CARSWELL AFB
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ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 760

CARSWELL / PLANT 4
RESTORATION ADVISORY BOARD MEETING

FINAL
SUMMARY MINUTES OF FEBRUARY 7, 2002
REGULAR QUARTERLY MEETING

A regular meeting of the Carswell / Plant 4 Restoration Advisory Board (RAB) was held February 7, 2002 at the Westworth Village Council Chamber, 311 Burton Hill Road. The RAB meeting began at 6:00 pm.

Agenda

Welcome / Introductions / Approval of Minutes

Air Force Plant 4
- Remedial process optimization project
- Three-phase heating
- Tree sampling
- Web sites
- Budget

Carswell Off-base
- Sanitary sewer system
- Weapons storage area
- RCRA permits
- Property transfers.

Carswell On-base
- Site closure update
- Special investigation

Westworth Redevelopment Authority
- Commercial development
- Golf course
- Residential Development

Community Affairs

Next Meeting

Open Discussion

Welcome and Introduction

Ms. J'Nell Pate welcomed attendees to the meeting. Introductions were made. Ms. Pate commented on the lack of community participation at the meeting and the need to get more community members involved. The minutes of the November 8, 2001 RAB meeting were approved. Ms. Pate brought up the need to elect another Community Co-Chair since she has served as Community Co-Chair for three years. This will be discussed more at the May meeting.

Air Force Plant 4

Mr. Walters went over some updates on projects. He talked about a remedial process optimization project and gave an update on the electrical resistance heating, previously known as six-phase heating, now known as three-phase heating. Mr. Walters then spoke about a method to sample ground water by sampling trees. Mr. Walters went through some Web sites that he thought might be of interest to community members, and briefly discussed his budget.

Remedial Process Optimization Project

Mr. Walters stated that the Landfill 3 system is his most expensive treatment system to operate. The goal of optimization is to find out if the system is effective, and how efficiently is it operating. AFCEE people came out about a year ago and they found some seeps along the edge of the site. The AFCEE personnel said they wanted to turn off the treatment system and do some water table measurements and take some concentrations at the seeps to see what's going on. This would show if the system was working. The regulators concurred and a monitoring program was initiated. A number of samples were taken with the system operating and then the system was turned off. Since last April, we have been monitoring the seeps and the surface water, seeing if any of the concentrations are going up because the treatment system is turned off. Concentrations are currently below applicable limits with the system turned off. Mr. Walters then spoke of a similar initiative at the Landfill 4 and 5 system. That treatment system will also be turned off. It cost over two million dollars to install it originally. He doesn't think it's doing a very good job of reducing the contamination levels after operating for more than 8 years. They will turn the system off in March and HydroGeoLogic and their subcontractors are going to install a thousand foot long iron filing wall.

Three Phase Heating

At Building 181, a three-phase heating system is being installed It used to be called six-phase heating, now it's called three-phase heating. Six-phase dealt with six electrodes in the ground. Three-phase uses a neutral that conducts the electricity under the ground. Apparently, three-phase works better over a larger area and the project has been expanded to half an acre. Leaky tanks were in Building 181. The contents went through the subsurface, hit the water, spread out, and probably have some DNAPL pools. The groundwater flows over to the parking lot where we have our treatment system. We used the soil gas survey to make sure the extraction and heating zone are where the hot spot is. This has pretty much proven the contamination is staying right in the area that we are heating. They are about halfway done drilling the holes to place 35-foot long electrodes into the ground on 19 foot centers. Once they are all installed, they are going to turn on 200 volts to each one and that will heat up the soil between the electrodes. TCE boils at about 87 degrees Celsius. The electrodes are going to heat up the air to about 100 degrees Celsius. Then extraction wells will pull a vacuum on the subsurface, removing soil vapor and groundwater. The vapors will be burned and the water will be routed to the POTW.

