (89061203)
  240.0 |     16.10694 (89012509)      9.85593 (89091706)      7.97477 (89040607)      6.44148 (89060301)      5.11575 (89060301)
  250.0 |     16.25661 (89122709)     10.01667 (89050901)      8.54674 (89101401)      6.77546 (89070804)      5.18283 (89070804)
  260.0 |     17.31231 (89120609)     10.28292 (89031106)      8.65982 (89040507)      6.87046 (89100922)      5.30747 (89070304)
  270.0 |     17.17266 (89011009)     10.43005 (89020824)      8.72809 (89050202)      6.92364 (89092806)      5.38170 (89092806)
  280.0 |     17.86038 (89111408)     10.53585 (89032503)      8.68124 (89062706)      7.01097 (89062503)      5.42762 (89062503)
  290.0 |     18.29115 (89121411)     10.73469 (89041805)      8.83519 (89051006)      7.11756 (89050401)      5.47361 (89050401)
  300.0 |     19.25688 (89120710)     10.89051 (89040408)      8.79056 (89050603)      7.15500 (89050603)      5.53188 (89092524)
  310.0 |     23.50676 (89120522)     19.34661 (89101704)     12.09031 (89102224)      8.35647 (89022124)      6.15544 (89020222)
  320.0 |     36.40709 (89121702)     19.57179 (89031107)     12.20241 (89112219)      8.75843 (89112219)      6.36433 (89092124)
  330.0 |     38.18314 (89080322)     19.61837 (89021902)     12.11778 (89072824)      8.74925 (89120401)      6.35886 (89120401)
  340.0 |     36.86891 (89091407)     19.76499 (89110901)     12.28843 (89072822)      8.72603 (89050704)      6.33231 (89050704)
  350.0 |     37.07028 (89012420)     19.56578 (89111423)     12.09215 (89101323)      8.27481 (89010422)      6.09576 (89010422)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***        03/27/97
                                   ***  RUN3-1998MET DATA                                                 ***          17:09:33
                                                                                                                       PAGE  14
 **MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                  *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                      INCLUDING SOURCE(S):      STACK1   ,

                                       *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                            ** CONC OF TCE      IN MICROGRAMS/M**3                                   **

 DIRECTION |                                                   DISTANCE (METERS)
 (DEGREES) |        300.00                  400.00                  500.00                  600.00                  800.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  360.0 |      4.15398 (89091801)      2.73006 (89091801)      1.93604 (89091801)      1.45593 (89091801)       .92937 (89091801)
   10.0 |      4.34165 (89092923)      2.83179 (89092923)      1.99801 (89092923)      1.49712 (89092923)       .95110 (89092923)
   20.0 |      4.84929 (89012805)      3.50036 (89012805)      2.59320 (89012805)      1.99615 (09012805)      1.30236 (89012805)
   30.0 |      4.21865 (89080704)      2.78626 (89080704)      1.97804 (89080704)      1.48734 (89080704)       .94832 (89080704)
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    40.0 |     4.21534 (89062501)      2.73876 (89032003)      1.93867 (89032003)      1.45336 (89032003)       .93507 (89051501)
    50.0 |     4.06579 (89062223)      2.62293 (89081005)      1.89246 (89081005)      1.43808 (89081005)       .92893 (89081005)
    60.0 |     4.73038 (89013101)      3.29142 (89013101)      2.38155 (89013101)      1.80126 (89013101)      1.14438 (89013101)
    70.0 |     3.99642 (89081824)      2.67541 (89022622)      1.91947 (89022622)      1.45306 (89022622)       .93383 (89022622)
    80.0 |     4.05022 (89073001)      2.68147 (89073001)      1.90583 (89073001)      1.44366 (89050422)       .92922 (89050422)
    90.0 |     4.01911 (89091901)      2.65943 (89091901)      2.05293 (89020701)      1.63990 (89020701)      1.12010 (89020701)
   100.0 |     3.94683 (89071801)      2.75149 (89013006)      2.12406 (89013006)      1.68284 (89013006)      1.13942 (89013006)
   110.0 |     3.94953 (89060721)      2.60835 (89060721)      1.85650 (89060721)      1.39903 (89060721)       .89416 (89060721)
   120.0 |     3.91227 (89071802)      2.58081 (89071802)      1.84198 (89053022)      1.40252 (89053022)       .90996 (89053022)
   130.0 |     3.90488 (89031923)      2.59571 (89031923)      1.85974 (89031923)      1.40958 (89031923)       .90992 (89091403)
   140.0 |     3.89056 (89040603)      2.58219 (89040603)      1.84965 (89040603)      1.40214 (89040603)       .90499 (89040603)
   150.0 |     3.85446 (89070202)      2.56047 (89070202)      1.83575 (89070202)      1.39266 (89070202)       .89988 (89070202)
   160.0 |     3.71381 (89080703)      2.49522 (89080703)      1.80000 (89080703)      1.37071 (89080703)       .88956 (89080703)
   170.0 |     3.85493 (89072301)      2.56103 (89072301)      1.83620 (89072301)      1.39300 (89072301)       .90008 (89072301)
   180.0 |     3.88161 (89092820)      2.57882 (89092820)      1.84812 (89092820)      1.40135 (89092820)       .90473 (89092820)
   190.0 |     3.89682 (89070301)      2.59277 (89070301)      1.85845 (89070301)      1.40894 (89070301)       .91007 (89060604)
   200.0 |     3.90889 (89051901)      2.60614 (89051901)      1.86874 (89051901)      1.41659 (89051901)       .91360 (89051901)
   210.0 |     3.96057 (89052804)      2.61371 (89052804)      1.85950 (89052804)      1.40159 (89080304)       .91016 (89080304)
   220.0 |     3.99211 (89040323)      2.63833 (89040323)      1.87664 (89040323)      1.41302 (89040323)       .91172 (89042924)
   230.0 |     4.02011 (89061203)      2.66046 (89061203)      1.89198 (89061203)      1.42381 (89061203)       .90766 (89061203)
   240.0 |     4.05744 (89060301)      2.68498 (89060301)      1.90778 (89060301)      1.43444 (89060301)       .91400 (89042302)
   250.0 |     4.09314 (89080705)      2.70685 (89080705)      1.92132 (89080705)      1.45283 (89091002)       .93377 (89091002)
   260.0 |     4.14807 (89070304)      2.69993 (89050804)      1.93376 (89050804)      1.46203 (89050804)       .93804 (89050804)
   270.0 |     4.19370 (89092806)      2.75519 (89052701)      1.94740 (89052701)      1.45875 (89052701)       .92418 (89052701)
   280.0 |     4.24279 (89090106)      2.77486 (89090106)      1.96665 (89052605)      1.48117 (89052605)       .94607 (89052605)
   290.0 |     4.23723 (89050401)      2.79041 (89040801)      1.98006 (89040801)      1.48845 (89040801)       .94875 (89040801)
   300.0 |     4.31520 (89092524)      2.81771 (89041902)      1.99254 (89041902)      1.49487 (89041902)       .95085 (89041902)
   310.0 |     4.68259 (89020222)      2.96719 (89020222)      2.06649 (89020222)      1.53799 (89020222)       .97111 (89020222)
   320.0 |     4.79667 (89092124)      3.00643 (89092124)      2.08072 (89092124)      1.54476 (89071206)       .97391 (89071206)
   330.0 |     4.78630 (89120401)      2.99703 (89120401)      2.07376 (89120401)      1.53702 (89120401)       .96965 (89121902)
   340.0 |     4.76394 (89050704)      2.98286 (89050704)      2.06449 (89050704)      1.53060 (89050704)       .96599 (89020805)
   350.0 |     4.62567 (89010422)      2.92331 (89010422)      2.03304 (89010422)      1.51167 (89010422)       .95321 (89010422)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***        03/27/97
                                        ***  RUN3-1989 MET DATA                                            ***           17:09:33
                                                                                                                        PAGE  15
**MODELOPTs: CONC                                 URBAN  FLAT          DFAULT

                                  *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL          ***
                                      INCLUDING SOURCE(S):       STACK1  ,                ,

                                      *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                           ** CONC OF TCE       IN MICROGRAMS/M**3                               **

 DIRECTION |                                                  DISTANCE (METERS)
 (DEGREES) |         1000.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |       .65954 (89091801)
    10.0 |       .67436 (89040706)
    20.0 |       .93216 (89012805)
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  30.0 |          .67213 (89080704)
  40.0 |          .66689 (89051501)
  50.0 |          .66360 (89081005)
  60.0 |          .80212 (89013101)
  70.0 |          .66478 (89022622)
  80.0 |          .66215 (89050422)
  90.0 |          .82361 (89020701)
 100.0 |          .83412 (89013006)
 110.0 |          .63405 (89060721)
 120.0 |          .65234 (89053022)
 130.0 |          .65214 (89091403)
 140.0 |          .64674 (89040603)
 150.0 |          .64357 (89070202)
 160.0 |          .63771 (89080703)
 170.0 |          .64370 (89072301)
 180.0 |          .64663 (89092820)
 190.0 |          .65223 (89060604)
 200.0 |          .65231 (89051901)
 210.0 |          .65266 (89080304)
 220.0 |          .65370 (89042924)
 230.0 |          .64470 (89111604)
 240.0 |          .65533 (89042302)
 250.0 |          .66476 (89091002)
 260.0 |          .66709 (89050804)
 270.0 |          .65868 (89030102)
 280.0 |          .67116 (89052605)
 290.0 |          .67234 (89040801)
 300.0 |          .67313 (89041902)
 310.0 |          .68555 (89020222)
 320.0 |          .68698 (89071206)
 330.0 |          .68481 (89121902)
 340.0 |          .68294 (89020805)
 350.0 |          .67219 (89010422)
*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***      03/27/97
                                   *** RUN3-1989 MET DATA                                                   ***          17:09:33
                                                                                                                        PAGE  16
**MODELOPTs: CONC                            URBAN  FLAT          DFAULT

                                *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                    INCLUDING SOURCE(S):      STACK1  ,

                                               *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                          ** CONC OF TCE      IN MICROGRAMS/M**3                              **

    X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)             X-COORD (M)  Y-COORD (M)        CONC     (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        -18.55         1.33       21.59458  (89101513)                -38.55         1.33       20.77217  (89051209)
        -58.55         1.33       16.10369  (89010309)                -78.55         1.33       12.59282  (89072906)
        -89.33         1.33       11.34286  (89020824)                -89.33        21.33       11.39843  (89032207)
        -89.33        41.33       11.00269  (89112121)                -89.33        61.33       11.04539  (89101704)
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          -89.33        81.33       15.30179  (89031701)                      -89.33       100.40        14.06264  (89022722)
          -69.33       100.34       16.17384  (89033103)                      -49.33       100.34        17.89636  (89112223)
          -29.33       100.34       18.77910  (89101620)                       -9.33       100.34        18.46819  (89031901)
            1.45       100.40       10.54132  (89082023)                        1.45        80.34        12.92196  (89112516)
            1.45        60.34       16.69753  (89112516)                        1.45        40.34        23.30411  (89102615)
            1.45        20.34         .00161  (89050612)                        1.45         1.33        16.10916  (89080609)

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***          03/27/97
                                    ***  RUN3-1998MET DATA                                                  ***           17:09:33
                                                                                                                          PAGE  17
**MODELOPTs: CONC                               URBAN  FLAT           DFAULT

                              *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                  INCLUDING SOURCE(S):       STACK1  ,

                                *** NETWORK ID: POLR1     ;  NETWORK TYPE: GRIDPOLR ***

                                  ** CONC OF TCE      IN MICROGRAMS/M**3                             **

DIRECTION |                                                DISTANCE (METERS)
(DEGREES) |          50.00                 100.00                 150.00                 200.00                 250.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |      2.63416c(89112524)     1.20394c(89082024)      .71461c(89082024)      .44136c(89082024)      .30259c(89123024)
    10.0 |      2.23490c(89033024)     1.08863c(89100724)      .77587c(89042824)      .55269c(89042824)      .39547c(89042824)
    20.0 |      2.22428c(89020424)     1.18132c(89100724)      .81982c(89042824)      .70024c(89042824)      .55556c(89042824)
    30.0 |      3.47597c(89020424)     1.48805c(89110324)      .82328c(89110324)      .54026c(89010924)      .42790c(89010924)
    40.0 |      3.73758c(89020424)     1.46308c(89063024)      .90434c(89063024)      .56735c(89063024)      .40872c(89011324)
    50.0 |      4.14956c(89072324)     2.74891c(89103024)     1.50676c(89103024)      .96140c(89103024)      .65934c(89103024)
    60.0 |      3.83960c(89042624)     3.37232 (89090824)     2.25284 (89090824)     1.45811 (89090824)     1.06673c(89103024)
    70.0 |      4.56969c(89081324)     2.68936c(89052424)     1.69095 (89090824)     1.24208 (89090824)      .92885 (89090824)
    80.0 |      4.11783 (89081224)     2.31533c(89103124)     1.48399c(89103124)     1.01883c(89103124)      .75074c(89041524)
    90.0 |      4.25305 (89071524)     2.63362 (89081224)     1.44958 (89081224)      .88009c(89082924)      .61416c(89082924)
   100.0 |      3.97153 (89090224)     1.95969 (89071524)     1.23658 (89081224)      .85511 (89081224)      .61832 (89081224)
   110.0 |      3.68895 (89090224)     1.91577 (89090224)     1.19767c(89083124)      .83817c(89083124)      .60718c(89083124)
   120.0 |      2.41947 (89080324)     1.42796 (89080324)      .80432 (89090224)      .55940c(89110324)      .42803c(89110324)
   130.0 |      1.82034c(89082424)     1.13914 (89080324)      .91728c(89030524)      .73417c(89030524)      .57093c(89030524)
   140.0 |      1.51128 (89072924)      .98385 (89072924)      .62665 (89072924)      .50224c(89121924)      .39785c(89121924)
   150.0 |      1.58491c(89121324)     1.07838c(89041924)      .71388c(89070224)      .51859c(89070224)      .38554c(89070224)
   160.0 |      1.71058c(89081124)     1.15598c(89081124)      .71046c(89081124)      .48222c(89070224)      .35481c(89070224)
   170.0 |      1.86438c(89070624)     1.01527c(89070624)      .64163c(89102224)      .45770c(89100824)      .35293c(89030524)
   180.0 |      2.77178c(89011224)     1.54998c(89070624)      .97937c(89070624)      .65441c(89070624)      .51195c(89011124)
   190.0 |      3.22992c(89011224)     1.43848c(89081924)     1.02255c(89081924)      .72009c(89081924)      .52644c(89081924)
   200.0 |      2.09958 (89121124)     1.02850 (89121124)      .60964c(89101324)      .42987c(89101324)      .31333c(89101324)
   210.0 |      2.13536 (89121124)     1.21128 (89121124)      .70841 (89121124)      .52782c(89082724)      .40454c(89082724)
   220.0 |      2.16878 (89121124)     1.14826 (89121124)      .73509c(89082724)      .49350c(89082724)      .39770c(89040324)
   230.0 |      3.10274c(89112824)     1.22854 (89112924)      .76951c(89022524)      .59775c(89022524)      .44866c(89022524)
   240.0 |      2.58568 (89112924)     1.57044 (89112924)      .98217c(89042224)      .69335c(89040624)      .52700c(89040624)
   250.0 |      3.30966 (89112924)     1.88272c(89111924)     1.60801c(89040524)     1.36351c(89040524)     1.10364c(89040524)
   260.0 |      3.94360c(89111924)     3.70564c(89040524)     2.64239c(89040524)     1.75271c(89040524)     1.20560c(89040524)
   270.0 |      4.53484 (89101924)     2.98114c(89111324)     1.94794c(89111324)     1.29914c(89111324)      .91033c(89111324)
   280.0 |      5.89878c(89012124)     2.87634c(89083024)     2.21527c(89090424)     1.61574c(89090424)     1.18734c(89090424)
```

```
     290.0 |        6.46971c(89012124)       3.12586c(89110524)       1.98851c(89121724)       1.51036c(89121724)       1.14896c(89121724)
     300.0 |        5.09048c(89111724)       2.94470 (89102124)       1.53551c(89112224)       1.07748c(89112324)        .81733c(89112324)
     310.0 |        5.67154 (89102024)       2.45505c(89102224)       1.42944c(89102224)       1.02698c(89111524)        .78588c(89111524)
     320.0 |        6.60909 (89102024)       2.48474c(89042924)       1.42351c(89111524)        .95499c(89111524)        .65917c(89111524)
     330.0 |        4.72388c(89010724)       2.10130c(89112224)       1.19242c(89112124)        .76745c(89112124)        .53508c(89112124)
     340.0 |        5.11246 (89051524)       2.14960c(89110924)       1.23766c(89110924)        .81342c(89110924)        .56562c(89110924)
     350.0 |        5.09448 (89051524)       1.93720 (89051524)       1.09292c(89010424)        .72670c(89010424)        .51753c(89010424)

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***        03/27/97
                                    ***  RUN3-1998MET DATA                                                   ***         17:09:33
                                                                                                                       PAGE  18
**MODELOPTs: CONC                                 URBAN  FLAT           DFAULT

                                 *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                     INCLUDING SOURCE(S):       STACK1  ,

                                      *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                          ** CONC OF TCE       IN MICROGRAMS/M**3                           **

DIRECTION |                                                 DISTANCE (METERS)
(DEGREES) |         300.00                   400.00                   500.00                   600.00                   800.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

     360.0 |         .23989c(89123024)        .15731c(89123024)        .11050c(89123024)        .08213c(89123024)        .05114c(89123024)
      10.0 |         .29278c(89042824)        .17728c(89042824)        .11878c(89042824)        .08540c(89042824)        .05266c(89052624)
      20.0 |         .43972c(89042824)        .28968c(89042824)        .20501c(89042824)        .15363c(89042824)        .09729c(89042824)
      30.0 |         .33643c(89010924)        .21855c(89010924)        .15276c(89010924)        .11319c(89010924)        .07021c(89010924)
      40.0 |         .31608c(89011324)        .20250c(89122624)        .14387c(89122624)        .10812c(89122624)        .06061c(89122624)
      50.0 |         .47440c(89103024)        .27560c(89103024)        .17928c(89103024)        .12597c(89103024)        .07223c(89103024)
      60.0 |         .82972c(89103024)        .53733c(89103024)        .37682c(89103024)        .28050c(89103024)        .17567c(89103024)
      70.0 |         .71575 (89090824)        .46161 (89090824)        .32409 (89090824)        .24174 (89090824)        .15191 (89090824)
      80.0 |         .57508c(89041524)        .36646c(89041524)        .26035c(89012624)        .19743c(89012624)        .12603c(89012624)
      90.0 |         .47157c(89013024)        .31864c(89013024)        .22789c(89013024)        .17135c(89013024)        .10811c(89013024)
     100.0 |         .46673 (89081224)        .30077c(89110224)        .21225c(89110224)        .15906c(89110224)        .10096c(89110224)
     110.0 |         .45830c(89083124)        .28874c(89083124)        .20039c(89083124)        .14858c(89083124)        .09297c(89083124)
     120.0 |         .33406c(89110324)        .21860c(89110324)        .15492c(89110324)        .11644c(89110324)        .07417c(89110324)
     130.0 |         .44920c(89030524)        .29563c(89030524)        .20950c(89030524)        .15709c(89030524)        .09930c(89030524)
     140.0 |         .31826c(89121924)        .21482c(89121924)        .15496c(89121924)        .11772c(89121924)        .07579c(89121924)
     150.0 |         .29602c(89070224)        .19007c(89070224)        .13308c(89070224)        .09909c(89070224)        .06216c(89070224)
     160.0 |         .27063c(89070224)        .17239c(89070224)        .12122c(89121324)        .09182c(89121324)        .05893c(89121324)
     170.0 |         .28784c(89030524)        .19839c(89030524)        .14461c(89030524)        .11051c(89030524)        .07158c(89030524)
     180.0 |         .42232c(89011124)        .29525c(89011124)        .21723c(89011124)        .16722c(89011124)        .10958c(89011124)
     190.0 |         .40030c(89081924)        .25458c(89081924)        .17759c(89081924)        .13205c(89081924)        .08285c(89081924)
     200.0 |         .23741c(89101324)        .14997c(89101324)        .10396c(89101324)        .07684c(89101324)        .0|843c(89092224)
     210.0 |         .31686c(89082724)        .20862c(89082724)        .14839c(89082724)        .11173c(89082724)        .07119c(89082724)
     220.0 |         .32072c(89040324)        .21769c(89040324)        .19737c(89040324)        .11976c(89040324)        .07742c(89040324)
     230.0 |         .34236c(89022524)        .21509c(89022524)        .14766c(89120724)        .11190c(89020424)        .07362c(89020424)
     240.0 |         .40808c(89040624)        .26278c(89040624)        .18348c(89040624)        .13605c(89040624)        .08460c(89040624)
     250.0 |         .89191c(89040524)        .60697c(89040524)        .43906c(89040524)        .33399c(89040524)        .21538c(89040524)
     260.0 |         .86828c(89040524)        .50638c(89040524)        .33086c(89040524)        .23354c(89040524)        .13513c(89040524)
     270.0 |         .67099c(89111324)        .41194c(89111324)        .29268c(89122224)        .22143c(89122224)        .14112c(89122224)
```

```
   280.0 |      .90040c(89090424)      .56728c(89090424)      .39246c(89090424)      .28999c(89090424)      .18508c(89121724)
   290.0 |      .89113c(89121724)      .56906c(89121724)      .39304c(89121724)      .28858c(89121724)      .17666c(89121724)
   300.0 |      .62970c(89112324)      .40104c(89112324)      .27754c(89112324)      .20443c(89112324)      .12604c(89112324)
   310.0 |      .61028c(89111524)      .39564c(89111524)      .27865c(89111524)      .20857c(89111524)      .13213c(89111524)
   320.0 |      .47745c(89111524)      .28238c(89111524)      .19300c(89040424)      .14262c(89040424)      .08920c(89040424)
   330.0 |      .39329c(89112124)      .23853c(89112124)      .16114c(89112124)      .11699c(89112124)      .07088c(89112124)
   340.0 |      .41576c(89110924)      .25423c(89110924)      .17392c(89110924)      .12807c(89110924)      .07988c(89110924)
   350.0 |      .38688c(89010424)      .24079c(89010424)      .16612c(89010424)      .12288c(89010424)      .07695c(89010424)

*** ISCST3 - VERSION 96113 ***     ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***        03/27/97
                                      ***  RUN3-1989 MET DATA                                                  ***         17:09:33
                                                                                                                          PAGE  19
 **MODELOPTs: CONC                                URBAN  FLAT           DFAULT

                                  *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL       ***
                                      INCLUDING SOURCE(S):       STACK1  ,

                                        *** NETWORK ID: POLR1    ;  NETWORK TYPE: GRIDPOLR ***

                                            ** CONC OF TCE       IN MICROGRAMS/M**3                             **

 DIRECTION |                                                 DISTANCE (METERS)
 (DEGREES) |         1000.00
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   360.0 |      .03547c(89011324)
    10.0 |      .03696c(89052624)
    20.0 |      .06851c(89042824)
    30.0 |      .04852c(89010924)
    40.0 |      .04828c(89122624)
    50.0 |      .04698c(89103024)
    60.0 |      .12245c(89103024)
    70.0 |      .10611 (89090824)
    80.0 |      .08853c(89012624)
    90.0 |      .07536c(89013024)
   100.0 |      .07129c(89110224)
   110.0 |      .06494c(89083124)
   120.0 |      .05245c(89110324)
   130.0 |      .06961c(89030524)
   140.0 |      .05382c(89121924)
   150.0 |      .04343c(89070224)
   160.0 |      .04180c(89121324)
   170.0 |      .05096c(89030524)
   180.0 |      .07879c(89011124)
   190.0 |      .05793c(89081924)
   200.0 |      .03485c(89092224)
   210.0 |      .05026c(89082724)
   220.0 |      .05521c(89040324)
   230.0 |      .05294c(89020424)
   240.0 |      .05879c(89013024)
   250.0 |      .15315c(89040524)
   260.0 |      .08867c(89040524)
```

```
*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***       03/27/97
                                   ***  RUN3-1998MET DATA                                                   ***         17:09:33
                                                                                                                        PAGE  24
**MODELOPTs: CONC                          URBAN  FLAT           DFAULT

*** Message Summary : ISCST3 Model Execution ***

 --------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           2 Warning Message(s)
A Total of        1158 Informational Message(s)

A Total of        1158 Calm Hours Identified

   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***

   ********   WARNING MESSAGES   ********
MX W430  4431 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    89070415
MX W430  4432 METQA :Ambient Temperature Data Out-of-Range.  KURDAT=    89070416

   ************************************
   *** ISCST3 Finishes Successfully ***
   ************************************
```

```
 270.0 |       .09922c(89122224)
 280.0 |       .13093c(89121724)
 290.0 |       .12092c(89121724)
 300.0 |       .08687c(89112324)
 310.0 |       .09311c(89111524)
 320.0 |       .06254c(89040424)
 330.0 |       .04829c(89112124)
 340.0 |       .05598c(89110924)
 350.0 |       .05402c(89010424)
*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***      03/27/97
                                   ***  RUN3-1989 MET DATA                                                ***       17:09:33
                                                                                                                   PAGE  20
**MODELOPTa: CONC                              URBAN  FLAT          DFAULT

                              *** THE   1ST HIGHEST 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                                  INCLUDING SOURCE(S):      STACK1   ,

                                                *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                                          ** CONC OF TCE      IN MICROGRAMS/M**3                        **

     X-COORD (M)  Y-COORD (M)         CONC      (YYMMDDHH)              X-COORD (M)  Y-COORD (M)        CONC      (YYMMDDHH)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
         -18.55         1.33        3.03968c (89110224)                   -38.55         1.33        5.49407c (89012024)
         -58.55         1.33        4.47305  (89101924)                   -78.55         1.33        3.61954  (89101924)
         -89.33         1.33        3.19147c (89111324)                   -89.33        21.33        3.79849c (89083024)
         -89.33        41.33        3.45116  (89102124)                   -89.33        61.33        2.61082c (89112224)
         -89.33        81.33        1.86565c (89102224)                   -89.33       100.40        1.91696c (89111524)
         -69.33       100.34        1.77258c (89112224)                   -49.33       100.34        1.61719c (89112124)
         -29.33       100.34        1.82723c (89110924)                    -9.33       100.34        1.42395c (89112124)
           1.45       100.40        1.18124c (89082024)                     1.45        80.34        1.49171c (89112124)
           1.45        60.34        2.17712c (89112524)                     1.45        40.34        3.18939c (89033024)
           1.45        20.34         .00016c (89100824)                     1.45         1.33        1.83961  (89072924)
*** ISCST3 - VERSION 96113 ***    *** NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***      03/27/97
                                   ***  RUN3-1989 MET DATA                                                ***       17:09:33
                                                                                                                   PAGE  21
**MODELOPTs: CONC                              URBAN  FLAT          DFAULT

                                           *** THE SUMMARY OF MAXIMUM PERIOD (  8760 HRS) RESULTS ***

                                          ** CONC OF TCE      IN MICROGRAMS/M**3                        **

                                                                                                   NETWORK
GROUP ID                     AVERAGE CONC               RECEPTOR  (XR, YR, ZELEV, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      1ST HIGHEST VALUE IS      1.52745 AT (     -46.98,      17.10,       .00,       .00)  GP   POLR1
         2ND HIGHEST VALUE IS      1.41435 AT (     -49.24,       8.68,       .00,       .00)  GP   POLR1
```

```
 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***        03/27/97
                                    ***  RUN3-1998MET DATA                                                     ***        17:09:33
                                                                                                                          PAGE  22
 **MODELOPTs: CONC                             URBAN  FLAT           DFAULT

                                                  *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***


                                         ** CONC OF TCE       IN MICROGRAMS/M**3                             **

                                                             DATE                                                             NETWORK
GROUP ID                                AVERAGE CONC      (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS      38.18314  ON 89080322: AT (     -25.00,       43.30,       .00,       .00)  GP    POLR1

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY

*** ISCST3 - VERSION 96113 ***    ***  NIBW REMEDIATION SITE-SHORT TERM MODEL-18 FT. STACK HT. & 10 INCH S ***        03/27/97
                                    ***  RUN3-1989 MET DATA                                                     ***        17:09:33
                                                                                                                          PAGE  23
 **MODELOPTs: CONC                             URBAN  FLAT           DFAULT

                                                  *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***


                                         ** CONC OF TCE       IN MICROGRAMS/M**3                             **

                                                             DATE                                                             NETWORK
GROUP ID                                AVERAGE CONC      (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZFLAG)     OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH  1ST HIGH VALUE IS       6.60909  ON 89102024: AT (     -32.14,       38.30,       .00,       .00)  GP    POLR1