Tree Sampling

Mr. Walters talked about the work being done by Greg Harvey, a phyto-remediation expert. He has a big plantation over on Carswell with lots of trees planted in the ground with roots down in the groundwater pulling up groundwater and evaporating and breaking down the TCE. If trees will pull groundwater out of the ground, and if the water happens to have TCE in it, then you should be able to find it inside the tree. What Greg does is take leaves and have the leaves tested in the lab after an extraction method. Cores are also bored out of the trees for analysis and it's been shown that when the cores are collected properly, the trees won't die. If contamination is found, then that site would be a good location for a monitoring well. Mr. Walters has some sites on Carswell that he wants him to go core to see if there is anything there instead of installing a monitoring well.

Web Sites

Mr. Walters had some environmental Web sites that he thought were really interesting and explained things well. The ATSDR has Plant Forest Public Assessment on their Web site. If you have never read it and do not want to go to the library, you can download it and see what they said about Plant 4.

Budget

Mr. Walters said his budget is in for this year. It was a little late, but he doesn't think the war effort had a lot to do with it. They were slower than normal getting his budget out. As soon as he receives that, he has to start planning for next year. If anybody has any ideas he is open to hearing them.

Ms. Pate asked, "Do you think they will cut your budget because of needing to spend more money on the war effort?"

Mr. Walters answered, "I don't know. I don't think so."

Carswell off base

Ms. Pate introduced Charles Pringle who works for the Air Force Center for Environmental Excellence as a Program Manager for the BRAC. He also represents the Air Force Base Conversion Agency. He gave an overview of some of the things he has been working on, including the sanitary sewer system, the weapons storage area, RCRA permits, and property transfers.

Sanitary Sewer System

A Sanitary Sewer System covered most of the base. There are 12 places where we have to go in and do some digging. Mr. Pringle is programming a project right now to dig up those holes and clean them up. Programming documents should go up to headquarters this month. He is hoping sometime in April to get out there and finish the work. IT Corporation is the one who did the investigation, so they will probably be the ones to do the cleanup.

Weapons Storage Area

The next item Mr. Pringle spoke about was on the Off-Site Weapons Storage Area. He is doing a FOS, which is Finding of Suitability to Transfer. The Weapons Storage Area is about five miles off to the west side of the base off of White Settlement Road. It's about 247 acres. The fenced-off area is 78 acres. That's where they would have kept the bombs and munitions in the

past. He has done an investigation and the sites have been closed. There is some contamination at different spots, so it's going to be closed under an industrial scenario, which is what most of the rest of this base is being closed under. The FOS will go to GSA and they will make that a public auction item on the street. Of the 247 acres, 87 acres will have a restriction on them. The Air Force Base Conversion Agency is handling that.

RCRA Permits

There is a RCRA permit on the base and it's been there for over 10 years. After 10 years, you have to renew it. Mr. Pringle has sent in a renewal application. The permit will be shifted to the major command who is working on the Naval Air Base. The permit was submitted last February to TNRCC, Texas Natural Resource Conservation Commission. They reviewed it. It came back last week. Mr. Pringle will look at it, see what their comments are and make changes accordingly.

Property Transfers

Mr. Pringle gave an update on some property transfers. The basic mission of the Air Force Base Conversion Agency is to take land from bases that have closed and either realign them or sell them. The Naval Air Station is active and there are about 1,170 acres that have been transferred over to them. Also, we transferred a housing area in October that has 40 acres. The Bureau of Prisons taken over the medical hospital (145 acres). They have had that since December. The stables were transferred in August. There are 50 acres associated with them. On the golf course, we had Landfill 6, which was part of the Naval Air Station. It will be sometime before this is transferred. The reason is that as long as this plume exists underneath, there are a number of things that have to happen.

Carswell on base

Ms. Pate introduced Mike Dodyk the Resident Engineer at Carswell. He gave a Site Closure Update and then introduced a contractor to speak about a special investigation at Waste Pile 7.