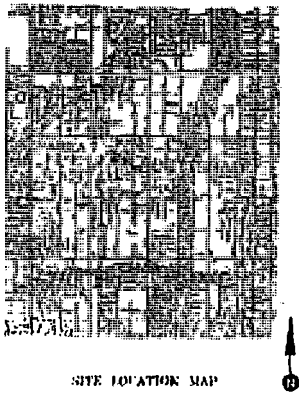
 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
                      BD = BOUNDARY
```

Appendix I

APPENDIX I

GENERAL PLANS FOR MAU GWET SYSTEM

Exhibit A
Page **440** of **495**
Attachment 3



SITE LOCATION MAP

PLANS

NIBW AREA 7 MAU
Groundwater Extraction and Treatment System

Prepared for

Siemens Components, Inc.
10950 North Tantau Avenue
Cupertino, California 95014

by

Levine•Fricke•Recon
8230 East Raintree Drive, Suite 103
Scottsdale, Arizona 85260

April, 1997

INDEX OF DRAWINGS

SHEET TITLE	SHEET NO.
TITLE SHEET	C1
[illegible]	C2
[illegible]	C3
[illegible]	C4
[illegible]	C5
[illegible]	C6
[illegible]	[illegible]

REVISION	DESIGN	DRAWN	CHECKED	DATE

SCALE : NTS
DESIGN : [illegible]
DRAWN : [illegible]
CHECKED :

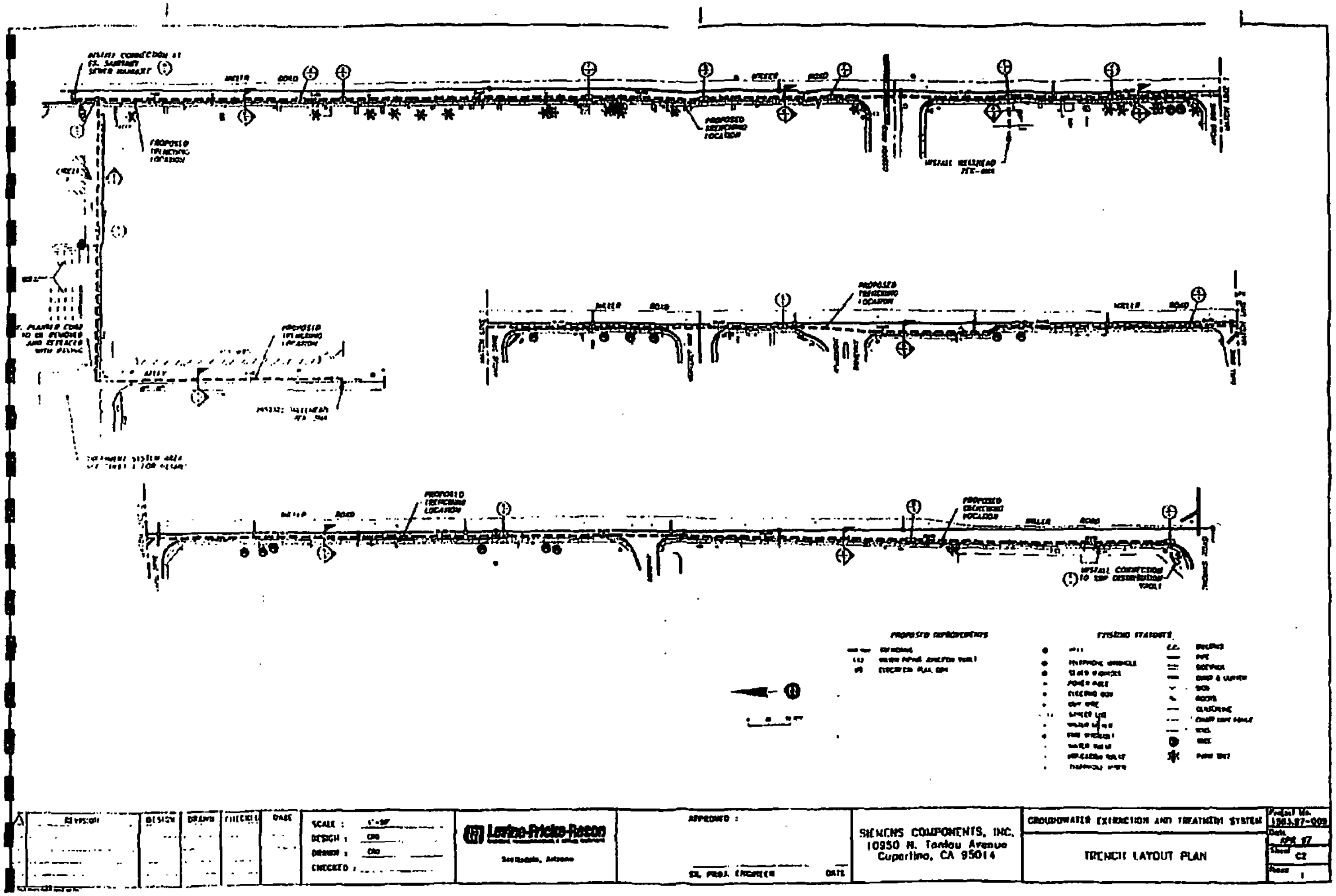
Levine-Fricke-Recon
Scottsdale, Arizona

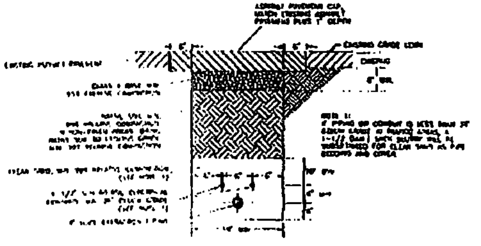
APPROVED :
SR. PROJ. ENGINEER DATE

Siemens Components, Inc.
10950 N. Tantau Avenue
Cupertino, CA 95014

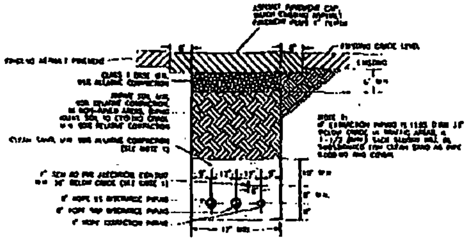
GROUNDWATER EXTRACTION AND TREATMENT SYSTEM
TITLE SHEET

Project No. 1883.97-009
Date APR 97
Sheet C1
Issue 1

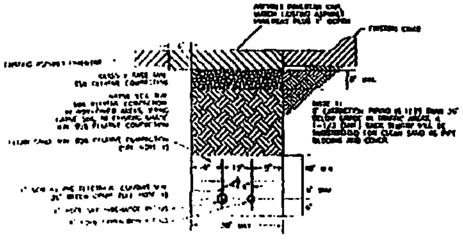

PROPOSED TRENCHING LOCATION
PROPOSED TRENCHING LOCATION
PROPOSED TRENCHING LOCATION
PROPOSED TRENCHING LOCATION
PROPOSED TRENCHING LOCATION
INSTALL WELLHEAD
ALLEY
WELLS ROAD
MILLER ROAD
INSTALL CONNECTION TO SRP DISTRIBUTION VAULT
PROPOSED IMPROVEMENTS
EXISTING FEATURES
REVISION
DESIGN
DRAWN
CHECKED
DATE
SCALE : 1"=50'
DESIGN : CRO
DRAWN : CRO
CHECKED :
Levine-Fricke-Recon
Scottsdale, Arizona
APPROVED :
SR. PROJ. ENGINEER
DATE
SIEMENS COMPONENTS, INC.
10950 N. Tantau Avenue
Cupertino, CA 95014
GROUNDWATER EXTRACTION AND TREATMENT SYSTEM
TRENCH LAYOUT PLAN
Project No.
Date
APR 97
Sheet
C2
Revd
1



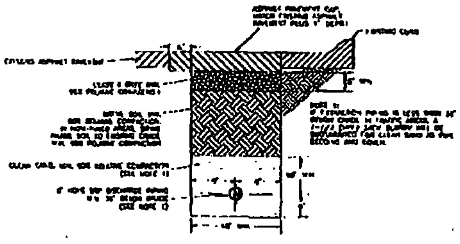
(A/2) EXTRACTION PIPING TRENCH (TYP.)
NTS



(B/2) EXTRACTION AND DISCHARGE PIPING TRENCH (TYP.)
NTS



(C/2) EXTRACTION AND DISCHARGE PIPING TRENCH (TYP.)
NTS



(D/2) DISCHARGE PIPING TRENCH (TYP.)
NTS

REVISION	DESIGN	DRAWN	CHECKED	DATE

SCALE : NTS
DESIGN :
DRAWN :
CHECKED :

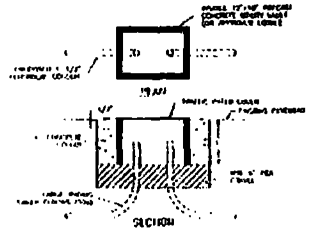
Levine-Fricke-Recon
Scottsdale, Arizona

APPROVED :
SR. PROJ. ENGINEER DATE

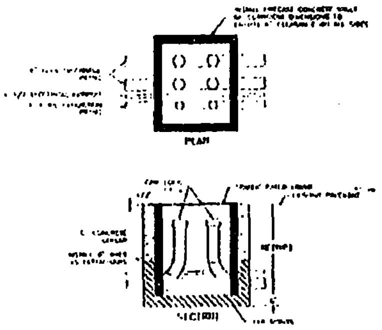
Siemens Components, Inc.
10050 N. Tantau Avenue
Cupertino, CA 95014

GROUNDWATER EXTRACTION AND TREATMENT SYSTEM
TRENCH SECTIONS

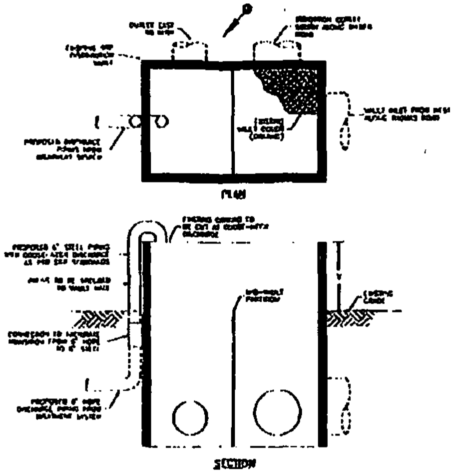
Project No. 1583.17-001
Date APR 97
Sheet C.5
Issue 1



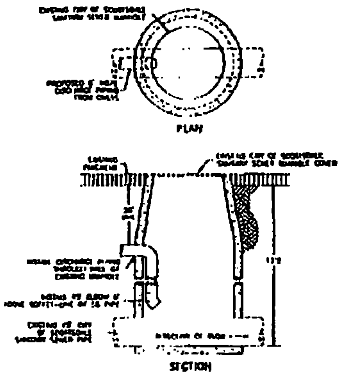
(1/2) ELECTRICAL PULL BOX (TYP.)



(G/2) WATER PIPING JUNCTION VAULT WITH TWO-WAY CLEAN OUTS



(C/2) DISCHARGE CONNECTION AT SRP VAULT



(H/2) DISCHARGE CONNECTION AT SANITARY SEWER

REVISION | DESIGN | DRAWN | CHECKED | DATE

SCALE :
DESIGN :
DRAWN :
CHECKED :

Lorimer-Fricke-Recon
Scottsdale, Arizona

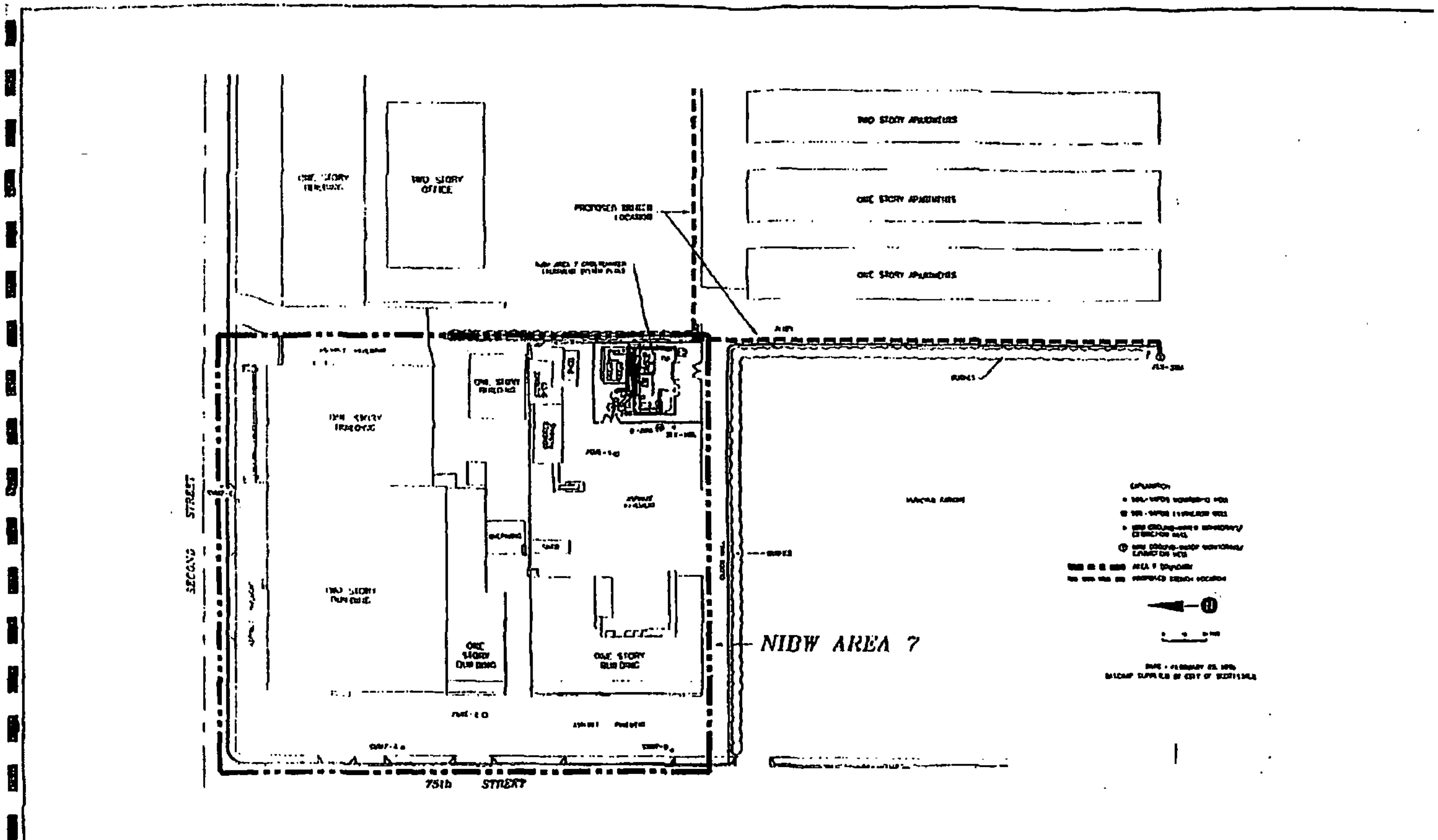
APPROVED :
SR. PROJ. ENGINEER DATE

Siemens Components, Inc.
10950 N. Tantau Avenue
Cupertino, CA 95014

GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

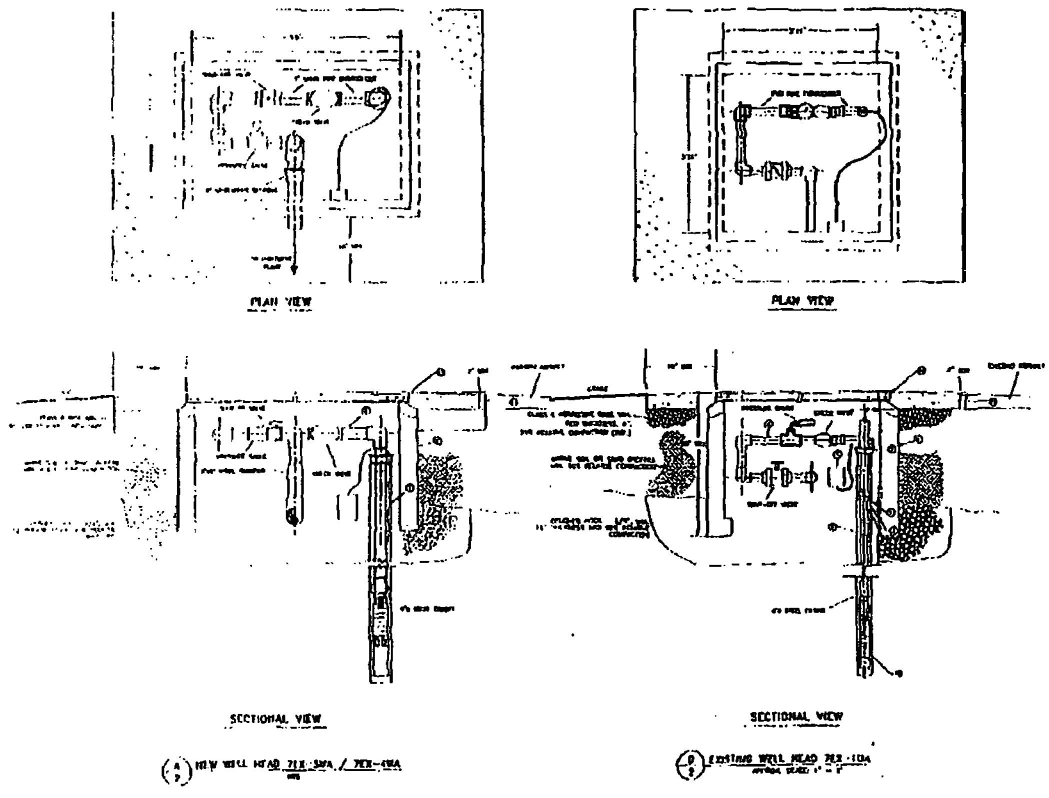
DISCHARGE CONNECTIONS AND
MISCELLANEOUS DETAILS

Project No. 1593.97-009
Date APR 97
Sheet C4
Issue 1



REVISION	DESIGN	DRAWN	CHECKED	DATE	SCALE : 1" = 30' DESIGN : TMP DRAWN : TMB CHECKED :	Levine-Fricke-Recon Scottsdale, Arizona	APPROVED : SR. PROJ. ENGINEER DATE	SIEMENS COMPONENTS, INC. 10950 N. Tantau Avenue Cupertino, CA 95014	GROUNDWATER EXTRACTION AND TREATMENT SYSTEM AREA 7 SITE PLAN	Project No. 1985.07-00 Date APR 97 Sheet C5 Issue 1

1394063v6



GENERAL NOTES.

1. [illegible]

① GROUND-WATER WELL PUMP

② WELL PUMP [illegible] 3/8" SAFETY CABLE. [illegible]

③ [illegible] FLAT JACKET POWER CABLE. TO PUMP MOTOR

④ STEEL WELL CASING

⑤ SANITARY WELL SEAL [illegible]

⑥ PLASTIC FASTENER (TYP.)

⑦ [illegible] JUNCTION BOX

⑧ [illegible] WELL HEAD [illegible]

⑨ CONCRETE VAULT. [illegible]

⑩ VAULT COVER, [illegible]

⑪ CONCRETE COLLAR [illegible]

REVISION	DESIGN	DRAWN	CHECKED	DATE

SCALE :
DESIGN :
DRAWN :
CHECKED :

Leedom-Fricke-Bacon
Scottsdale, Arizona

APPROVED :
SR. PROJ. ENGINEER DATE

Siemens Components, Inc.
10950 N. Tantau Avenue
Cupertino, CA 95014

GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

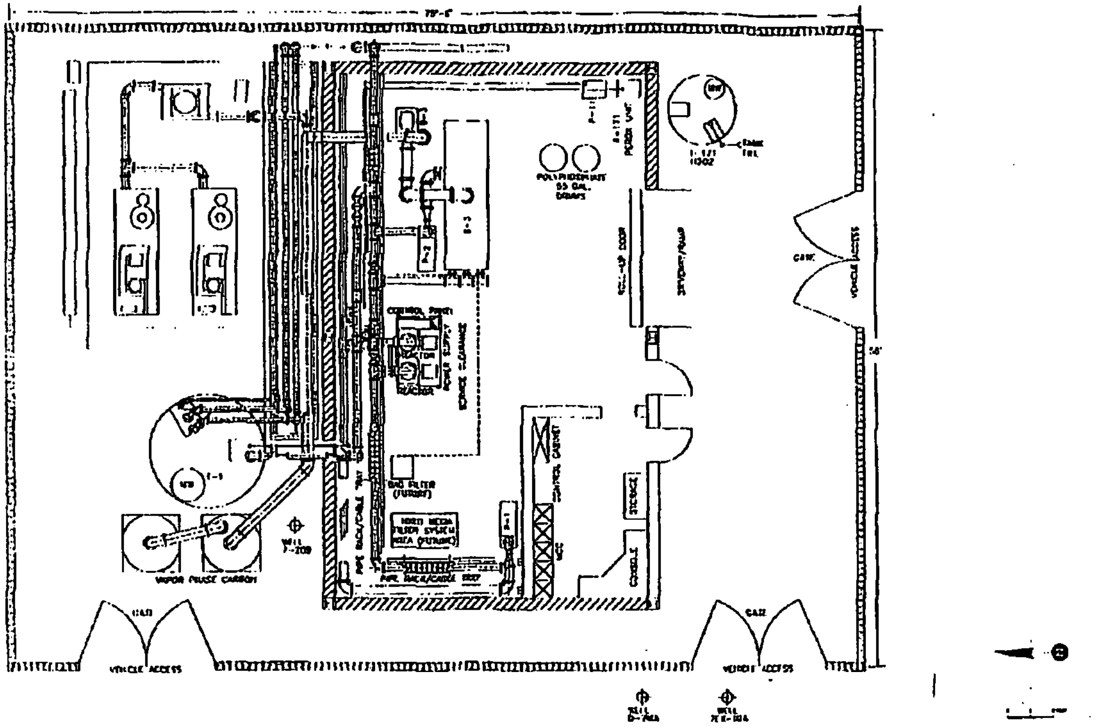
TYPICAL WELL HEAD DETAIL

Project No. [illegible]
Date APR 97
Sheet C9
Issue 1

Exhibit A
Page 445 of 495
Attachment 3

City of Scottsdale Contract No. 1998-006-COS-A2

Exhibit A
Page **446** of **495**
Attachment 3



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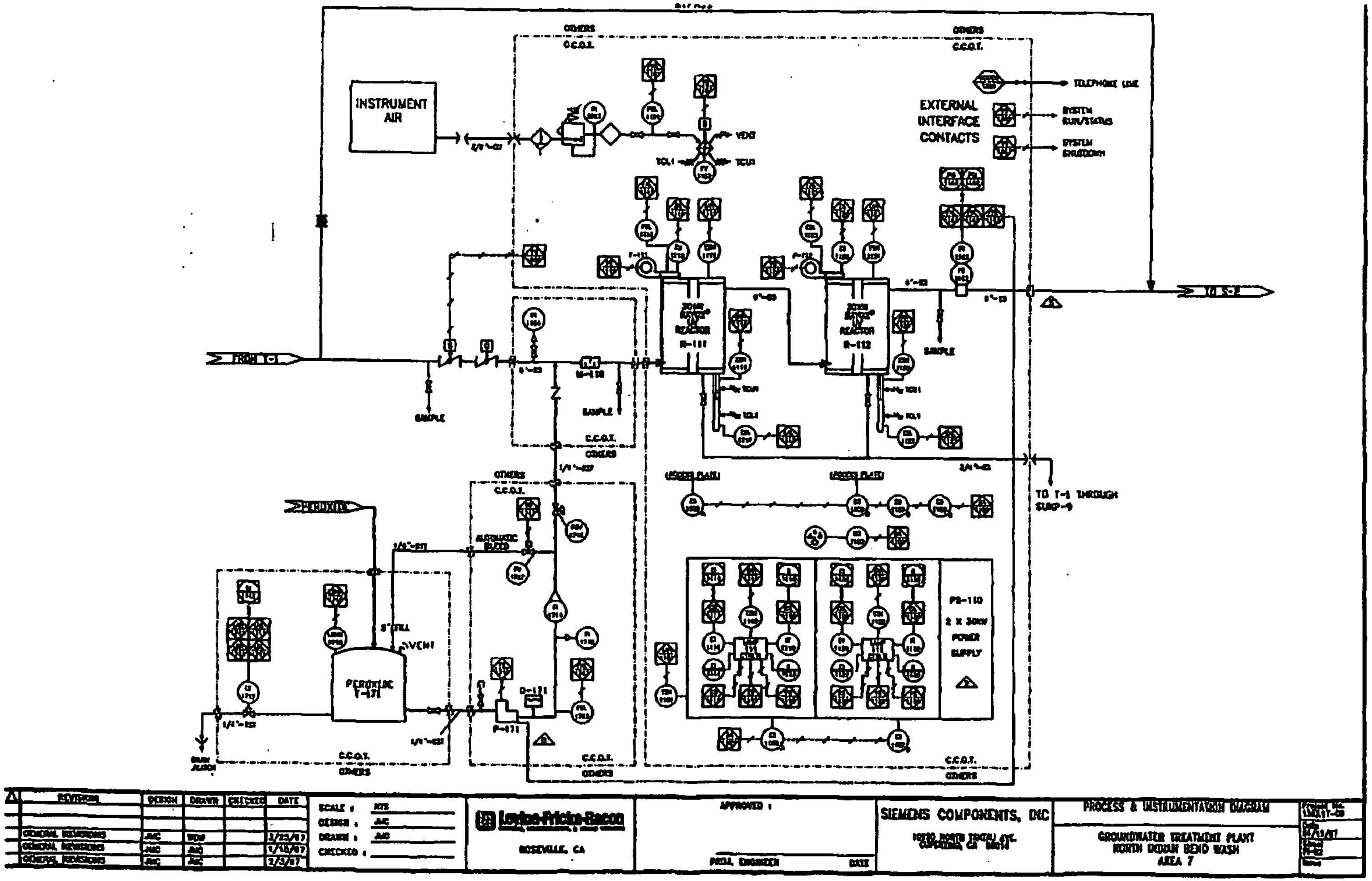
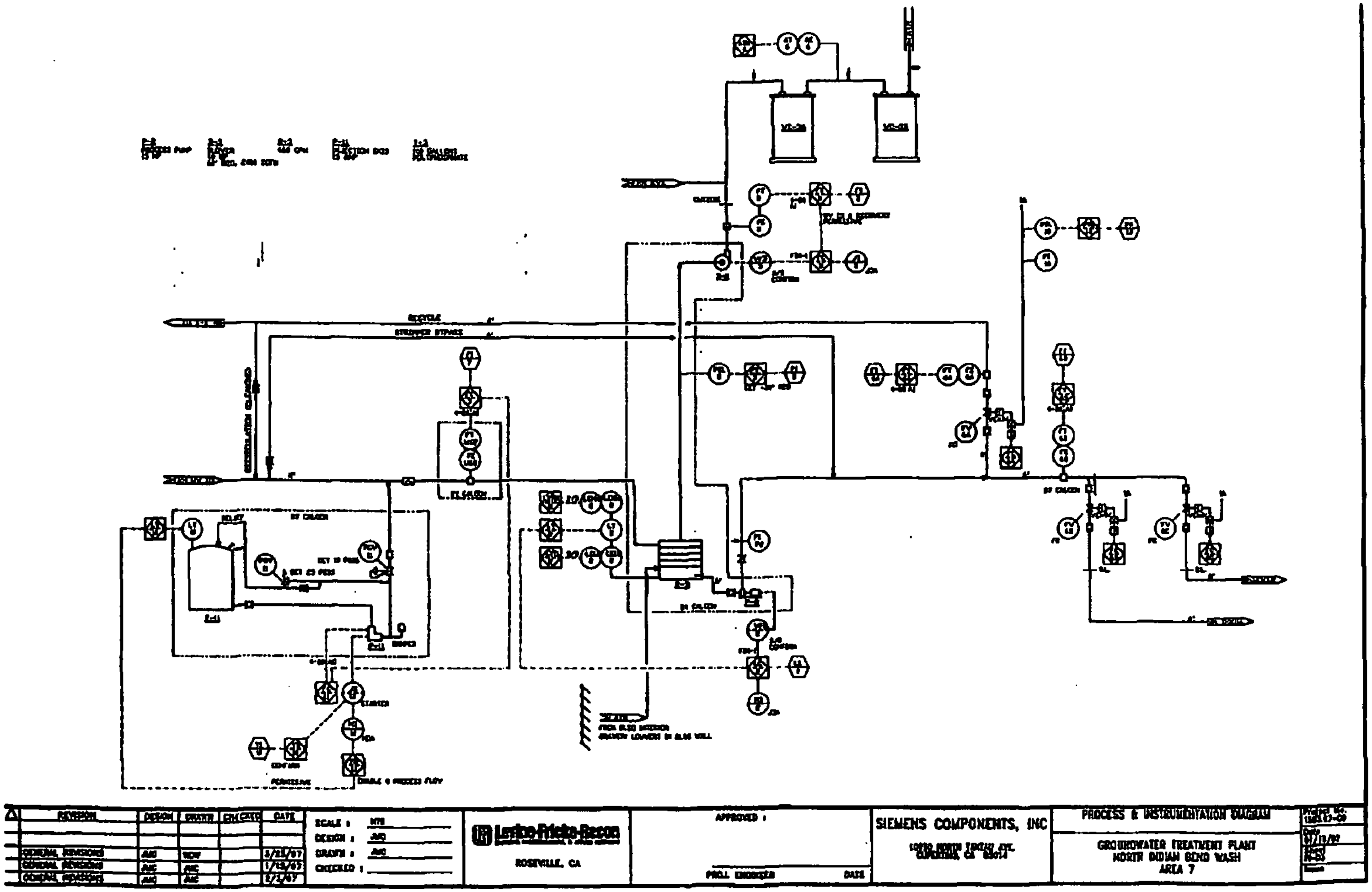
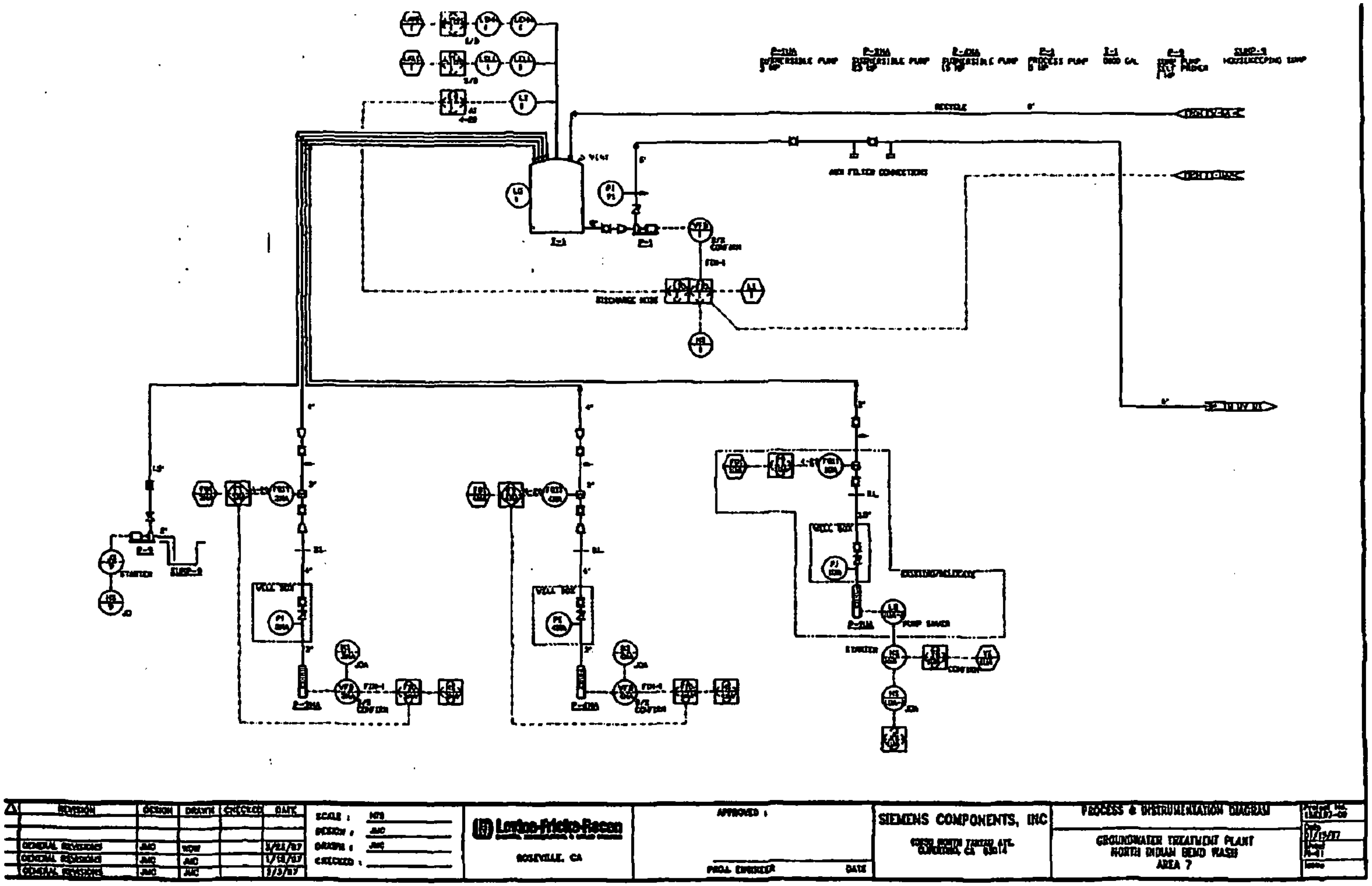
Appendix J

APPENDIX J

PROCESS AND INSTRUMENTATION DIAGRAM


OTHERS
C.C.O.T.
INSTRUMENT AIR
EXTERNAL INTERFACE CONTACTS
TELEPHONE LINE
SYSTEM RUN/STATUS
SYSTEM SHUTDOWN
VENT
TCU1
FROM
SAMPLE
REACTOR
R-111
R-112
TO S-2
TO T-1 THROUGH SUMP-9
PEROXIDE
AUTOMATIC BLEED
3" FILL
VENT
PEROXIDE T-171
P-171
PS-110
2 X 30kW POWER SUPPLY
REVISIONS
DESIGN
DRAWN
CHECKED
DATE
GENERAL REVISIONS
3/25/97
1/15/97
2/3/97
SCALE : NTS
DESIGN : AJC
DRAWN : AJC
CHECKED :
Levine-Fricke-Recon
ROSEVILLE, CA
APPROVED :
PROJ. ENGINEER
DATE
SIEMENS COMPONENTS, INC
PROCESS & INSTRUMENTATION DIAGRAM
GROUNDWATER TREATMENT PLANT
NORTH INDIAN BEND WASH
AREA 7


RECYCLE
STRIPPER BYPASS
DRAIN & PROCESS FLOW
PERMISSIVE
REVISION
DESIGN
DRAWN
DATE
GENERAL REVISIONS
GENERAL REVISIONS
GENERAL REVISIONS
3/25/97
1/15/97
2/1/97
SCALE : NTS
DESIGN : AJG
DRAWN : AJG
CHECKED :
Levine-Fricke-Recon
ROSEVILLE, CA
APPROVED :
PROJ. ENGINEER
DATE
SIEMENS COMPONENTS, INC
PROCESS & INSTRUMENTATION DIAGRAM
GROUNDWATER TREATMENT PLANT
NORTH INDIAN BEND WASH
AREA 7


RECYCLE
P-1
T-1
VENT
DISCHARGE HOSE
WELL BOX
P-3HA
SUMP-3
STARTER
PUMP SAVER
CONFIRM
REVISION
DESIGN
DRAWN
CHECKED
DATE
GENERAL REVISIONS
SCALE :
DESIGN :
DRAWN :
CHECKED :
Levine-Fricke-Recon
ROSEVILLE, CA
APPROVED :
PROJ. ENGINEER
DATE
SIEMENS COMPONENTS, INC
PROCESS & INSTRUMENTATION DIAGRAM
GROUNDWATER TREATMENT PLANT
NORTH INDIAN BEND WASH
AREA 7

Appendix K

APPENDIX K

MANUFACTURER'S LITERATURE FOR GAC ADSORBERS

NIXTOX® Radial Flow

MODULAR ADSORBERS for Flows up to 3000 CFM

(U.S. PATENT 4,379,750, CANADA PATENT 1,197,075)

Specifications and Properties

4/10/92

Unit	— Design Maximum — CFM(a)	psig.	°F	Connections	Diameter/ Height, Inches(b)	Adsorbent Pounds(c)	Minimum Contact, Sec.(d)	Shipping Pounds(e)
N-500	500	Open	350	4" DUCT	28/42	200	0.8	406
N-1000	1000	Open	350	6" DUCT	34/47	400	0.8	630
N-1500	1500	Open	350	7" DUCT	34/47	300	0.4	540
N-3000	3000	Open	350	10" DUCT	50/74	1600	1.1	2190

(a) Maximum; adequate contact time may require lower flow, see (e).

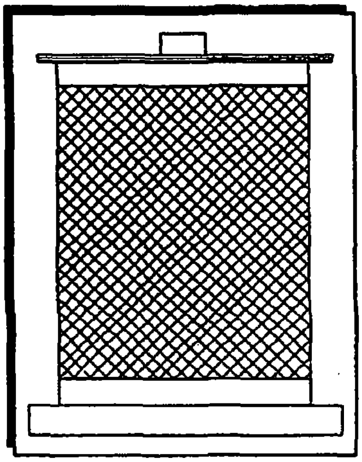
(b) Primary adsorber vessel, including support assembly.

(c) Virgin TIGG 5C 0410 Activated Carbon, see (f).

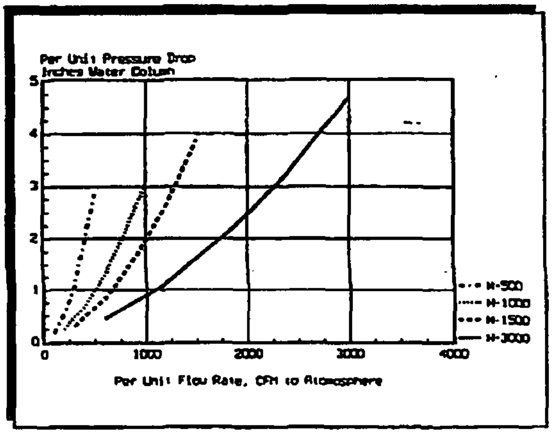
(d) Superficial at maximum flow.

(e) Active carbon basis. Other adsorbents, prewetting will change.

This popular design treats large flows at very low pressure drop and small space requirements. Flow is from a central stainless screened distributor, outward through adsorbent exhausting through side stainless screened ports to atmosphere or into Accumulator Cabinets. Flow may be reversed as preferred. Units in this series are normally recharged, with arrangements of disposable units used if adsorbent and vessel are to be discarded together. Condensate drains are standard; saturation indicators are available options. Construction is expanded metal coated with high-solids epoxy with stainless steel available on s[illegible] order. For higher flows, segmented models are available utilizing the same design principal (N5000 and N8000 High-Flow Radial Adsorbers).



FLOW RESISTANCE



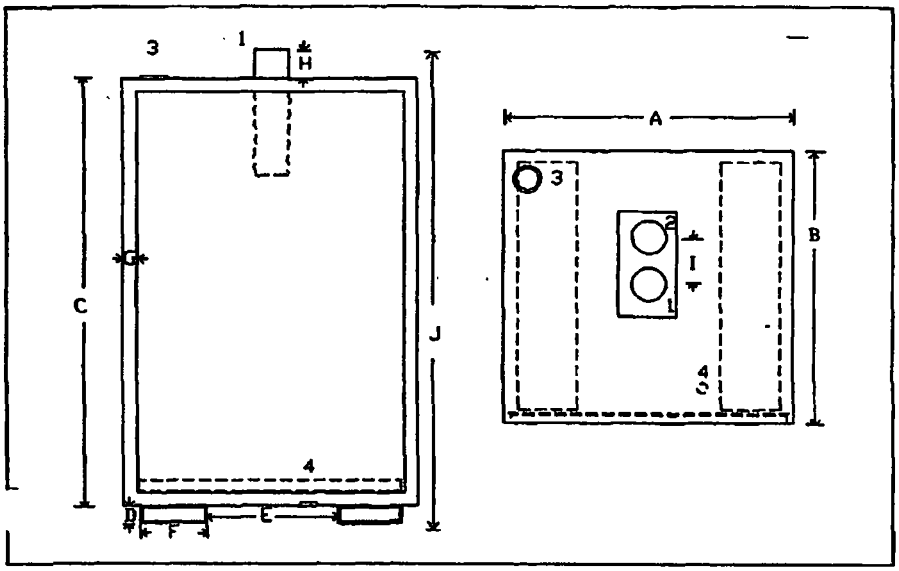
TIGG CORPORATION
BOX 11661
PITTSBURGH, PA 15228

TELEPHONE: (412) 563-4300
TELEX: 269312 (RCA)
FAX: 412-563-6155
CABLE: TIGGCOR PITTSBURGH
MANUFACTURING: TIGG SOUTHCENTRAL OPERATIONS
ROUTE 16 EAST
HEBER SPRINGS, ARKANSAS 72543

ᴹᵁXTOX® Accumulator Cabinets

foı Radial Flow Adsorbers

(U.S. PATENT 4,379,750, CANADA 1,197,075)



DIMENSIONS, inches

Model	A	B	C	D	E	F	G	H	I	J	1 DUCT	2 DUCT	3	4 NPT
N500	36	36	61	1½	22	3	2	6	8	68½	4	4	4	¾
N1000	44	44	61	1½	30	3	3½	6	8	68½	6	6	-6	¾
N1500	44	44	61	1½	30	3	3½	6	8	68½	7	7	7	¾
N3000	60	60	61	2	42½	6	3	6	12	99	10	10	10	¾

FITTING SCHEDULE:

1. INLET
2. OUTLET
3. PRESSURE/TEMPERATURE RELIEF DISK
4. CONDENSATE DRAIN

4/10/92

TIGG CORPORATION
BOX 11661
PITTSBURGH, PA 15228

TELEPHONE: (412) 563-4300
TELEX: 269312 (RCA)
FAX: 412-563-6155
CABLE: TIGGCOR PITTSBURGH
MANUFACTURING: TIGG SOUTHCENTRAL OPERATIONS
ROUTE 16 EAST
HEBER SPRINGS, ARKANSAS 72543

Appendix L

APPENDIX L

ADDENDUM TO SALT RIVER PROJECT NORTH INDIAN BEND WASH SAMPLING AND ANALYSIS PLAN AND QUALITY ASSURANCE PLAN

INTRODUCTION

This information provided in this Addendum is incorporated into the June 1991 "North Indian Bend Wash, Sampling & Analysis Plan and Quality Assurance Project Plan," prepared by the Salt River Project (SRP). The addenda items in this appendix are presented to document the sampling, analysis, and quality assurance procedures associated with the Area 7 upper Middle Alluvial Unit (MAU) groundwater response action described in this report.

The sections presented in this Addendum correlate with the sections of the Sampling and Analysis Plan (SAP) and the Quality Assurance Project Plan (QAPP) prepared by SRP.

Addendum to Sampling and Analysis Plan

1.0 OBJECTIVE

The objective of the source area response action at Area 7 is to enhance the North Indian Bend Wash (NIBW) Operating Unit (OU)-1 remedy by containing the source and capturing high concentrations of volatile organic compounds (VOCs) in the upper MAU near the source.

The objectives of the monitoring associated with the Area 7 upper MAU groundwater response action at Area 7 are:

- to implement the monitoring program for the AREA 7 upper MAU groundwater remedial action in order to track the progress and effectiveness of the VOC mass reduction in the upper MAU and treatment of the groundwater;
- to monitor the nature and extent of VOCs in the upper MAU during the response action; and
- to collect groundwater extraction and treatment (GWET) system operating data, groundwater quality data, and vapor emission data for monitoring of the GWET system effectiveness and efficiency.

2.0 BACKGROUND

2.6 Scope

To meet these objectives, the scope of work for implementation of the upper MAU groundwater response action activities at Area 7 will include the following:

- installation of a system to extract groundwater from the upper MAU beneath and downgradient from Area 7;

fe

- construction management for installation of the GWET system;
- routine operation and maintenance (O&M) of the GWET system; and
- monitoring of the GWET system.

3.0 GROUNDWATER SAMPLING PROTOCOL

In addition to collecting groundwater samples, vapor samples will be collected to monitor the effectiveness of the granular activated carbon (GAC) treatment system. Protocol for vapor sample collection and analysis is included in the following sections.

3.1 Requested Samples

Groundwater Samples

The following are the proposed analytes and EPA methods for analysis of groundwater samples collected from the GWET system.

<u>EPA Method 200.7/6010 - Inorganic Chemistry, Total Metals</u>

Hardness, Calcium, Iron, Magnesium, Sodium, Copper, and Zinc

<u>EPA Method 310.1 - Inorganic Chemistry, Non Metals</u>

Alkalinity, Bicarbonate, and Carbonate

<u>EPA Method 325.2 - Inorganic Chemistry, Non Metals</u>

Chloride

<u>EPA Method 365.3 - Inorganic Chemistry</u>

Phosphorous

<u>EPA Method 375.2 - Inorganic Chemistry</u>

Sulfate

<u>EPA Method 353.2 - Inorganic Chemistry</u>

Nitrate

<u>EPA Method 150.1 - Inorganic Chemistry, Non Metals</u>

pH

EPA Method 160.1 - Inorganic Chemistry, Non Metals

Total Dissolved Solids

EPA Method 180.1 - Inorganic Chemistry, Non Metals

Turbidity

EPA Method 8010 - Halogenated Volatile Organics

Vapor Samples

Vapor samples collected from the GAC treatment system in SUMMA canisters will be stored a maximum of 14 days before chemical analyses. The collected vapor samples will be analyzed by EPA Method TO-14 (GC/MS using SUMMA canisters).

3.4 Sample Collection

Groundwater Sampling

The groundwater sampling procedures are listed below:

- Upon request, the lab will provide the sampling containers, labels and chain of custody (COC) form, and an ice chest with blue ice. The analytical laboratory will be informed of the sampling date and requested analysis several days prior to sampling;
- All well samples will be collected after well purging as described in section 3.3 of the SRP SAP;
- The GWET system will be allowed to operate for at least two hours prior to sampling;
- A field replicate groundwater sample will be collected during each sampling event;
- The time, sample name/number, sampling location, and observations (e.g., ground conditions, odors, weather) will be recorded on the label for the sample container; and
- Samples will be submitted to the laboratory on the same day they are collected.

Analytical Laboratories: American Environmental Network will conduct analysis of groundwater samples collected from the GWET system.

Vapor Sampling

Inlet and outlet vapor samples will be collected from the GAC treatment system. The inlet vapor sample will be collected at the process vapor (off-gas) outlet of the air stripper, prior to the GAC treatment system, in six-liter SUMMA canisters. The outlet vapor sample will be collected at a sampling port located near the stack outlet of the GAC treatment system.

The vapor sampling procedures are listed below:

- All transfer tubing and fittings will be thoroughly purged prior to collection of the vapor samples. Transfer tubing and fittings will be Teflon or an equivalent;
- The time, sample name/number, sampling location, and observations (e.g., ground conditions, odors, weather) will be recorded on the sample container;
- A field replicate vapor sample will be collected during each sampling event; and
- The vapor samples will be shipped overnight to the laboratory the day of the sampling via Federal Express.

The laboratory used for chemical analysis of the vapor samples is Air Toxics, Ltd. of Rancho Cordova, California (1-800-985-5955). Air Toxics will provide the necessary sampling equipment given approximately one week's notice.

4.0 SAMPLING SCHEDULE

Location	Sample Type	EPA Method for Analysis	Monitoring Interval
7EX-3MA	Groundwater	8010	Quarterly
7EX-4MA	Groundwater	8010	Quarterly
7EX-1UA	Groundwater	8010	Quarterly
GWET System Influent	Groundwater	8010 (see section 3.1)	Monthly/Quarterly
GWET System Effluent	Groundwater	8010 (see section 3.1)	Monthly/Quarterly
GAC Treatment Inlet	Process Vapor	TO-14 (GC/MS using SUMMA canisters)	Quarterly
GAC Treatment Outlet	Process Vapor	TO-14 (GC/MS using SUMMA canisters)	Quarterly
Field Blanks Sample	Groundwater	8010 analysis only	One per sampling event
Trip Blanks Sample	Groundwater	8010 analysis only	One per sampling event
Duplicate/Replicate Sample	Groundwater	Shadow Sampling Event Analysis	One per sampling event
Duplicate/Replicate Sample	Process Vapor	TO-14 (GC/MS using SUMMA canisters)	One per sampling event

7.0 SITE SAFETY AND HEALTH PLAN

See Addendum to Health and Safety Plan in Appendix M of this report.

Addendum to Quality Assurance Project Plan

1.0 INTRODUCTION

1.6 Scope

This addendum to the SRP QAPP focuses on the groundwater monitoring activities associated with the upper MAU groundwater remedial activities at NIBW Area 7.

1.7 Project Objective

The objective of the source area response action at Area 7 is to enhance the NIBW OU-1 remedy by containing the source and capturing high concentrations of VOCs in the MAU near the source.

The objectives of the monitoring associated with the MAU groundwater response action at Area 7 are:

- to implement the monitoring program for the MAU groundwater response action in order to track the progress and effectiveness of the VOC mass reduction in the upper MAU and treatment of the groundwater;
- to monitor the nature and extent of VOCs in the MAU during response action; and
- to collect GWET system operating data, groundwater quality data, and vapor emission data for monitoring of the GWET system effectiveness and efficiency.

2.0 PROJECT TABLE OF ORGANIZATION

The key LFR personnel for implementation of the MAU groundwater response action are listed below.

Project Manager - Bradley D. Cross, R.G.

Laboratory & Field Services Coordinator - Ned Overs, P.E.

Information Services Coordinator - Ned Overs, P.E.

Corporate Health & Safety Officer - James Bucha, CIH

Project Engineer - James A. Lutton, P.E.

Lead Field Technician - Marshall Brown

Project QA/QC Officer - Scott Seyfried

4.0 WORK PLAN

4.1 Sampling Schedule

Location	Sample Type	EPA Methods for Analysis	Monitoring Interval
7EX-3MA	Groundwater	8010	Quarterly
7EX-4MA	Groundwater	8010	Quarterly
7EX-1UA	Groundwater	8010	Quarterly
GWET System Influent	Groundwater	8010 (see section 6.0)	Monthly/Quarterly
GWET System Effluent	Groundwater	8010 (see section 6.0)	Monthly/Quarterly
GAC Treatment Inlet	Process Vapor	TO-14 (GC/MS using SUMMA canisters)	Quarterly
GAC Treatment Outlet	Process Vapor	TO-14 (GC/MS using SUMMA canisters)	Quarterly
Field Blanks Sample	Groundwater	8010 analysis only	One per sampling event
Trip Blanks Sample	Groundwater	8010 analysis only	One per sampling event
Duplicate/Replicate Sample	Groundwater	Shadow Sampling Event Analysis	One per sampling event
Duplicate/Replicate Sample	Process Vapor	TO-14 (GC/MS using SUMMA canisters)	One per sampling event

4.3 Water Quality Sampling

Groundwater Sampling

The groundwater sampling procedures are listed below:

- Upon request, the lab will provide the sampling containers, labels and chain of custody (COC) form, and an ice chest with blue ice. The analytical laboratory will be informed of the sampling date and requested analysis several days prior to sampling;

- All well samples will be collected following well purging as described in section 3.3 of the SRP SAP;
- The GWET system will be allowed to operate for at least 2 hours prior to sampling;
- A field replicate groundwater sample will be collected during each sampling event;
- The time, sample name/number, sampling location, and observations (e.g., ground conditions, odors, weather) will be recorded on the sample container; and
- The samples will be submitted to the laboratory the same day they are collected.

Analytical Laboratories: American Environmental Network will conduct analysis of groundwater samples collected from the GWETS.

Vapor Sampling

Inlet and outlet vapor samples will be collected from the GAC treatment system. The inlet vapor sample will be collected at the process vapor (off-gas) outlet of the air stripper, prior to the GAC treatment system, in six liter SUMMA canisters. The outlet vapor sample will be collected at a sampling port located near the stack outlet of the GAC treatment system.

The vapor sampling procedures are listed below:

- All transfer tubing and fittings will be thoroughly purged prior to collection of the vapor samples. Transfer tubing and fittings will be Teflon or the equivalent;
- The time, sample name/number, sampling location, and observations (e.g., ground conditions, odors, weather) will be recorded on the sample container;
- A field replicate vapor sample will be collected during each sampling event; and
- The vapor samples will be shipped overnight to the laboratory via Federal Express.

The laboratory used for chemical analysis of the vapor samples will be Air Toxics, Ltd. of Rancho Cordova, California (1-800-985-5955). Air Toxics will provide the necessary sampling equipment given approximately one week's notice.

6.0 ANALYTICAL PROCEDURES

Initially, American Environmental Network (of Phoenix, Arizona) will be the primary analytical laboratory for the monitoring activities associated with the MAU groundwater response action at NIBW Area 7.

The laboratory to be used for chemical analysis of the vapor samples is Air Toxics, Ltd. of Rancho Cordova, California.

Groundwater Samples

The following are the proposed analytes and EPA methods for analysis of groundwater samples collected from the GWET system.

EPA Method 200.7/6010 - Inorganic Chemistry, Total Metals

Hardness, Calcium, Iron, Magnesium, Sodium, Copper, and Zinc

EPA Method 310.1 - Inorganic Chemistry, Non Metals

Alkalinity, Bicarbonate, and Carbonate

EPA Method 325.2 - Inorganic Chemistry, Non Metals

Chloride

EPA Method 365.3 - Inorganic Chemistry

Phosphorous

EPA Method 375.2 - Inorganic Chemistry

Sulfate

EPA Method 353.2 - Inorganic Chemistry

Nitrate

EPA Method 150.1 - Inorganic Chemistry, Non Metals

pH

EPA Method 160.1 - Inorganic Chemistry, Non Metals

Total Dissolved Solids

EPA Method 180.1 - Inorganic Chemistry, Non Metals

Vapor Samples

Vapor samples collected from the GAC treatment system in SUMMA canisters will be stored a maximum of 14 days before chemical analyses. The collected vapor samples will be analyzed by EPA Method TO-14 (GC/MS using SUMMA canisters).

10.0 DATA REPORTING & MANAGEMENT

A remote computer will be used to access the database in the PLC via telephone modem. The local database in the PLC will be downloaded to a remote computer system approximately every week. The data collected and logged will be maintained in a computer file and a hard copy will be printed for use in reporting and monitoring. The remaining data collected in the field by a technician will be entered into a field log book. The original field log books will be kept at the Site. Photocopies of the field log book, hard and soft copies of the operating data, and original laboratory reports will be archived at Levine·Fricke·Recon's office in Scottsdale, California.

Upon completion of start-up, an installation report will be prepared. The installation report will include a summary of the system design, installation, control systems, start-up monitoring data, and O&M procedures. The installation report will be submitted to EPA within 90 days after successful completion of system start-up.

Data and response action performance evaluation reports will be prepared on a semi-annual basis. The reports will include a description of the extraction and treatment system, summary of O&M procedures, and tabulation and discussion of the O&M data. Additionally, the semi-annual report will include tabulated monitoring data, VOC time series, and laboratory analytical results with QA/QC data and reports. The semi-annual data evaluation will be based on the calendar year and will be submitted to EPA within 90 days of the end of each operating period.

Appendix M

APPENDIX M

HEALTH AND SAFETY PLAN FOR MAU REMEDIATION ACTIVITIES

Health and Safety Plan
for MAU Remediation Activities
North Indian Bend Wash - Area 7
Scottsdale, Arizona

April 2, 1997
1583.97-009

Levine·Fricke·Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

Printed on recycled paper

1. GENERAL

This Health and Safety Plan (HSP) has been developed for use during the Middle Alluvial Unit (MAU) response activities to be conducted at North Indian Bend Wash (NIBW) Area 7 located at 3701B North 75 Street in Scottsdale, Arizona ("the Site").

All activities conducted at the Site shall be in compliance with applicable Occupational Safety and Health Administration (OSHA) regulations, particularly those in Title 29 Code of Federal Regulations (CFR) 1910.120, and other applicable federal, state, and local laws, regulations, and statutes.

This HSP addresses the potential hazards associated with planned field activities at the Site during installation, construction, operation, and monitoring of a groundwater treatment (GWET) system. The GWET system is intended to extract and treat VOC-affected groundwater from the upper MAU beneath and downgradient from NIBW Area 7. This HSP presents the minimum health and safety requirements for establishing and maintaining a safe working environment during the course of work. In the event of conflicting requirements, the procedures or practices that provide the highest degree of personnel protection shall be implemented. If work plan specifications change or if site conditions encountered during the course of the work are found to differ substantially from those anticipated, the Director of Health and Safety shall be informed immediately, and appropriate changes shall be made to this HSP.

It is the Project Manager's responsibility to ensure that health and safety procedures are enforced at the Site. All project personnel, including subcontractors, must receive a copy of this HSP and sign the form indicating acceptance before on-site project activities begin.

2. SITE DESCRIPTION AND BACKGROUND

In 1981, VOCs, primarily trichloroethene (TCE), tetrachloroethene (PCE), 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), and chloroform, were detected in water samples collected from several Scottsdale and Phoenix drinking-water supply wells, at concentrations exceeding drinking water standards set by the Arizona Department of Health Service. The EPA subsequently designated a 10-square-mile area in Scottsdale, Arizona, as the NIBW Study Area. The NIBW was added to the National Priorities List of Superfund sites in September 1983.

The EPA began the Remedial Investigation (RI) for the NIBW Study Area in June 1984. Twelve areas within the NIBW have been investigated separately as part of the RI. These areas have been designated by number (Area 1 through Area 12). In addition, the EPA investigated activities at several City of Scottsdale (COS) groundwater supply wells.

The EPA released the overall Remedial Investigation/Feasibility Study report for the second operable unit of NIBW in April 1991 (NIBW RI/FS). The NIBW RI/FS focused on the presence of VOCs in the vadose zone and saturated portions of the Upper Alluvial Unit (UAU). In September 1991, the EPA issued the NIBW Record of Decision (OU-II ROD), selecting remedial actions for the vadose zone and saturated portions of the UAU. The OU-II ROD determined that the fate of VOCs in the saturated portion of the UAU will be monitored, and that soil vapor extraction (SVE) was required at NIBW areas where vadose-zone modeling indicates that VOCs in the vadose zone pose a significant threat to groundwater quality.

Previous work completed at Area 7 as part of the NIBW RI/FS or the OU-II ROD Statement of Work (SOW) included a soil-vapor survey, vadose-zone soil sampling and analysis, vadose-zone soil-vapor monitoring, vadose-zone modeling, and soil-vapor extraction. Additionally, Levine·Fricke·Recon (LFR) conducted a groundwater investigation and groundwater extraction and treatment of the UAU beneath NIBW Area 7 in 1993, after water-level monitoring of the UAU indicated that groundwater levels and VOC concentrations beneath Area 7 had risen. Additionally, LFR installed and tested extraction wells for the MAU groundwater. Based on results of these remedial investigations, source area MAU groundwater remediation was proposed at Area 7.

The objective of source area remediation at Area 7 is to enhance the NIBW OU-1 remedy by containing the source and capturing high concentrations of VOCs in the MAU near the source, rather than depending on VOC mass to migrate to the OU-1 extraction wells for removal and treatment. While the existing remedy provides adequate containment of VOCs in the MAU beneath Area 7, GWET at the source will be more efficient and cost effective, and will significantly expedite reduction of mass in the MAU groundwater.

3. PLANNED SITE ACTIVITIES

Scheduled work will consist of the following activities:

- Field installation of a GWET system to remove and treat VOC-affected groundwater from the upper MAU at Area 7. Trenching excavation depth for installation of groundwater extraction or treated water discharge piping will not exceed 4 feet below ground surface.
- Construction management for installation of the GWET system
- Routine operation and maintenance (O&M) of the GWET system
- Monitoring of the GWET system

Work is anticipated to begin in August 1997 and will last approximately four months. Upon completion of start-up activities, routine operation of the remediation system will begin.

4. KEY LEVINE·FRICKE·RECON PERSONNEL AND RESPONSIBILITIES

Project Manager	Bradley D. Cross, R.G.
Site Safety Officer	Ned Overs, P.E.
Director of Health and Safety	James Bucha, C.I.H.

The responsibilities of Levine·Fricke·Recon project personnel are outlined below.

Project Manager

The Project Manager has the ultimate responsibility for the health and safety of Levine·Fricke·Recon personnel at the Site. The Project Manager is responsible for:

- ensuring that all project personnel have received a copy of, and have read and understand, this HSP
- keeping the Director of Health and Safety informed of project developments
- keeping on-site personnel, including subcontractors, informed of the expected hazards and appropriate protective measures at the Site
- ensuring that resources are available to provide a safe and healthy work environment for Levine·Fricke·Recon personnel

Director of Health and Safety

The Director of Health and Safety is responsible for the review, interpretation, and modification of this HSP. Modifications to this HSP that may result in less-stringent precautions cannot be undertaken by the Project Manager or Site Safety Officer (SSO) without the approval of the Director of Health and Safety. In addition, he has the following responsibilities:

- advising the Project Manager and SSO on matters relating to health and safety on this project
- recommending appropriate safeguards and procedures
- modifying this HSP, when necessary

- approving changes in health and safety procedures employed at the Site

Site Safety Officer

The SSO is responsible for enforcing the requirements of this HSP once site work begins. The SSO has the authority to immediately correct all situations where noncompliance with this HSP is noted and to immediately stop work in cases where an immediate danger to site workers or the environment is perceived. Responsibilities of the SSO also include:

- obtaining and distributing personal protective equipment (PPE) and air monitoring equipment necessary for this project
- limiting access at the Site to authorized personnel
- communicating any unusual or unforeseen conditions at the Site to the Project Manager
- supervising and monitoring the safety performance of all site personnel to ensure that required health and safety procedures are followed, and correcting any deficiencies
- conducting daily tailgate safety meetings before each day's activities begin

5. HAZARDS OF KNOWN OR EXPECTED CHEMICALS OF CONCERN

The UAU remediation and MAU investigation activities have indicated that the following compounds are present in the groundwater at Area 7: TCE, PCE, 1,1-DCE, 1,1,1-TCA, and chloroform.

Known Compounds	Source (soil/water/drum, etc.)	Known Concentration Range (ppm, mg/kg, mg/l)	
		Lowest	Highest
TCE	MAU groundwater	0.0048 mg/l	7.90 mg/l
PCE	MAU groundwater	ND	0.016 mg/l
TCE	soil-vapor	0.04 ppmv	1,600 ppmv
PCE	soil-vapor	0.009 ppmv	30 ppmv
1,1-DCE	soil-vapor	ND	3.4 ppmv
Chloroform	soil-vapor	ND	1.4 ppmv

Exposure pathways of concern for chemical compounds that may be present at the Site are inhalation of airborne contaminants and direct skin contact with contaminated materials. Dermal contact can be minimized by wearing protective equipment and following decontamination procedures listed in Section 9. To minimize inhalation hazards, dust control measures will be implemented, where necessary, and action levels will be observed during scheduled activities. Site-specific action levels are presented in Section 10. Descriptions of chemicals of concern, including health effects and exposure limits, are provided in Appendix A of this HSP.

On-site worker exposure to airborne contaminants will be monitored during all intrusive site activities. A calibrated photoionization detector (PID) or flame ionization detector (FID) will be used to monitor any changes in exposure to VOCs. Personnel will perform routine monitoring during site operations to evaluate concentrations of VOCs in employee breathing zones. If VOCs are detected above predetermined action levels specified in Section 10, the procedures found in Section 7 of this HSP will be followed.

In accordance with the Hazard Communication standard, material safety data sheets (MSDSs) will be maintained on site for chemical products used by Levine-Fricke-Recon personnel at the Site. In addition, all containers will be clearly labeled in English to indicate their contents and appropriate hazard warnings.

6. PHYSICAL HAZARDS

The following potential health and safety hazards may be encountered during scheduled activities at the Site:

- slips, trips, and falls
- heavy equipment
- heat stress
- noise
- electrical sources
- excavations
- underground and overhead utilities
- container handling
- biological hazards

General Safe Work Practices

All personnel, including subcontractor personnel, shall bring to the attention of the SSO any unsafe condition or practice associated with site activities.

- Workers shall thoroughly clean their hands, faces, and all other potentially contaminated areas before smoking, eating, or leaving the Site.
- Respiratory devices may not be worn with beards or long sideburns, or under other conditions that prevent a proper seal.
- All accidents and/or injuries shall be immediately reported to the SSO. If necessary, a first report will be initiated by the SSO.
- Periodic safety briefings will be held to discuss current site conditions, field tasks being performed, planned modifications, and work concerns.
- Site conditions may include uneven, unstable, or slippery work surfaces. Substantial care and personal observation is required on the part of each employee to prevent injuries from slips, trips, and falls.
- Workers shall maintain good housekeeping practices during field activities to maintain a safe working environment. The work site shall be kept free of debris, waste, and trash at all times.
- The "buddy system" shall be used whenever appropriate.

Heavy Equipment

Any equipment, including earth-moving equipment, drill rigs, or other heavy machinery, will be operated in strict compliance with the manufacturer's instructions, specifications, and limitations, as well as any applicable regulations. The operator is responsible for inspecting the equipment daily to ensure that it is functioning properly and safely.

Operation of heavy equipment at the Site for the activities outlined in Section 3 poses potential physical hazards. The following precautions should be observed whenever heavy equipment is in use:

- PPE, including steel-toed boots, safety glasses, and hard hats, must be worn.
- Personnel must be aware at all times of the location and operation of heavy equipment and take precautions to avoid getting in the way of its operation. Workers must never assume that the equipment operator sees them; eye contact and hand signals should be used to inform the operator of intent.
- Traffic safety vests are required for personnel working near mobile heavy equipment or near high traffic areas.
- Personnel should never walk directly in back of, or to the side of, heavy equipment without the operator's knowledge.
- Nonessential personnel shall be kept out of the work area.

Heat Stress

Adverse climate conditions, primarily heat, are important considerations in planning and conducting site operations. *Heat-related illnesses range from heat fatigue to heat* stroke, with heat stroke being the most serious condition. The effects of ambient temperature can cause physical discomfort, loss of efficiency, and personal injury, and can increase the probability of accidents. In particular, protective clothing that decreases the body's ventilation can be an important factor leading to heat-related illnesses. To reduce the possibility of heat-related illness, workers should drink plenty of fluids and establish a work schedule that will provide sufficient rest periods for cooling down. Workers should be aware of signs and symptoms of heat-related illnesses, as well as first aid for these conditions. These are summarized in the following table.

CONDITION	SIGNS	SYMPTOMS	RESPONSE
Heat Rash or Prickly Heat	Red rash on skin.	Intense itching and inflammation.	Increase fluid intake and observe affected worker.
Heat Cramps	Heavy sweating, lack of muscle coordination.	Muscle spasms, and pain in hands, feet, or abdomen.	Increase fluid uptake and rest periods. Closely observe affected worker for more serious symptoms.
Heat Exhaustion	Heavy sweating; pale, cool, moist skin; lack of coordination; fainting.	Weakness, headache, dizziness, nausea.	Remove worker to a cool, shady area. Administer fluids and allow worker to rest until fully recovered. Increase rest periods and closely observe worker for additional signs of heat exhaustion. If symptoms of heat exhaustion recur, treat as above and release worker from the day's activities after he/she has fully recovered.
Heat Stroke	Red, hot, dry skin; disorientation; unconsciousness	Lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse.	Immediately contact emergency medical services by dialing 911. Remove the victim to a cool, shady location and observe for signs of shock. Attempt to comfort and cool the victim by administering small amounts of cool water (if conscious), loosening clothing, and placing cool compresses at locations where major arteries occur close to the body's surface (neck, underarms, and groin areas). Carefully follow instructions given by emergency medical services until help arrives.

Noise

Noise may result primarily from the operation of drill rigs and mechanical equipment. The use of heavy equipment may generate noise above the OSHA permissible exposure limit for noise of 90 dBA for an 8-hour time-weighted average. Workers shall wear appropriate hearing protection when operating or working near heavy equipment. If loud noise is present or normal conversation becomes difficult, hearing protection in the form of ear plugs, or equivalent, will be required.

Electric Shock

All electrical equipment to be used during field activities will be suitably grounded and insulated. Ground fault circuit interrupters (GFCI) will be used with all heavy electrical equipment to reduce the potential for electrical shock.

Lockout/Tagout procedures in accordance with 29 CFR 1910.147 will be conducted before activities begin on or near energized or mechanical equipment. Workers conducting the operation will positively isolate the piece of equipment, lock/tag the energy source, and verify effectiveness of the isolation. Only employees who perform the lockout/tagout procedure may remove their own tags/locks. Employees will be thoroughly trained before initiating this procedure.

Excavations

A competent person who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them, shall be present during excavation activities.

The atmosphere shall be tested in any excavation greater than 4 feet in depth where oxygen deficiency or flammable gases are likely to be present before employees are permitted to enter and begin work. The atmosphere should be ventilated and retested until flammable gas concentrations less than 20 percent of the lower flammable limit (LFL) are obtained. Worker entry shall not be allowed if the oxygen concentration is less than 19.5 percent.

Workers shall not enter excavations greater than 4 feet in depth without appropriate protective systems such as benching, sloping, or shoring. Side slopes shall not be steeper than 1:1 without a written report from a qualified civil or geotechnical engineer. All excavations shall be in accordance with the OSHA Excavation Safety Standard, 29 CFR 1926, Subpart P.

The competent person shall inspect excavations daily. If there is evidence that a cave-in or slide is possible, all work shall cease until the necessary safeguards have been taken. Excavated material shall be placed far enough from the edge of the excavation (a minimum of 2 feet) so that it does not fall back into the opening. At the end of each day's activities, all open excavations will be clearly marked and secured to prevent nearby workers or unauthorized personnel from entering them. Remote sampling techniques will be the preferred method of sample collection in excavations.

Underground and Overhead Utilities

The locations of all underground pipes, electrical conductors, fuel lines, and water and sewer lines must be determined before soil intrusive work is performed. All lines must be de-energized, blocked out, or blinded where feasible. Equipment with articulated upright booms or masts shall not be permitted to pass within 20 feet of an overhead utility line while the boom is in the upright position.

Container Handling and Moving Procedures

The movement and handling of containers and materials on the Site pose a risk to workers in the form of muscle strains and minor injuries. These injuries can be avoided by using safe handling practices, proper lifting techniques, and proper personal safety equipment such as steel-toed boots and sturdy work gloves. Where practical, mechanical devices will be utilized to assist in the movement of containers and materials.

Biological Hazards

Biological hazards that may be encountered at the Site include possible exposure to:

- **Fur-bearing animals**. Animals may potentially carry the rabies virus or ticks that may transmit lyme disease to humans. Avoid contact. Do not attempt to feed or touch.

- **Poisonous reptiles**. Primarily snakes (rattlesnake, water moccasin, copperhead). Avoid contact and areas that may barbor snake populations including high grass, shrubs, and crevices.

- **Poisonous insects**. Common examples include bees and wasps. Avoid contact with insects and their hives.

- **Spiders**. The black widow and brown recluse spiders are the most venomous. Avoid contact with spiders and areas where they may hide.

- **Poisonous plants**. Common examples include poison ivy and poison oak. Avoid contact. Long-sleeved shirts and pants will allow some protection against inadvertent contact.

If any of the above biological hazards are identified at the Site, workers in the area will immediately notify the SSO and remaining Site personnel.

7. PERSONAL PROTECTIVE EQUIPMENT

All Levine·Fricke·Recon personnel will be provided with appropriate personal safety equipment and protective clothing. The SSO is to inform each worker about necessary protection and must provide proper training in the use of the safety equipment. The required PPE to be worn is described below.

Conditions Requiring Level D Protection

Work activities will commence in Level D PPE. During work activities, sustained PID/FID readings (continuous over a 5-minute duration) within action levels specified in Section 10 will require level D protection. Level D protection is described as follows:

- work shirt and long pants
- steel-toed boots or safety shoes
- safety glasses
- hard hat

Other personal protection readily available for use, if necessary, includes the following:

- outer nitrile gloves at a minimum for all material handling; inner nitrile surgical gloves are recommended where practical.
- chemical-resistant clothing (e.g., Tyvek or polycoated Tyvek coveralls) when contact with chemically affected soils or groundwater is anticipated
- hearing protection

Conditions Requiring Level C Protection

During work activities, sustained PID/FID readings above action levels specified in Section 10 will require level C protection. Level C protection requires the following in addition to level D protection:

- half-face air-purifying respirator (APR) equipped with combination organic vapor/high-efficiency particulate air (HEPA) filter cartridges
- chemical-resistant clothing (e.g., Tyvek, polycoated Tyvek, or Saranex coveralls) when contact with chemically affected soils or groundwater is anticipated
- outer nitrile gloves and inner nitrile surgical gloves
- safety shoes/boots with protective overboots or knee-high PVC polyblend boots when direct contact with chemically affected soils is anticipated

During work activities, sustained PID/FID readings above action levels specified in Section 10 will require level C protection with the addition of a full-face APR equipped with organic vapor/HEPA filter cartridges in lieu of half-face APR and safety glasses.

If sustained PID/FID readings are above the action levels specified in Section 10, activities must cease, and personnel must evacuate the Exclusion Zone (see Section 9). If questions arise, they should be addressed to the SSO. The Project Manager and Director of Health and Safety will be contacted immediately.

8. SAFETY PROCEDURES

Procedures must be followed to ensure site control so that persons who may be unaware of site conditions are not exposed to hazards. The work area will be barricaded by tape, warning signs, or other appropriate means. Any equipment or machinery will be secured and stored safely.

Access inside the specified work area will be limited to authorized personnel. Only Levine·Fricke·Recon employees and designated Levine·Fricke·Recon subcontracted personnel, as well as designated employees of the client, will be admitted to the work site. Only those workers possessing evidence of the required current 40-hour OSHA health and safety training (or current 8-hour refresher) and physician's authorization to conduct hazardous waste activities will be permitted in the designated Exclusion Zone. The SSO will be responsible for ensuring that workers wear proper personal protective clothing. All personnel entering the Site will sign the signature page in this HSP, indicating they have read and accepted the health and safety practices outlined in this plan.

Real-time air monitoring devices will be used to analyze for airborne contaminant concentrations every 30 minutes in the workers' breathing zones while workers are in the Exclusion Zone. The equipment will be calibrated daily, and the results will be recorded on Levine·Fricke·Recon's Air Monitoring form or project log book. The results of air monitoring will be recorded on a Levine·Fricke·Recon Air Monitoring Form or project log book and will be retained in the project files following completion of field activities. A copy of the Air Monitoring Form is located in Appendix B of this HSP.

A daily morning briefing to cover safety procedures and contingency plans in the event of an emergency is to be included with a discussion of the day's activities. These daily meetings will be recorded on Levine·Fricke·Recon Daily Tailgate Safety Meeting Forms. A debriefing to cover the activities is to be held upon completion of the work. A copy of the Daily Tailgate Safety Meeting Form is located in Appendix B of this HSP.

Minimum emergency equipment maintained on site shall include a fully charged 20-pound ABC dry chemical fire extinguisher, an adequately stocked first aid kit, and an emergency eyewash station.

All personnel entering the Site will exit at the same location. There must be an alternate exit established for emergency situations. In all instances, worker safety will take precedence over decontamination procedures. If decontamination of personnel is necessary, exiting the Site will include the decontamination procedures described below.

9. WORK ZONES AND DECONTAMINATION PROCEDURES

In some instances it may be necessary to define three established work zones: an Exclusion Zone, a Contamination Reduction Zone, and a Support Zone. Work zones may be established based on anticipated contamination and projected work activities. The physical dimensions and applicability of work zones will be determined for each area based on the nature of job activity and hazards present. Within these zones, prescribed operations will occur using appropriate PPE. Movement between zones will be controlled at checkpoints.

Considerable judgment is needed to ensure a safe working area for each zone, balanced against practical work considerations. Physical and topographical barriers may constrain ideal locations. Field measurements combined with climatic conditions may, in part, determine the control zone distances. Even when work is performed in an area that does not require the use of chemical-resistant clothing, work zone procedures may still be necessary to limit the movement of personnel and retain adequate site control.

Despite protective procedures, personnel may come in contact with potentially hazardous compounds while performing work tasks. If so, decontamination needs to take place using an Alconox or TSP wash, followed by a rinse with deionized water. Standard decontamination procedures for levels C and D are as follows:

- equipment drop
- boot cover and glove wash and rinse
- boot cover and outer glove removal
- suit wash and rinse
- safety boot and suit removal
- inner glove wash and rinse
- respirator removal
- inner glove removal
- field wash of hands and face

Workers should employ only applicable steps in accordance with level of PPE worn and extent of contamination present. All disposable items will be disposed of in a dry container. Wash and rinse water generated from decontamination activities will be drummed and sampled to determine proper disposal procedures. Nondisposable items will be sanitized before reuse. The SSO is responsible for the maintenance, decontamination, and sanitizing of the PPE.

Used equipment will be decontaminated as follows:

- An Alconox or TSP and water solution will be used to wash the equipment.
- The equipment will be rinsed, first with tap water, then with deionized water.

Each person must follow these procedures to ensure that potential contamination is not transferred off site.

10. ACTION LEVELS

See Section 7 of this HSP for minimum required health and safety procedures. The following action levels have been established for groundwater extraction and treatment system installation activities at the site.

Activity	Action Level	Level of Respiratory Protection
Groundwater Extraction and Treatment System Installation	0 to 10 ppm above background	Level D: No respiratory protection required.
	11 to 50 ppm	Level C: Half-face air-purifying respirator fitted with organic vapor/HEPA filter cartridges.
	51 to 150 ppm	Level C: Full-face air-purifying respirator fitted with organic vapor/HEPA filter cartridges.
	> 150 ppm	Cease operations and evacuate work area. Contact Director of Health and Safety and Project Manager immediately.

11. CONTINGENCY PROCEDURES

In the event of an emergency, site personnel will signal distress with three blasts of a horn (a vehicle horn will be sufficient). Communication signals, such as hand signals, must be established where communication equipment is not feasible or in areas of loud noise.

It is the SSO's duty to evaluate the seriousness of the situation and to notify appropriate authorities. Section 12 of this plan contains emergency telephone numbers as well as directions to the hospital. Nearby telephone access must be identified and available to communicate with local authorities. If a nearby telephone is not available, a cellular telephone will be maintained on site during work activities. Personnel should dial 911 in the event of an emergency.

Injury/Illness

If an exposure or injury occurs, work shall be temporarily halted until an assessment can be made of whether it is safe to continue work. The SSO, in consultation with the Director of Health and Safety, shall make the decision regarding the safety of continuing work. The SSO will conduct an investigation to determine the cause of the incident and steps to be taken to prevent recurrence.

In the event of an injury, the extent and nature of the victim's injuries will be assessed and first aid will be rendered as appropriate. If necessary, the individual may be transported to the nearby medical center. The mode of transportation and the eventual destination will be based on the nature and extent of the injury. A hospital route map is presented in Appendix C of this HSP. In the event of a life-threatening emergency, the injured person shall be given immediate first aid and emergency medical services will be contacted by dialing 911. The individual rendering first aid shall follow directions given by emergency medical personnel via telephone. A person certified in first aid/CPR techniques will be present on site at all times during field activities.