Site Closure Update

Mr. Dodyk said that since the last meeting, he has submitted and received closure from the TNRCC for one site. That was Solid Waste Management Unit 26, which is also known as Landfill 3. He has 48 down, 40 more to go. He has been performing soil hot spot excavation work at various landfills and waste accumulation areas. He also has soil and groundwater sampling which was conducted at SWMUs 49 and 50. These were former aircraft washing areas back in the SAC days. He is doing soil and groundwater sampling in SMWU 19, the former fire training area. He did groundwater sampling at AOC 1, the former base gas station. He performed sediment and surface water samplings at SWMU 54 on base. Certain hot spot areas are going to be excavated at Landfill 7. He is going to do the site preparation work for the permeable reactive barrier area. We have constructed a temporary road already. Future work will be a temporary fence. Then the installation will start. In the summer, he is going to that put in a treatment system at the gas station that will extract the contaminated groundwater from the ground and treat it. Last month, Mr. Dodyk received the work plans for the Paluxy well installation. He is going to install three wells going down into the Paluxy aquifer. He has received those plans from the contractor and is currently reviewing them. He has also received a draft technical review report for AOC 2.

Special Investigation

Mr. Dodyk introduced Margaret O'Hare from CH2M Hill to describe the special investigation recently completed at Waste Pile 7, also know as SWMU 24. Ms. O'Hare said that the point of the investigation was to look at Waste Pile 7, which is a very small site, a little bit more than half an acre, and find out if there was TCE DNAPL associated with it.

There have been two drum removals there. The first one was in 1999. There was a geophysical survey done with some anomalies. They decided to go look and found drums. And then there was some more sampling done and another drum removal in 2000. Then two wells were installed. In the initial drum removal, there were 34 drums found and there was some liquid TCE that was removed at that time. Then some soil sampling was accomplished. The results were less than the Risk Reduction Standard and the site was closed out under that. However, there was still some concern that the groundwater concentrations were just a little high.

Ms. O'Hare said that the field activities that they did in the special investigation were, first they went to those existing wells and screened them for DNAPL, and then they went in and performed a CPT and MIP investigation. MIP is Membrane Interface Probe. It's a tool that attaches on to the Cone Penatrometer Tool probe. The MIP is a membrane with a heating block that heats the soil and causes VOCs to be released. The VOCs pass through the membrane to a carrier gas and are brought up to the rig and analyzed with a mass spectrometer. In areas where the MIP detected high concentrations, they went back with a flute ribbon sampler and conventional core samplings to double check. They also put in groundwater monitoring wells. The flute ribbon sampler is a ribbon that has a tube inside of it. The ribbon is pushed down into the hole, and then the tube is used to fill up the ribbon with water. It presses against the side of the
bore hole and then is pulled out of the hole. The stripes on the ribbon are a hydrophobic dye that will react with DNAPL if it comes in contact with it. If any DNAPL is in the bore hole, it's going to react with the dye. All the ribbon samplers were negative. The site is not significantly affecting the groundwater concentrations in that area.

Westworth Redevelopment Authority

Ms. Pate introduced Leland Clemons with the Westworth Redevelopment Authority who gave an update on ongoing projects. These projects include commercial development, the golf course, and residential development.

Commercial Development

They have received a deed on approximately 75 percent of the total commercial development and job creation acreage. The remaining 25 percent is for a later phase. There is a new building on Hwy 183. It's 135,000-square-foot Lowe's Home Improvement Center scheduled to open the last week in March. From an employment standpoint, they are looking at somewhere between 200 and 225 employees. There is a smaller tract that we have sold to a group that is negotiating for a Walgreen's drug store in that location. They are talking to a variety of different users for the balance of the commercial tract on which they currently have a deed.

Golf Course

Golf course construction is completed. They are growing grass and planting trees right now and interviewing potential management teams to come in and run the course. It's scheduled for an opening first of July. Several local golf professionals have come out to take a look at it, both course managers and course superintendents, and the reviews have been very positive. Even with about three and a half million dollars' worth of additions on it, it will still be an open-to-the public, pay-for-play course.

Residential development

Marketing activity began about ten days ago on the residential development. The response has been very favorable. There are 100 lots. Twelve of those lots have already pre sold. Construction will begin soon, which will entail getting rid of the remaining abandoned utilities and doing a sizeable amount of dirt work to deal with some of the drainage issues. They have to create a slope to deliver water to the existing drainage systems in Westworth Village. They anticipate that the first houses can begin construction in about seven months from that time.

An audience member asked, "What was the size of the lots that you were offering?"

Mr. Clemons answered, "They range in size from 6,600 square feet to just under 14,000 square feet."

Community Affairs

Ms. Pate introduced Donald Yates with the Public Affairs office at Wright-Patterson AFB, who has been working to establish a school outreach program. He is going to be conducting school activities with the Lake Worth and White Settlement school districts on March the 6th, 7th, and 8th. On the 6th, we will be working with the Lake Worth children, and the 7th will be at White Settlement High School. The 8th will be at White Settlement Middle School. Eight partners have committed to participate; Aeronautical Systems Center, Lockheed Martin, United States Geological Survey, Fish and Wildlife Commission, Texas Department of Health, White Settlement Water Department, and Fort Worth Environmental. There is a possibility of some others entering in. They will report at the next meeting and let the RAB know how it turned out.

Next Meeting

Ms. Pate asked if RAB meetings were going to scheduled on the second Thursday once again. The audience agreed and the next meeting was set for the 9th of May.

Open Discussion

Ms. Pate then opened the meeting to any comments or questions form the audience.

An audience member said, "Just wanted to make a comment when I was making my comments, talking about working with George and Don and myself. I don't want to leave out the regulatory folks because they are working as hard as anyone, because they are a part of the whole clean-up crew. They worked with us very well. So I just wanted to make sure everybody knows it's bigger than just the Air Force and involved with TNRCC and the Air Force."

Ms. Pate answered, "Thank you."

An audience member asked, "I was wondering with a question for the commander. Is the air station doing an air show this year? Or has that been cancelled?"

An audience member answered, "We are not going to be able to do an air show this year due to security, not going to be able to keep the security level that it needs to be at in order to open the base up. So we are going to try to put it off until the next year instead of, you know, continuing on a two-year cycle, we are just going to try to put it off one year to get it on that two-year cycle again. So it's not what we wanted to do. But under current conditions, it's probably the best decision down the road here."

Ms. Pate adjourned the meeting at 7:13 pm.

In Attendance

Carswell DERA (On-Base)

Don Ficklen, HQ AFCEE/ERD
Mike Hawkins, HQ AFCEE/ERD
Mike Dodyk, AFCEE, Resident Engineer
Rich Wheeler, Ellis Environmental Group
Rick Levin, Ellis Environmental Group
Mark Webster, Ellis Environmental Group
Miquette Rochford, HydroGeoLogic, Inc.
Lynn Morgan, HydroGeoLogic, Inc.
Peter Dacyk, HydroGeoLogic, Inc.
Cindy Crane, HydroGeoLogic, Inc
Larry Tyner, IT Corporation
Todd Harrah, Roy F. Weston, Inc
Audrie Medina, Booz Allen Hamilton
Christina Hewitt, TN Associates
Margaret O'Hare, CH2M Hill
Dureen Davis, CH2M Hill
Scott Irving, CH2M Hill
Wade Walker, Rio Technical Services

Carswell AFBCA (Off-Base)

Charles C. Pringle, HQAFCEE/ERD
Rafael Vazquez, AFCEE
Melvin Alli, HQAFCEE
John Gillespie, AFCEE
Gene Gallogly, AFCEE

Air Force Plant 4

Rick Wice, IT Corporation
Victor Dozey, IT Corporation
Don Yates, Wright Patterson Air force Base
Sonja A. Jones, U.S. Geological Survey
George Walters, AFP 4 Project Manager, Wright-Patterson AFB
Ted Grady, Wright-Patterson AFB