Fire

In the event of fire, personnel should contact the local fire department immediately by dialing 911. When representatives of the fire department arrive, the SSO, or designated representative, shall advise the commanding officer of the location, nature, and identification of hazardous materials on site. Only trained, experienced fire fighters should attempt to extinguish substantial fires at the Site. Site personnel should not attempt to fight fires, unless properly trained and equipped to do so.

Underground Utilities

In the event that an underground conduit is damaged during excavation or drilling, all mechanized equipment will immediately be shut off until the nature of the piping can be determined. Depending on the nature of the broken conduit (e.g., natural gas, water, or electricity), the appropriate local utility will be contacted.

Evacuation

The SSO shall designate evacuation routes and refuge areas to be used in the event of an emergency. Site personnel shall stay upwind from vapors or smoke and upgradient from spills. If workers are in an Exclusion or Contamination Reduction Zone at the start of an emergency, they should exit through the established decontamination areas whenever possible. If evacuation cannot be done through an established decontamination area, site personnel shall go to the nearest safe location and remove contaminated clothing there or, if possible, leave it near the Exclusion Zone. All personnel shall assemble at the predetermined refuge following evacuation and decontamination. The SSO, or designated representative, shall count and identify personnel to ensure that all have been evacuated safely.

Hazardous Material Spill

If a hazardous material spill occurs, site personnel should locate the source of the spill and determine the hazard to the health and safety of site workers and the public. Attempt to stop or reduce the flow if it can be done without risk to personnel. Isolate the spill area and do not allow entry by unauthorized personnel. De-energize all sources of ignition within 100 feet of the spill, including vehicle engines. Should any spill be of the nature or extent that it cannot be safely contained, or poses an imminent threat to human health or the environment, an emergency cleanup contractor will be called out as soon as possible. Spill containment measures listed below are examples of responses to spills.

- Upright or rotate containers to stop the flow of liquids. This step may be accomplished as soon as the spill or leak occurs, providing it is safe to do so.
- Sorbent pads, booms, or adjacent soil may be used to dike or berm materials, subject to flow, and to solidify liquids.

12. EMERGENCY CONTACTS

Ambulance:	911
Police:	911
Fire Department:	911
Hospital:	911
National Response Center:	(800) 424-8802
Poison Control Center:	(800) 682-9211
TOXLINE:	(301) 496-1131
CHEMTREC:	(800) 424-9300
Levine·Fricke·Recon Director of Health and Safety (Irvine, CA):	(714) 955-1390
Levine·Fricke·Recon (Scottsdale, Arizona)	(602)905-9311
Nearby Hospital:	(602) 481-4000 or 911

Scottsdale Memorial Hospital
7400 East Osborn Road
Scottsdale, Arizona

DIRECTIONS TO HOSPITAL:

From the Site location head South on North 75 Street to Osborn Road. At Osborn Road turn right, head West, approximately 1/4 mile to the Scottsdale Memorial Hospital at 7400 East Osborn Road.

A hospital route map is provided in Appendix C of this HSP.

13. LEVINE·FRICKE·RECON APPROVALS

This Health and Safety Plan (HSP) has been prepared for the following project:

North Indian Bend Wash - Area 7
3701B North 75 Street
Scottsdale, Arizona

Levine·Fricke·Recon Project Number 1583.97-009

This Health and Safety Plan (HSP) has been approved by the following Levine·Fricke·Recon personnel:

4-1-97

Ned Overs, P.E.
Site Safety Officer

Date

4/1/97

Bradley D. Cross, R.G.
Project Manager

Date

3/31/97

James Bucha, CIH
Director of Health and Safety

Date

THE AMERICAN BOARD OF INDUSTRIAL HYGIENE
INCORPORATED
6738 CP
EXPIRES 12-31-2002
PENNSYLVANIA · 1960
JAMES A. BUCHA, CIH

APPENDIX A

CHEMICAL DESCRIPTIONS

CHEMICAL DESCRIPTIONS

The following chemical descriptions are presented for chemicals that may be present at the Site. Each chemical description includes physical and odor recognition characteristics, health effects associated with exposure, and exposure limits expressed as an eight-hour time weighted average (TWA). Provided are federal OSHA ("OSHA") permissible exposure limits (PELs; located in 29 CFR 1910.1000); California OSHA ("Cal/OSHA") PELs (located in 8 CCR 5155); and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs).

For sites outside California, Cal/OSHA PELs are included as an additional reference.

CHLOROFORM

Chloroform is a confirmed carcinogen with experimental carcinogenic, teratogenic, neoplastigenic, and tumorigenic data. It is a human poison by ingestion and inhalation. Human systemic effects by inhalation include hallucinations and distorted perceptions, nausea, vomiting and other unspecified gastrointestinal effects. Inhalation of the concentrated vapor causes dilation of the pupils with reduced reaction to light. In the initial stages there is a feeling of warmth of the face and body, then an irritation of the mucous membranes and skin, followed by excitation, loss of reflexes, and unconsciousness. Prolonged inhalation will bring on paralysis accompanied by cardiac respiratory failure and finally death.

- The OSHA PEL is listed as 50 ppm.
- The Cal/OSHA PEL is listed as 2 ppm.
- The TLV is listed as 10 ppm.

1,1-DICHLOROETHYLENE (OR 1,1-DCE)

1,1-DCE (also known as vinylidene chloride) is a volatile, colorless liquid that polymerizes easily and has a mild, sweet odor. Short-term exposure to 1,1-DCE can cause irritation to the skin and mucous membranes. 1,1-DCE is narcotic in high concentrations and can cause liver and kidney damage. 1,1-DCE has been identified by the National Institute for Occupational Safety and Health as a carcinogen.

- An OSHA PEL is not listed.
- The Cal/OSHA PEL is listed as 1 ppm.

- The TLV is listed as 5 ppm.

TETRACHLOROETHYLENE (PCE)

Tetrachloroethylene (also known as perchloroethylene) is a colorless liquid with an ether-like odor. Short-term exposure to PCE may cause headaches, nausea, drowsiness, dizziness, incoordination, unconsciousness, irritation of the eyes, nose, and throat, and flushing of the face and neck. In addition, it may cause liver damage with such findings as yellow jaundice and dark urine. Liver damage may become evident several weeks after exposure. Skin contact may create a dry, scaly, itchy dermatitis. PCE is Classified by the U.S. Environmental Protection Agency as a Group B2 probable human carcinogen.

- The OSHA PEL is listed as 100 ppm.
- The Cal/OSHA PEL is listed as 25 ppm.
- The TLV is listed as 25 ppm.

1,1,1-TRICHLOROETHANE (1,1,1-TCA)

1,1,1-TCA (also known as methyl chloroform) is a colorless liquid with a mild odor, like chloroform. It is moderately toxic by inhalation and skin contact. It is a skin irritant and can cause central nervous system effects such as hallucinations or distorted perceptions, motor activity changes, irritability, and aggression. Gastrointestinal changes such as diarrhea, nausea, or vomiting have also been reported from 1,1,1-TCA exposure at high concentrations. Short-term exposure to 1,1,1-TCA vapor may cause headaches, dizziness, drowsiness, unconsciousness, irregular heart beat, and death. 1,1,1-TCA liquid splashed in the eye causes irritation.

Prolonged inhalation at high concentrations may affect the central nervous system and, if massively inhaled, may cause cardiac arrest. Exposure to vapors may cause mild eye irritation, and prolonged skin contact may produce irritation and dermatitis. Brief exposure to high concentrations of vapor may cause a slight loss of coordination because of its anesthetic properties.

- The OSHA PEL is listed as 350 ppm.
- The Cal/OSHA PEL is listed as 350 ppm.
- The TLV is listed as 350 ppm.

TRICHLORETHYLENE (TCE)

TCE is a clear, colorless liquid with a characteristic chloroform odor. It is a mildly toxic VOC that is also an experimental carcinogen, tumorigen, and teratogen. It can cause eye effects, hallucinations and distorted perceptions when inhaled. TCE is an eye and severe skin irritant. Exposure to vapors may cause eye, nose and throat irritation. Prolonged inhalation of moderate concentrations of vapor may cause headaches and drowsiness. Inhalation of high concentrations may cause narcosis and anesthesia. Severe, acute exposure can result in cardiac failure. Significant chronic exposure may damage the liver and other organs. Prolonged repeated skin contact with the liquid may cause irritation and dermatitis.

- The OSHA PEL is listed as 100 ppm.
- The Cal/OSHA PEL is listed as 25 ppm.
- The TLV is listed as 50 ppm.

APPENDIX B

LEVINE·FRICKE·RECON FORMS

Levine·Fricke·Recon

DAILY TAILGATE SAFETY MEETING FORM

Date:______________ **Time:**_________________ **Project Number:**__________________

Project Name:____

Specific Location:____

Type of Work:____

____

Chemicals Present:____

SAFETY TOPICS DISCUSSED

Protective Clothing/Equipment: ____

____

Hazards of Chemicals Present: ____

____

Physical Hazards: ____

____

Special Hazards: ____

____

Other Topics: ____

____

ATTENDEES

Name (printed)	**Signature**

vine·Fricke·Recon
R MONITORING FORM

Page ____ of ____

Date:____________ **Project Name:**______________ **Project Number:**__________

Type of Activities:____

Type of PID/FID: ______________________ **Serial Number:**_______________

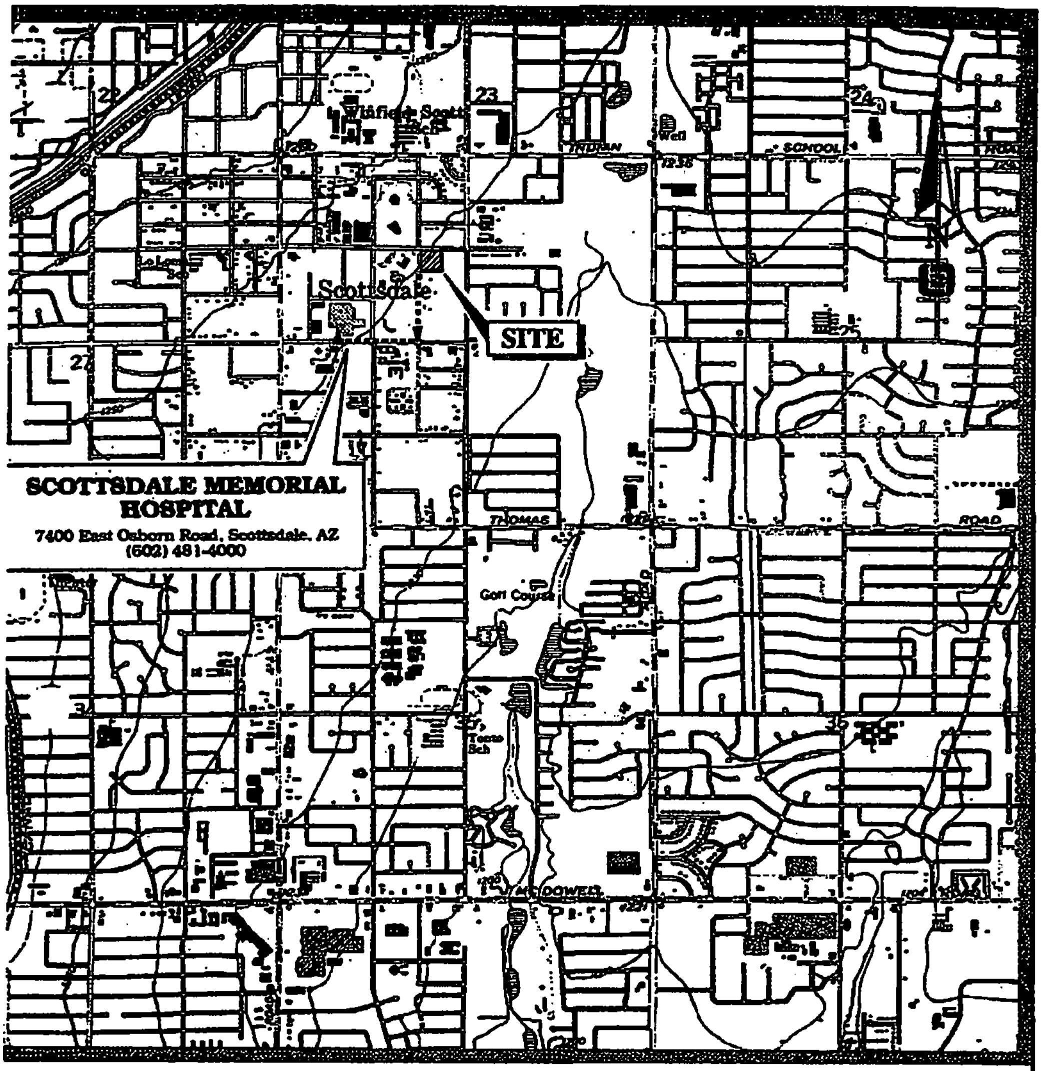
Pre-Calibration Reading: ______________ **Post-Calibration Reading:** _____________

Calibration Standard/Concentration: ___________________________________

Mini-RAM Serial Number: ____________________ **Zeroed in Z-Bag?** **Yes** **No**

Time	***Activity/Location***	***PID/FID (ppm)***	***Mini-RAM (mg/m^3)***

ame: ________________________ **Signature:** ______________________



MAP SOURCE:
U.S.G.S. TEMPE, AZ
7.5' Quadrangle
1:24,000 (1 INCH = 2,000 FEET)

0 2000 FEET

NIBW - AREA 7

Hospital Route Map

Levine-Fricke-Recon

Project No. 1583

Exhibit B
October 10, 1997 Addendum to Design Report

Levine·Fricke·Recon
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

EIVED
OCT 13 1997

October 10, 1997

1583.98-009

RECEIVED
OCT 14 97
MDC

Ms. Emily Roth
United States Environmental Protection Agency
Office of Superfund Programs
75 Hawthorne Street (H-7-2)
San Francisco, California 94105-3901

Subject: Addendum to NIBW Area 7 MAU Groundwater Response Action Design Report

Dear Ms. Roth:

On behalf of Siemens Components, Inc. (Siemens), this letter is submitted as an addendum to the report entitled "Design Report, North Indian Bend Wash Area 7, Groundwater Extraction and Treatment System," dated April 3, 1997 ("the Design Report"). The Design Report described Siemens' proposed plan to implement the Area 7 Middle Alluvial Unit (MAU) groundwater response action. This addendum addresses end-use of the treated groundwater and control of air stripper off-gas emissions. Two minor changes in construction of the treatment plant are also included in this addendum.

Treated Groundwater End-Use

In Section 8.6 of the Design Report, discharge of treated groundwater to Salt River Project's (SRP's) irrigation network at Osborn and Thomas Road was described as the selected alternative for groundwater end-use. In this scenario, treated groundwater from Area 7 would be conveyed by underground pipeline to SRP's junction box located at Osborn and Thomas Road. From the junction box, the water would gravity flow into North El Dorado Park Lake through SRP's system. North El Dorado Lake is used for irrigation water in the park and at a neighboring golf course, although demands from those users are less than the proposed delivery rate of 385 gallons per minute (gpm) from the Area 7 treatment system. As a result, Area 7 treated water would be the sole source of water to North El Dorado Lake and a flow-through situation would occur where excess water would discharge into a small creek and continue to other lakes in NIBW. Ultimately, any excess water that reached the southern end of NIBW would be pumped by SRP to the Grand Canal for use as irrigation water.

Since developing that alternative, Siemens has consulted with the City of Scottsdale, ADEQ, Arizona Department of Water Resources (ADWR), and EPA to examine other options and re-evaluate end-use alternatives for treated groundwater. All of those parties expressed interest in direct groundwater recharge as an alternative. Therefore, with the assistance of the City of Scottsdale, suitable locations for recharge wells were identified and a new recharge end-use alternative was developed.

Recharge of Treated Groundwater

Siemens is proposing that the selected alternative for treated groundwater end-use be changed from delivery to SRP's irrigation system to direct recharge to the Upper Alluvial Unit (UAU) north of Area 7. Direct groundwater recharge at existing SRP well No. 22.3E, 7N was considered in the original Design Report, but was excluded because the water would be reinjected into contaminated areas and may impact the existing OU-1 extraction and treatment remedy. With the assistance of the City of Scottsdale, however, suitable locations for UAU recharge wells have been identified north of Area 7. Recharge to the UAU north of Area 7 will not negatively impact existing remedies. In fact, recharge in this area may expedite the remediation of the saturated UAU beneath Area 7 through flushing from upgradient. Direct recharge to the UAU will also conserve the local groundwater resource for its maximum beneficial use.

Figure 1 shows the location of proposed UAU recharge wells north of NIBW Area 7 on 1st Street. At the proposed recharge well location, the UAU is likely to be either unsaturated or have a thin saturated zone (less than 10 feet) just above the UAU/MAU contact. UAU sediments are expected to consist of highly permeable sand and gravel deposits from approximately 50 feet below ground surface (bgs) to 150 feet bgs. Above 50 feet bgs, the UAU is predominately silt and clay. Based on aquifer testing at 7EX-1UA, the saturated UAU in the vicinity of the recharge area has a hydraulic conductivity of approximately 300 feet/day. At a recharge rate of approximately 385 gpm, the unconfined and unsaturated UAU should readily accept the recharge water without substantial mounding using a single recharge well. A second recharge well located approximately 20 to 50 feet away from the first is proposed as a back-up to reduce down time in the event that periodic well maintenance is needed to enhance recharge capacity.

The proposed recharge wells will have a minimum diameter of eight inches and will be constructed as shown in Figure 2. The recharge wells will be completed with slotted casing from approximately 55 feet bgs to the base of the UAU. An injection pipe will be located inside the well casing to a depth of approximately 10 feet above the base of the well. A high-water level monitoring device will be installed in each recharge well. Activation of the high-level alarm will shut down the extraction wells. Periodic inspection and maintenance, including disinfection of the recharge wells, will be performed if the ability of the well to transmit water to the alluvial unit appears to decrease with time.

Permitting

According to ADWR, the extraction and recharge activities will be conducted in response to a CERCLA action and are exempt from permitting within that agency. Similarly, ADEQ has advised that no aquifer protection (AP) permitting will be required for the proposed recharge activities unless water quality in the UAU is being degraded by the recharge activities. With respect to naturally occurring constituents (TDS, metals, nitrates, and common cations and anions), groundwater in the MAU is generally of higher quality than groundwater in the UAU. The groundwater extracted from the MAU will be treated to reduce VOCs to drinking water standards before being recharged to the UAU. As such, it is not anticipated that water quality in the UAU will be degraded by these recharge activities.

Monitoring

The existing UAU monitor well network will be used to monitor water quality in the UAU in the vicinity of Area 7, downgradient of the recharge wells. The wells will be monitored on a semi-annual basis in accordance with the current sampling schedule for the NIBW monitor well network. Water quality of treatment system effluent will be monitored more frequently in accordance with sampling schedules to be outlined in the treatment system operations and maintenance manual that will be developed and submitted to EPA for approval.

Treatment System VOC Emissions Control