United States Navy
J.D. Davis
Jeff Brusoski

Texas Natural Resource Conservation Commission
Luda Voskov
Mark Weegar
Tim Sewell

Lockheed Martin
Fred Novak
Norman Robins

Others (Off-Base)
J'Nell Pate, Community member, co-chair.
John Maddox, Community member
Leland Clemons, Westworth Redevelopment Authority
Robert Taylor, City of Fort Worth
Jim Pernell, Westworth Village City Council

Comments regarding these meeting minutes should be addressed to:

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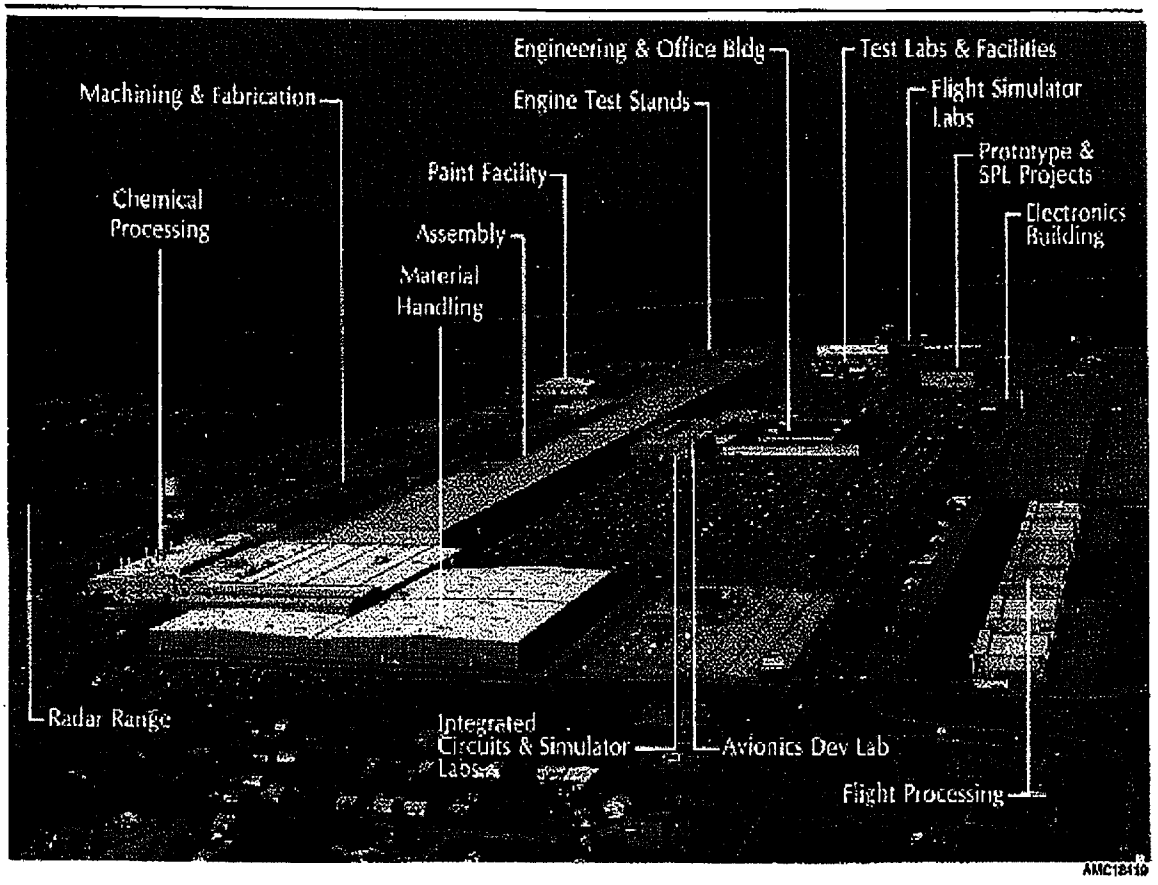
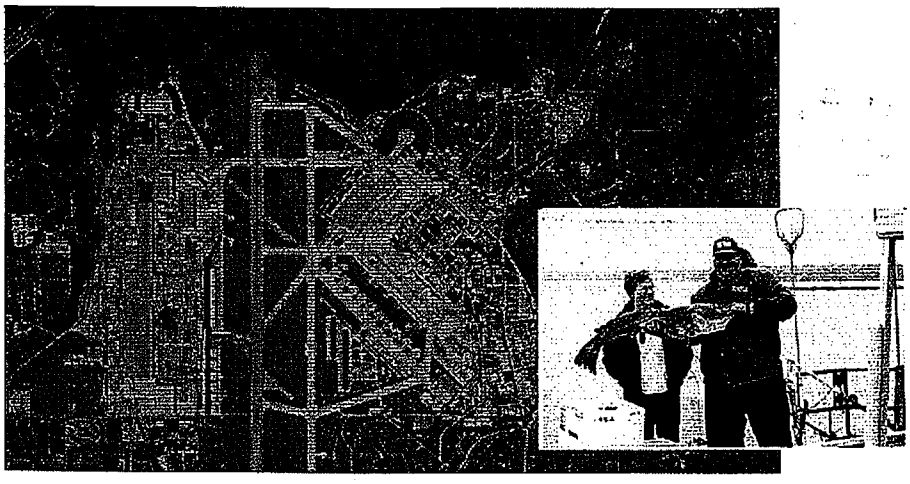
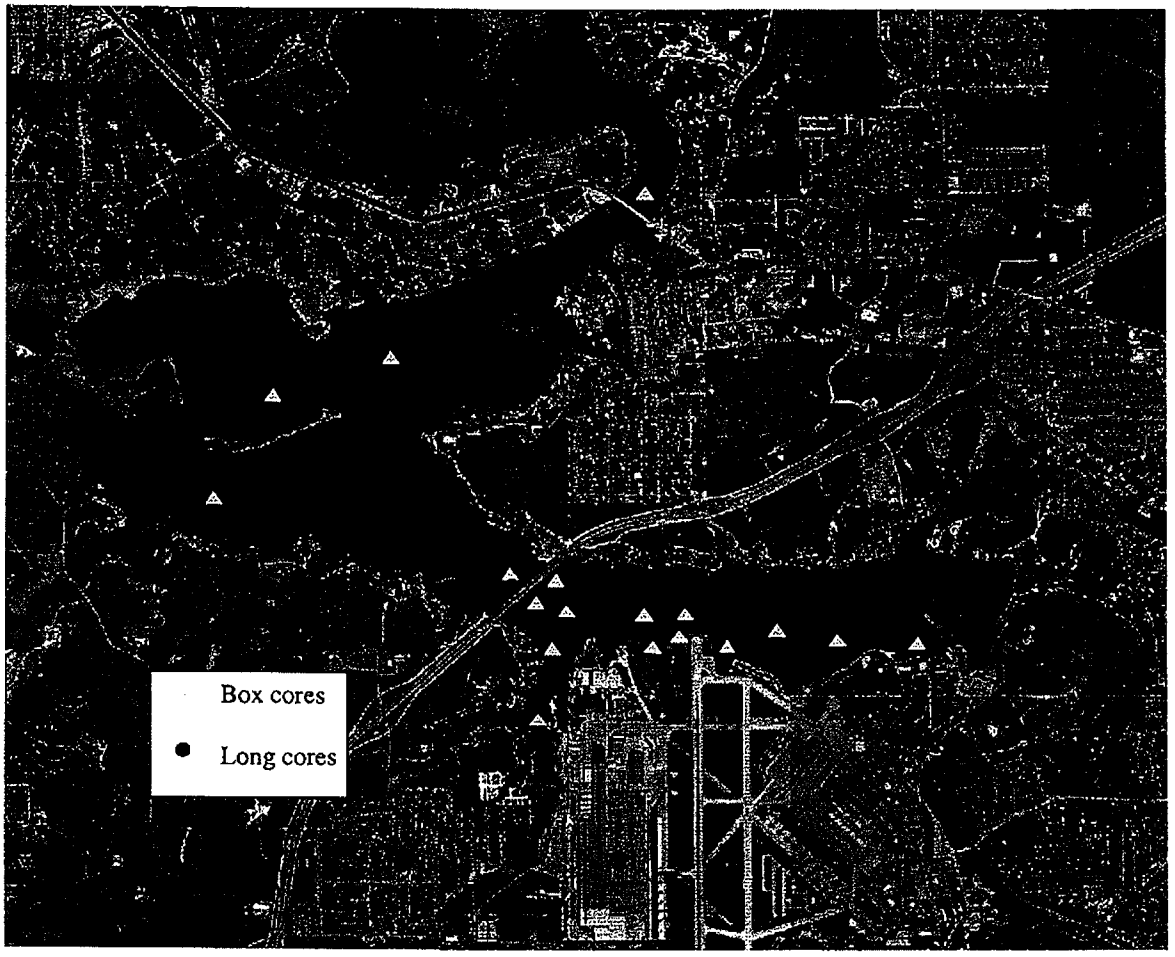
Newberry, FL 32669
Phone: (352) 332-3888
Fax: (352) 332-3222
rick.levin@ellisenv.com