The proposed treatment system design included two vapor-phase granular activated carbon (GAC) adsorbers in a series configuration to remove VOCs from the air stripper off-gas prior to discharge to the atmosphere. Air quality modeling was conducted to determine the acceptable VOC emission rate from the treatment system that would not pose a significant health risk to nearby receptors in the vicinity of Area 7. Appendix H of the Design Report presents the methods and results of the air quality modeling. The modeling data indicated that up to 1.49 pounds of trichloroethene (TCE) could be discharged to the atmosphere while still meeting the acceptable risk criteria based on Arizona Ambient Air Quality Guidelines. The proposed strategy for the VOC emission control system was to remove the GAC adsorbers when the VOC emissions were less than 1.49 pounds per day.

Although the emissions limit developed from the air quality modeling complies with Arizona Ambient Air Quality Guidelines, several issues regarding the acceptability of this limit have arisen since publication of the Design Report. In order to expedite approval and implementation of the Area 7 MAU groundwater response action, Siemens has agreed not to remove the GAC adsorbers upon meeting specific emissions criteria as proposed. Siemens may choose to re-address this issue with EPA at a later date after reviewing the operating and monitoring data from the proposed system.

Treatment Plant Design Modifications

The foundation for the treatment plant building will be a flat concrete slab designed to support the planned pre-fabricated metal structure and groundwater treatment equipment. The on-site inventory of hydrogen peroxide for the UV/Oxidation system will be stored in a double-contained cross-linked polyethylene tank located on a separate concrete foundation outside to the south of the building.

The extracted groundwater conveyance piping will be SDR-21 high density polyethylene (HDPE) piping rated for 80 pounds per square inch (psi) working pressure. The maximum operating pressure within the conveyance piping is estimated at less than 20 psi at the well head for well 7EX-4MA.

Siemens would like to begin implementation of the Area 7 MAU groundwater response action as soon as possible. We will appreciate your timely approval of the Design Report and this addendum for NIBW Area 7 MAU groundwater response action.

Please call Bradley D. Cross, R.G., Principal Hydrogeologist, at (602) 905-9311 or me at (916) 786-0320 if you have any questions.

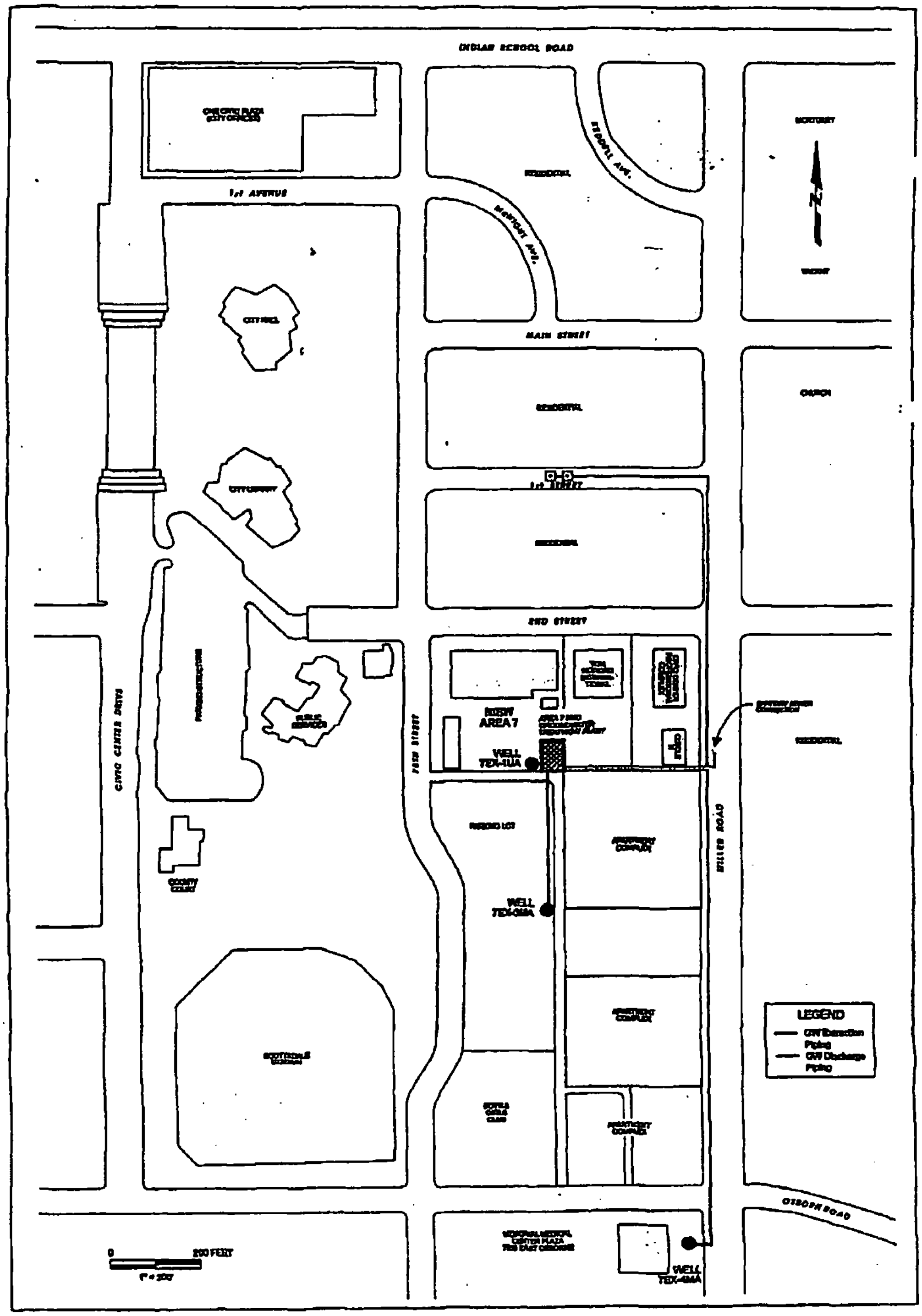
Sincerely,

James A. Lutton

James A. Lutton, P.E.
Senior Associate Engineer

Attachments

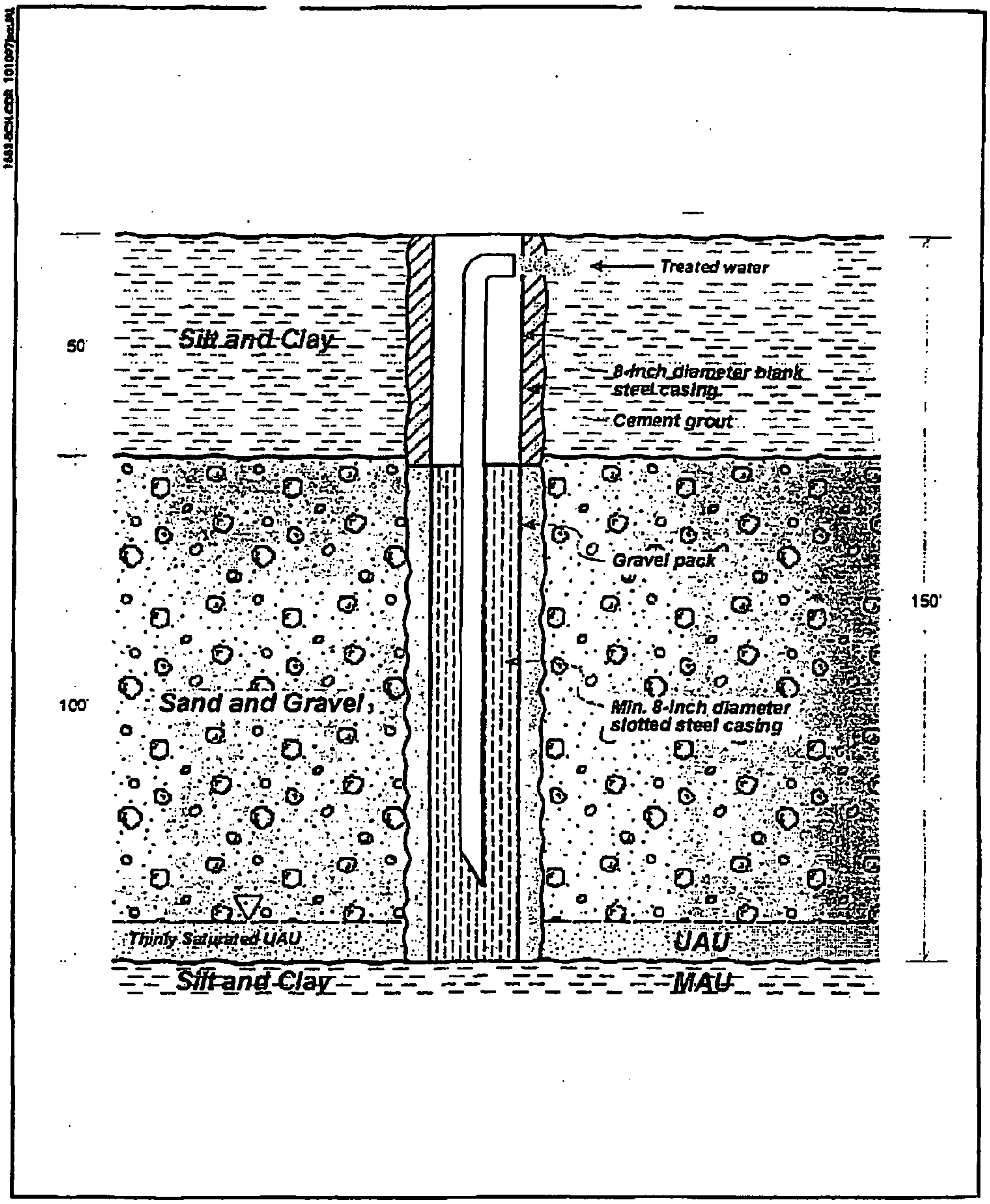
cc: John Wyss, Siemens Components, Inc.
Mary Stockel, Siemens Corporation
Mike Vandenbergh, Latham and Watkins
Ed Pond, ADEQ
Winifred Au, CH2M Hill
Tim Graves, CH2M Hill
Maria Mahar, COS
Kevin Wanttaja, SRP



NIBW Area 7 - Site Plan Showing Well and Pipe Locations

NORTH INDIAN BEND WASH-AREA 7

Exhibit B
Page **5** of **6**
Attachment 3

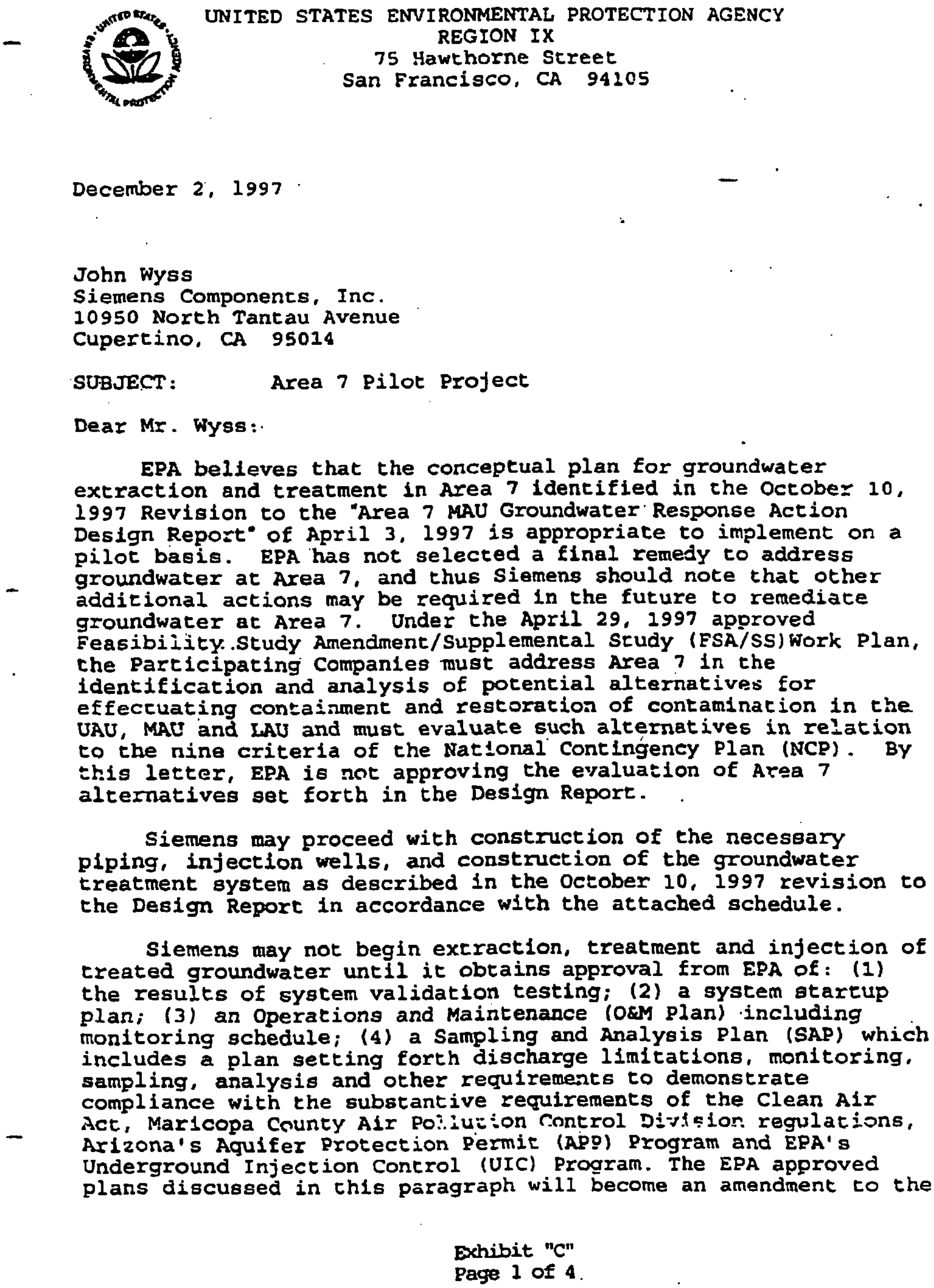


Generalized Construction Schematic for Recharge Well

Levine·Fricke·Recon
Project No. 1583

SIEMENS - NORTH INDIAN BEND WASH
Figure 2

Exhibit C
EPA's approval of the design and specifications of the GWET and the other systems and Area 7 remedial action work



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

December 2, 1997

John Wyss
Siemens Components, Inc.
10950 North Tantau Avenue
Cupertino, CA 95014

SUBJECT: Area 7 Pilot Project

Dear Mr. Wyss:

EPA believes that the conceptual plan for groundwater extraction and treatment in Area 7 identified in the October 10, 1997 Revision to the "Area 7 MAU Groundwater Response Action Design Report" of April 3, 1997 is appropriate to implement on a pilot basis. EPA has not selected a final remedy to address groundwater at Area 7, and thus Siemens should note that other additional actions may be required in the future to remediate groundwater at Area 7. Under the April 29, 1997 approved Feasibility Study Amendment/Supplemental Study (FSA/SS)Work Plan, the Participating Companies must address Area 7 in the identification and analysis of potential alternatives for effectuating containment and restoration of contamination in the UAU, MAU and LAU and must evaluate such alternatives in relation to the nine criteria of the National Contingency Plan (NCP). By this letter, EPA is not approving the evaluation of Area 7 alternatives set forth in the Design Report.

Siemens may proceed with construction of the necessary piping, injection wells, and construction of the groundwater treatment system as described in the October 10, 1997 revision to the Design Report in accordance with the attached schedule.

Siemens may not begin extraction, treatment and injection of treated groundwater until it obtains approval from EPA of: (1) the results of system validation testing; (2) a system startup plan; (3) an Operations and Maintenance (O&M Plan) including monitoring schedule; (4) a Sampling and Analysis Plan (SAP) which includes a plan setting forth discharge limitations, monitoring, sampling, analysis and other requirements to demonstrate compliance with the substantive requirements of the Clean Air Act, Maricopa County Air Pollution Control Division regulations, Arizona's Aquifer Protection Permit (APP) Program and EPA's Underground Injection Control (UIC) Program. The EPA approved plans discussed in this paragraph will become an amendment to the

April 29, 1997, Feasibility Study Amendment/Supplemental Study (FSA/SS) workplan submitted to EPA by Harding Larson Associates on behalf of the Participating Companies.

Arizona's APP Program requirements include the following: (1) re-injected groundwater must meet Arizona Aquifer Water Quality Standards at the injection wellhead, (2) groundwater injection may not further degrade the aquifer unit, and (3) best available demonstrated control technology (BADCT) must be used.

Finally, an installation report including as-built drawings shall be due 60 days following the completion of construction of the treatment system.

The pilot project will occur on site, thus no federal state or local permit shall be required for the pilot project. However, the reinjection and plant operation and discharge shall be consistent with the substantive requirements of the APP, Clean Air Act, Maricopa County Air Pollution Control regulations and UIC Program.

Attached are comments from Tim Graves of CH2M Hill pertaining to the report. Tim's comments also discuss Kevin Wanttaja's (Salt River Project's (SRP)) October 13, 1997 letter and comments on the October 10 Design Revision document.

If you have questions regarding these submittals, please call me or discuss these requirements with Mike Grigorieff of CH2M Hill ((714) 429 2020 ext. 2306). If you have any questions with regard to this letter, please call me at (415) 744-2247.

Sincerely,

Emily Roth
EPA Project Manager

c:
Janet Carlson, EPA
Michele Benson, EPA
Stephanie Ciekot, ADEQ
Bruce Robinson, ADEQ
James DuBois, ADEQ
Bill Engstrom, ADEQ
Jim Lutton, Levine-Fricke
Brad Cross, Levine-Fricke
Mike Grigorieff, CH2M Hill
Winifred Au, CH2M Hill

MEMORANDUM **CH2MHILL**

Review of *Addendum to NIBW Area 7 MAU Groundwater Response Action Design Report,* dated October 10, 1997, by Levine•Fricke•Recon; and Letter Entitled *SRP NIBW Water Needs,* dated October 13, 1997, by SRP

TO: Emily Roth/U.S. EPA, Region IX

COPIES: Project Files

FROM: Tim Graves/CH2M HILL

DATE: October 21, 1997

I have reviewed the subject documents. The first document (prepared by Levine•Fricke•Recon [LFR] on behalf of Siemens Components, Inc. [Siemens]) summarizes Siemens' proposal to change their preferred end use of treated MAU groundwater from surface-water discharge to recharge into the UAU north of Area 7. Under Siemens' revised proposal, approximately 400 gallons per minute of treated upper MAU groundwater would be recharged via one of two recharge wells located about 300 to 400 feet north of Area 7. The proposed recharge wells would be screened in the unsaturated coarse-grained portion of the UAU. One recharge well would operate while the other was available for backup during maintenance periods of the lead well. LFR suggests that the proposed recharge end use may expedite the existing UAU remediation effort by flushing from upgradient of the Area 7 site.

I believe that the Siemens-proposed end use is technically sound and of potential beneficial use in furthering remediation. Siemens will need to conduct their described monitoring to ensure that negative water quality impacts are not realized from their plan.

The referenced SRP letter documents SRP's concerns with the proposed change in the Area 7 MAU groundwater end use from surface water discharge to groundwater recharge. A main component of SRP's objections to the Siemens plan deals with the issue of SRP's diminished groundwater pumping capability within the NIBW area due to groundwater contamination caused by the Participating Companies (PCs). Because of this diminished pumping capacity, SRP would rather have the extracted and treated groundwater supplement their surface water distribution system rather than being put back into the ground. This is more of a policy issue than a technical issue, and we have no comment on this aspect of the debate.

SRP additionally objects to Siemens' proposed plan on the basis of possible impacts on groundwater quality. They cite the potential for furthering the horizontal movement of TCE-contaminated water within the UAU and the possibility that the recharged water may contain elevated nitrate levels that "could produce undesirable impacts on the underlying drinking water aquifers." I do not share these concerns for the following reasons: (1) flushing of the UAU with clean water is consistent with the selected OUII remedy; and (2) because the higher nitrate water potentially being delivered to the UAU will have come

Exhibit C
Page 3 of 4
Attachment 3

from the MAU (an underlying drinking water aquifer), it is hard to understand how this could potentially degrade the drinking water supply. Additionally, in reviewing the recent Interim Site Characterization Data Submittal (Figures F-3 and F-8) from the PCs, it appears that the UAU and the upper MAU have very similar nitrate concentrations in the vicinity of Area 7; and if anything, the UAU nitrate concentrations are higher than those of the upper MAU.

Exhibit D
Facility Property Description

AREA 7 FACILITY PROPERTY

LEGAL DESCRIPTION

SOUTH 76 FEET OF THE EAST 58.23 FEET OF THE FOLLOWING DESCRIBED REAL PROPERTY.

THE SOUTH 121 FEET OF THE NORTH 346 FEET OF THE EAST 280.84 FEET OF THE WEST 310.84 FEET OF THE EAST HALF OF THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 26, TOWNSHIP 2 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA, CONTAINING 4426 SQ. FT.

Exhibit E
Extraction Wells and Extraction Wells Property

12/23/15

Richard Kopchynski
Water Works Engineering, LLC
7580 North Dobson Road, Suite 200
Scottsdale, Arizona 85256

Mr. Kopchynski

Pursuant to your request, we gathered survey information for (5) sites located in the North Indian Bend Wash—Area 7, located in Section 26, Township 2 North, Range 4 East. The datum utilized for this purpose was based upon GPS observation of the northeast corner, the east quarter corner, the southeast corner and the west quarter corner of said Section 26. The State Plane Grid coordinates utilized were based on the GDACS survey recorded in Book 734 of Maps, Page 10 of the Maricopa County Records. The coordinates shown herein are ground coordinates derived by said Grid coordinates. To revert the ground coordinates back to the grid divide the ground coordinates by a scale factor of 1.000154552. The elevations shown herein were based on the brass cap in hand hole located at the east quarter corner of said Section 26 having an elevation of "1235.015" NAVD88 as published in said GDACS survey. The following is the result of our effort.

71N-1UA: Southwest corner of Vault, N=906,733.736, E=699,400.726. North flange bolt elevation = 1242.10, the southerly flange bolt elevation = 1242.06 and the southeasterly flange bolt elevation = 1241.27.

71N-2UA: Southwest corner of Vault, N=906,734.933, E=699,547.992. The north flange bolt elevation = 1240.08, the elevations for the next three flange bolts going south are 1241.13, 1241.14 & 1240.09.

7EX-3MA: Southwest corner of Vault, N=905,781.298, E=699,481.113. The top of well elevation is 1238.74.

7EX-4MA: Southwest corner of Vault, N=904,947.561, E=699,778.640. The top of well elevation is 1231.32.

7EX-6MA: Southwest corner of Vault, N=904,415.002, E=699,312.172. The north flange bolt elevation = 1232.30, the south flange bolt elevation = 1232.32.

27233
JAMES G.
ELLIS
DATE SIGNED 12/23/15
Expires 06/30/17

J.G. ELLIS
LAND SURVEYING SERVICES, INC.
3238 North 81st Place
Scottsdale, Arizona 85251

Phone 480-970-6265 Fax 480-970-6271
E-mail jgsurvey@aol.com

Exhibit F
Extraction Pipeline and Extraction Pipeline Property

North Indian Bend Wash Superfund Site

PIPELINE ROUTE DESCRIPTIONS
NORTH INDIAN BEND WASH – AREA 7 GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

7EX-3MA:

The extraction pipeline for well 7EX-3MA exits the Area 7 GWETS compound at the south west corner of the site. The pipeline travels approximately 290 feet south through an alley that borders the eastern boundary of the Scottsdale Stadium parking lot. The pipeline then turns west into the Scottsdale Stadium parking lot and continues approximately 10 feet where it terminates at the 7EX-3MA well head located in the 7EX-3MA well vault.

7EX-4MA & 7EX-6MA:

The extraction pipeline for wells 7EX-4MA and 7EX-6MA exits the Area 7 GWETS compound at the south west corner of the site. The pipeline travels approximately 75 feet east to Miller Road. The pipeline then turns south at Miller Road. The pipeline follows Miller Road south approximately 6 to 8 feet from the western curb for approximately 1,100 feet to a tee fitting. The tee fitting branches due west and terminates at the 7EX-4MA well head located within the 7EX-4MA well vault. The 7EX-4MA well head is located on private property approximately 40 feet west of the west of the pipeline.

The 7EX-6MA pipeline continues from the south branch of the tee fitting that connects to 7EX-4MA. From the tee fitting, the 7EX-6MA pipeline continues an approximately 550 feet south to the southwest corner of Miller Rd. and Monterey Way. The pipeline turns west onto Monterey Way approximately 6 to 8 feet from the western curb for an approximate length of 570 feet where it terminates at the 7EX-6MA well head located in the 7EX-6MA well vault. Well 7EX-6MA is located in the city right-of-way.

7EX-5MA:

The extraction pipeline for well 7EX-5MA has been abandoned in place along Miller Rd. The abandoned section of pipeline travels approximately 790 feet south along Miller Road south approximately 6 to 8 feet from the western curb. The pipeline turns west and continues approximately 20 feet where it terminates at the 7EX-5MA well head located in the 7EX-5MA well vault. Well 7EX-5MA is located on private property and will be abandoned in 2016.

7IN-1UA & 7IN-2UA:

The extraction pipeline for well 7IN-1UA and 7IN-2UA exits the Area 7 GWETS compound at the south west corner of the site. The pipeline travels approximately 75 feet east to Miller Road. The pipeline then turns north at Miller Road. The pipeline follows Miller Road north approximately 6 to 8 feet from the western curb for approximately 670 feet and then turns west along 2nd Street approximately 6 to 8 feet from the southern curb for approximately 275 feet to a tee fitting. The tee fitting branches north and terminates at the 7IN-2UA well head located within the 7IN-2UA well vault.

The 7IN-1UA pipeline continues from the west branch of the tee fitting that connects to 7IN-1UA. From the tee fitting, the 7IN-1UA pipeline continues an approximately 110 feet west where it terminates at the 7IN-1UA well head located in the 7IN-1UA well vault. Both wells 7EX-1IN and 7EX-2IN are located in the city of right-of-way.

Exhibit G
Reinjection Wells and Reinjection Wells Property

12/23/15

Richard Kopchynski
Water Works Engineering, LLC
7580 North Dobson Road, Suite 200
Scottsdale, Arizona 85256

Mr. Kopchynski

Pursuant to your request, we gathered survey information for (5) sites located in the North Indian Bend Wash—Area 7, located in Section 26, Township 2 North, Range 4 East. The datum utilized for this purpose was based upon GPS observation of the northeast corner, the east quarter corner, the southeast corner and the west quarter corner of said Section 26. The State Plane Grid coordinates utilized were based on the GDACS survey recorded in Book 734 of Maps, Page 10 of the Maricopa County Records. The coordinates shown herein are ground coordinates derived by said Grid coordinates. To revert the ground coordinates back to the grid divide the ground coordinates by a scale factor of 1.000154552. The elevations shown herein were based on the brass cap in hand hole located at the east quarter corner of said Section 26 having an elevation of "1235.015" NAVD88 as published in said GDACS survey. The following is the result of our effort.

71N-1UA: Southwest corner of Vault, N=906,733.736, E=699,400.726. North flange bolt elevation = 1242.10, the southerly flange bolt elevation = 1242.06 and the southeasterly flange bolt elevation = 1241.27.

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7EX-3MA: Southwest corner of Vault, N=905,781.298, E=699,481.113. The top of well elevation is 1238.74.

7EX-4MA: Southwest corner of Vault, N=904,947.561, E=699,778.640. The top of well elevation is 1231.32.