Engineering & Office Bldg
Test Labs & Facilities
Machining & Fabrication
Engine Test Stands
Flight Simulator Labs
Prototype & SPL Projects
Paint Facility
Chemical Processing
Assembly
Electronics Building
Material Handling
Radar Range
Integrated Circuits & Simulator Labs
Avionics Dev Lab
Flight Processing
AMC18419

Lake Worth Sediment Sampling

- USGS Peter Van Metre- Austin TX
- $200K Sampling now, results in 6 months.
- Follow-up to Fish Tissue Sampling
- Will focus on PCB's in sediment and whether additional contamination is continuing to migrate into the lake (based on depth of PCBs)

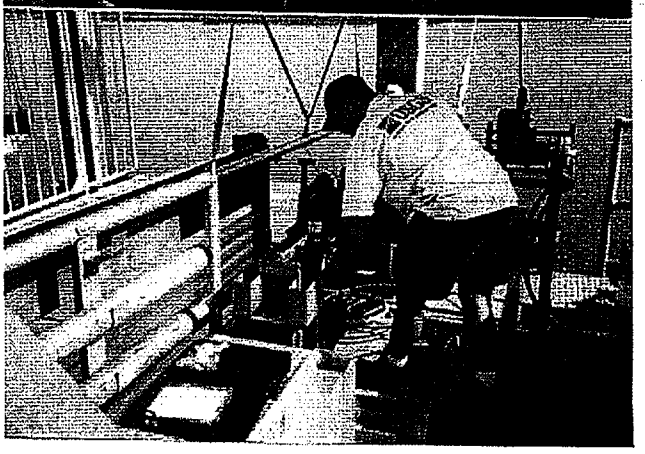




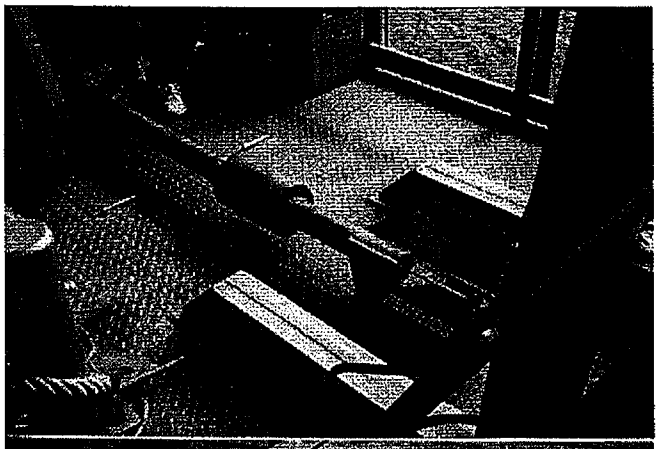
USGS Pontoon Boat

Nov 00
- Long Core Sampling (3)