7EX-6MA: Southwest corner of Vault, N=904,415.002, E=699,312.172. The north flange bolt elevation = 1232.30, the south flange bolt elevation = 1232.32.

27233
JAMES G.
ELLIS
DATE SIGNED 12/23/15
Expires 06/30/17

J.G. ELLIS
LAND SURVEYING SERVICES, INC.
3238 NORTH 81ST PLACE
SCOTTSDALE, ARIZONA 85251

Phone 480-970-6265 Fax 480-970-6271
E-mail jgsurvey@aol.com

Exhibit H
Reinjection Pipeline and Reinjection Pipeline Property

North Indian Bend Wash Superfund Site

PIPELINE ROUTE DESCRIPTIONS
NORTH INDIAN BEND WASH – AREA 7 GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

7EX-3MA:

The extraction pipeline for well 7EX-3MA exits the Area 7 GWETS compound at the south west corner of the site. The pipeline travels approximately 290 feet south through an alley that borders the eastern boundary of the Scottsdale Stadium parking lot. The pipeline then turns west into the Scottsdale Stadium parking lot and continues approximately 10 feet where it terminates at the 7EX-3MA well head located in the 7EX-3MA well vault.

7EX-4MA & 7EX-6MA:

The extraction pipeline for wells 7EX-4MA and 7EX-6MA exits the Area 7 GWETS compound at the south west corner of the site. The pipeline travels approximately 75 feet east to Miller Road. The pipeline then turns south at Miller Road. The pipeline follows Miller Road south approximately 6 to 8 feet from the western curb for approximately 1,100 feet to a tee fitting. The tee fitting branches due west and terminates at the 7EX-4MA well head located within the 7EX-4MA well vault. The 7EX-4MA well head is located on private property approximately 40 feet west of the west of the pipeline.

The 7EX-6MA pipeline continues from the south branch of the tee fitting that connects to 7EX-4MA. From the tee fitting, the 7EX-6MA pipeline continues an approximately 550 feet south to the southwest corner of Miller Rd. and Monterey Way. The pipeline turns west onto Monterey Way approximately 6 to 8 feet from the western curb for an approximate length of 570 feet where it terminates at the 7EX-6MA well head located in the 7EX-6MA well vault. Well 7EX-6MA is located in the city right-of-way.

7EX-5MA:

The extraction pipeline for well 7EX-5MA has been abandoned in place along Miller Rd. The abandoned section of pipeline travels approximately 790 feet south along Miller Road south approximately 6 to 8 feet from the western curb. The pipeline turns west and continues approximately 20 feet where it terminates at the 7EX-5MA well head located in the 7EX-5MA well vault. Well 7EX-5MA is located on private property and will be abandoned in 2016.

7IN-1UA & 7IN-2UA:

The extraction pipeline for well 7IN-1UA and 7IN-2UA exits the Area 7 GWETS compound at the south west corner of the site. The pipeline travels approximately 75 feet east to Miller Road. The pipeline then turns north at Miller Road. The pipeline follows Miller Road north approximately 6 to 8 feet from the western curb for approximately 670 feet and then turns west along 2nd Street approximately 6 to 8 feet from the southern curb for approximately 275 feet to a tee fitting. The tee fitting branches north and terminates at the 7IN-2UA well head located within the 7IN-2UA well vault.

The 7IN-1UA pipeline continues from the west branch of the tee fitting that connects to 7IN-1UA. From the tee fitting, the 7IN-1UA pipeline continues an approximately 110 feet west where it terminates at the 7IN-1UA well head located in the 7IN-1UA well vault. Both wells 7EX-1IN and 7EX-2IN are located in the city of right-of-way.

Exhibit I
Site Features Map

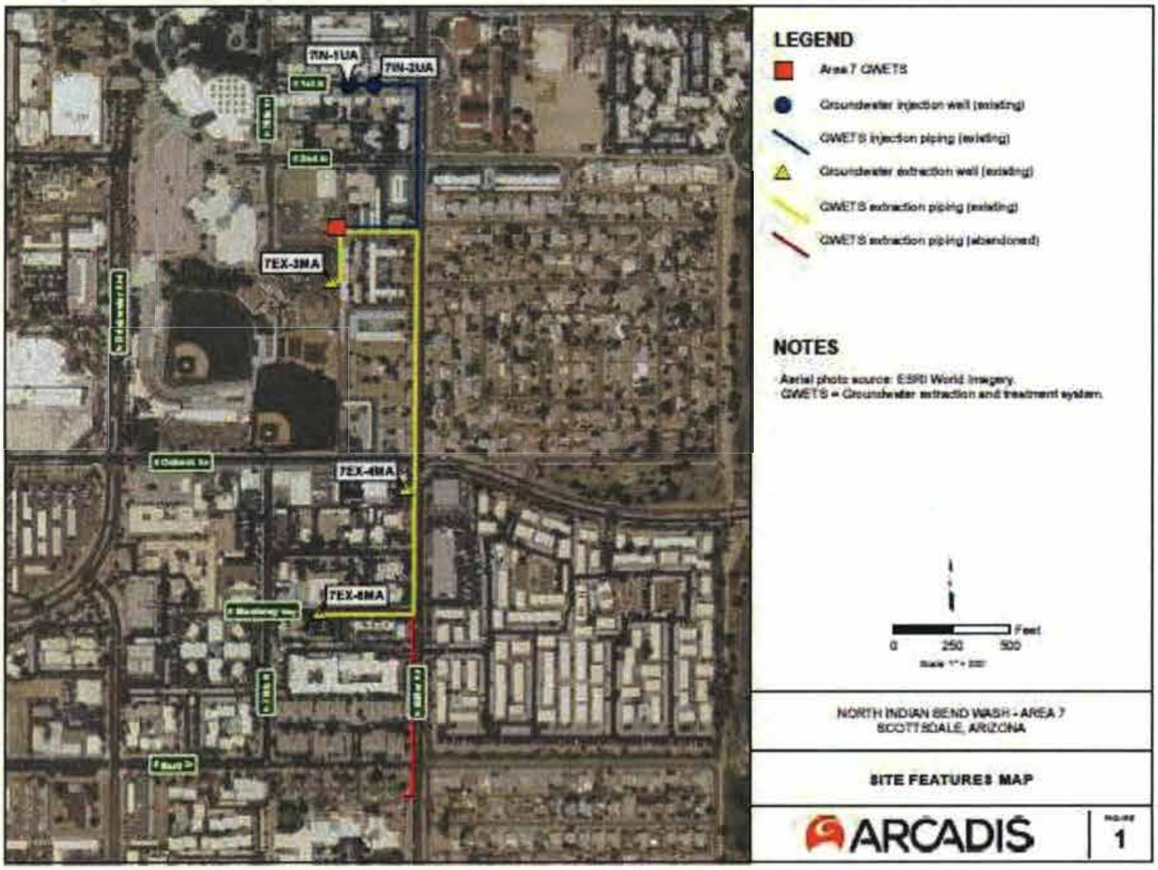

Exhibit J
Additional Encroachment Permit Conditions
For North Indian Bend Wash Area 7 Work

The City's approval of the subject Permission to Work in Right-of-Way and Permission for Private Improvements in Right-of-Way includes and is expressly subject to the following:

The work to be undertaken under the Permission to Work in Right-of-Way and Permission for Private Improvements in Right-of-Way includes remediation "Work" as defined and as set forth in Amended Consent Decree, Civil Action No. 91-1835-PHX-FJM ("ACD"). The ACD implements the 2001 Record of Decision Amendment ("ROD Amendment)" for the North Indian Bend Wash Superfund Site Final Operable Unit. The ROD Amendment is the selected final Remedial Action for the NIBW Site. Appendix A to the ACD is the Statement of Work for Remedial Design and Remedial Action for the NIBW Superfund Site Final Operable Unit ("SOW").

In the event of a conflict between the terms of the Permission to Work in Right-of-Way and Permission for Private Improvements in Right-of-Way and the terms of the ACD, the terms of the ACD shall govern and control.

As part of the NIBW Work, Section VII.H of the ACD requires contaminated groundwater treatment at the NIBW Area 7 Groundwater Extraction and Treatment System ("GWETS"). The Area 7 GWETS is located at 3703 North 75th Street in Scottsdale, Arizona, a City-owned parcel of land. The Environmental Protection Agency ("EPA") has approved [INSERT NAME OF NEW SYSTEM COMPONENT], which will [INSERT DESCRIPTION OF FUNCTION IN RELATION TO AREA 7 TREATMENT SYSTEM]. The Permission to Work in Right-of-Way and Permission for Private Improvements in Right-of-Way are intended to accommodate the installation of the new [INSERT NAME OF NEW SYSTEM COMPONENT].

Fees.

Pursuant to Section XVI of the ACD, the City hereby waives any fees which may otherwise be recovered in accordance with Scottsdale Revised Code, Chapter 47.

Hazardous Materials.

The NIBW Administrative Record File includes the following 2002 EPA clarification of the 2001 ROD Amendment:

> "The NIBW groundwater extracted to implement the remedy must be managed as if it were a RCRA hazardous waste and managed consistent with the 'Contained-In Policy.'"

The SOW requires implementation of Site contingency plans and emergency response plans to respond to accidental releases of untreated groundwater from Site treatment facilities and associated equipment, including pipelines and extraction wells. Such plans shall provide that untreated water released to the environment will be managed as a hazardous waste if characteristically hazardous or if the volume of water poses a risk to human health or the environment.

All work related to the installation of [INSERT NAME OF SYSTEM COMPONENT] shall be the sole responsibility of the Owner, its agents, employees, and contractors and shall be performed in a manner which strictly complies with the SOW and ROD Amendment including, but not limited to, groundwater containment, spills, spill response, and notification measures.

Insurance.

Owner must procure and maintain insurance against claims for injury to persons or damage to property which may arise from or in connection with the design, construction, operation, and maintenance of the well, pipeline, and appurtenances and all other obligations performed by the Owner.

MINIMUM SCOPE AND LIMITS OF INSURANCE

A. Commercial General Liability-Occurrence Form

Commercial General Liability: Owner must maintain "occurrence" form Commercial General Liability insurance with a limit of $5,000,000 for each occurrence, and a $5,000,000 policy General Aggregate. The policy must cover liability arising from premises, operations, products completed operations, personal injury and advertising injury.

B. Automobile Liability-Any Auto or Owned, Hired and Non-Owned Vehicles

Automobile Liability: Owner must maintain Business Automobile Liability insurance with a combined single limit of $1,000,000 per occurrence and in the aggregate on owned, hired, and non-owned vehicles assigned to or used by Owner.

C. Worker's Compensation and Employers' Liability

Worker's Compensation: Owner must maintain Worker's Compensation insurance to cover obligations imposed by federal and state statutes having jurisdiction of Owner's employees engaged in the performance of the work and must also maintain Employers' Liability insurance of $1,000,000 for each accident, $1,000,000 disease for each employee, and $1,000,000 disease policy limit.

OTHER INSURANCE REQUIREMENTS

A. Commercial General Liability and Automobile Liability Coverages

1. The Commercial General Liability and Automobile Liability policies are to contain blanket endorsements adding the City, its officers, directors, officials, and employees as additional insureds with respect to liability arising out of activities performed by, or on behalf of Owner.

2. Owner's insurance must contain broad form contract liability coverage and must not exclude liability arising out of explosion, collapse, or underground property damage hazards ("XCU") coverage.

3. Owner's commercial general liability insurance must be primary insurance with respect to the City, its officers, directors, officials, and employees arising from its operations only. Any insurance or self-insurance maintained by the City, its officers, directors, officials, and employees must be in excess of the coverage provided by Owner and must not contribute to it.

4. Owner's insurance must apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

5. All policies, including Worker's Compensation, must contain a waiver of subrogation against the City, its officers, directors, officials, and employees for losses arising from work performed by Owner.

6. All auto insurance policies on owned, hired, and non-owned vehicles used to transport any hazardous material, as defined by any local, state, or federal authority, which is the subject of or transported in the performance of Owner's work require an MCS endorsement providing $5,000,000 per occurrence limits of liability for bodily injury and property damage.

SUBCONTRACTOR'S AND CONSULTANT'S INSURANCE

If any on-site services under this document are subcontracted in any way, Owner shall execute a written agreement with its subcontractor or consultant that includes the insurance provisions set forth in A. 1 through 6 above and an indemnification clause protecting the City to the same extent as set forth in this document and providing the following levels of coverage: Commercial General Liability insurance with a limit of $5,000,000 for each occurrence, and a $5,000,000 General Aggregate per policy; Automobile Liability insurance with a combined single limit of $2,000,000 per occurrence with an MCS 90 endorsement of $5,000,000.

Owner shall be responsible for executing the agreement with its subcontractor or consultant and obtaining Certificates of Insurance verifying the insurance requirements.

Exhibit K
Insurance Requirements

INSURANCE REQUIREMENTS

A. Within three days of execution of this Agreement, MSI will furnish the City a certificate of insurance on a standard insurance industry ACORD form. The ACORD form must be issued by an insurance broker or agent authorized to transact business in the State of Arizona. Insurance companies must maintain an A.M. Best rating of not less than B++6 with policies and forms reasonably satisfactory to the City.

B. MSI must procure and maintain, during the term of this Agreement, insurance against claims for injury to persons or damage to property, which may arise from or in connection with the design, construction, operation, and maintenance of the water treatment and delivery components and all other obligations (the "Work") performed by MSI, its agents, representatives, and employees under this Agreement.

C. The insurance requirements for this Agreement in no way limit the indemnity covenants contained in this Agreement.

D. The City in no way warrants that the limits contained in this Agreement are sufficient to protect MSI from liabilities that might arise out of the performance of the Work by MSI, its agents, representatives, and employees, and MSI is free to purchase any additional insurance as may be determined necessary.

MINIMUM SCOPE AND LIMITS OF INSURANCE

MSI will provide coverage and with limits of liability of those stated below.

A. Commercial General Liability-Occurrence Form

Commercial General Liability: For the initial term of this Agreement, MSI must maintain "occurrence" form Commercial General Liability insurance with a limit of $10,000,000 for each occurrence, and a $10,000,000 General Aggregate. The policy must cover liability arising from premises, operations, independent contractors, products completed operations, personal injury and advertising injury.

B. Automobile Liability-Any Auto or Owned, Hired and Non-Owned Vehicles

Automobile Liability: MSI must maintain Business Automobile Liability insurance with a limit of $5,000,000 each accident on owned, hired, and non-owned vehicles assigned to or used by MSI.

C. Worker's Compensation and Employers' Liability

Worker's Compensation: MSI must maintain Worker's Compensation insurance to cover obligations imposed by federal and state statutes having jurisdiction of MSI employees engaged in the performance of the Work and must also maintain

Employers' Liability insurance of $1,000,000 for each accident, $1,000,000 disease for each employee and $1,000,000 disease policy limit.

POLICY DEDUCTIBLES AND/OR SELF-INSURED RETENTIONS

The policies set forth in these requirements may provide coverage which contains deductibles or self-insured retention amounts. Such deductibles or self-insured retentions shall not be applicable with respect to the policy limits provided to the City of Scottsdale. MSI shall be solely responsible for any such deductible or self-insured retention amount.

OTHER INSURANCE REQUIREMENTS

The policies are to contain, or be endorsed by blanket endorsements, the following provisions:

A. Commercial General Liability and Automobile Liability Coverages

1. The Commercial General Liability and Automobile Liability policies are to contain, or be endorsed by blanket endorsements, the following provisions: The City, its officers, directors, officials, and employees are additional insureds with respect to liability arising out of activities performed by, or on behalf of MSI.
2. MSI's insurance must contain broad form contract liability coverage and must not exclude liability arising out of explosion, collapse, or underground property damage hazards ("XCU") coverage.
3. MSI's insurance coverage must be primary insurance with respect to the City, its officers, directors, officials, and employees arising from its operations only. Any insurance or self-insurance maintained by the City, its officers, directors, officials, and employees must be in excess of the coverage provided by MSI and must not contribute to it.
4. MSI's insurance must apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.
5. All policies, including Worker's Compensation, must contain a waiver of subrogation against the City, its officers, directors, officials, and employees for losses arising from Work performed by MSI.

SUBCONTRACTOR'S AND CONSULTANT'S INSURANCE

If any on-site services under this Agreement are subcontracted in any way, MSI shall execute a written agreement with its Subcontractor or Consultant that includes an indemnification clause protecting the City to the same extent as set forth in this Agreement and providing the same insurance requirements with the exception that the following levels of coverage will apply: Commercial General Liability insurance with a limit of $5,000,000 for each occurrence, and a $5,000,000 General Aggregate.

MSI shall be responsible for executing the agreement with its Subcontractor or Consultant and obtaining Certificates of Insurance verifying the insurance requirements.

NOTICE OF CANCELLATION

Each insurance policy required by the insurance provisions of this Agreement must provide the required coverage and must not be cancelled except until after 30 days written notice has first been given, by mail, to:

City of Scottsdale
Water Resources Director
9379 E. San Salvador
Scottsdale, Arizona 85258

VERIFICATION OF COVERAGE

A. MSI must furnish the City, Certificates of Insurance (ACORD form) and with copies of blanket endorsements effecting coverage as required by this Agreement. The certificates and blanket endorsements for each insurance policy are to be issued by a person authorized by that insurer to bind coverage on its behalf.

B. All certificates are to be received and approved by the City before the Work commences. Each insurance policy required by this Agreement must be in effect at or before the commencement of the Work and remain in effect for the duration of the performance of the Work. Failure to maintain the insurance policies as required by this Agreement or to provide evidence of renewal is a material breach of this Agreement.

C. All certificates of insurance required by this Agreement must be sent directly to the City's Water Resources Division.

APPROVAL

Any modification or variation from the insurance requirements in this Agreement must be approved by the Risk Management Division, whose decision is final. This action will not require a formal Agreement amendment, but may be made by administrative action.

OTHER INSURANCE

The City may reasonably require, by written notice to MSI, an increase in the limits or types of any insurance to account for inflation, changes in risk, or any other factor that the City reasonably determines to affect the prudent amount of insurance to be provided. Any adjustment to such limits or types of insurance are subject to the Parties' mutual agreement.