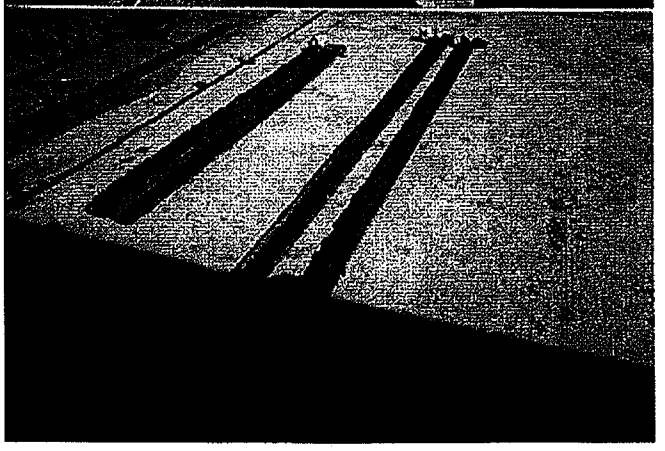
Jan 01
- Box Cores shallow (18)



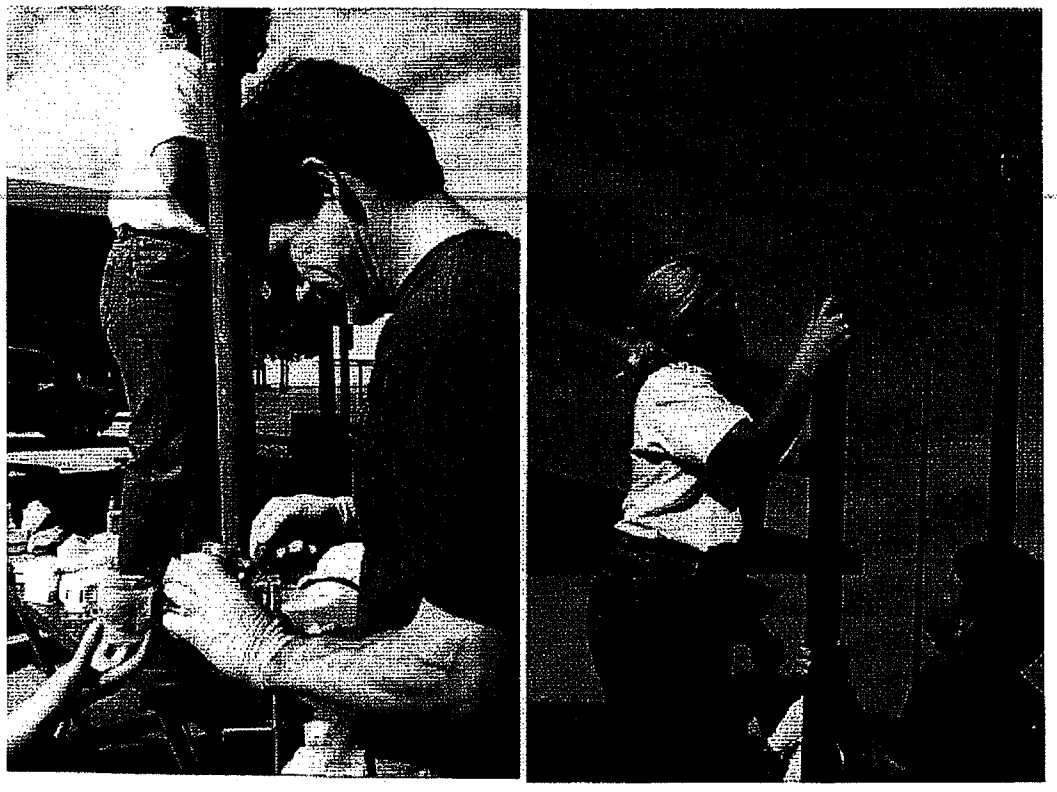
Sediment boring device

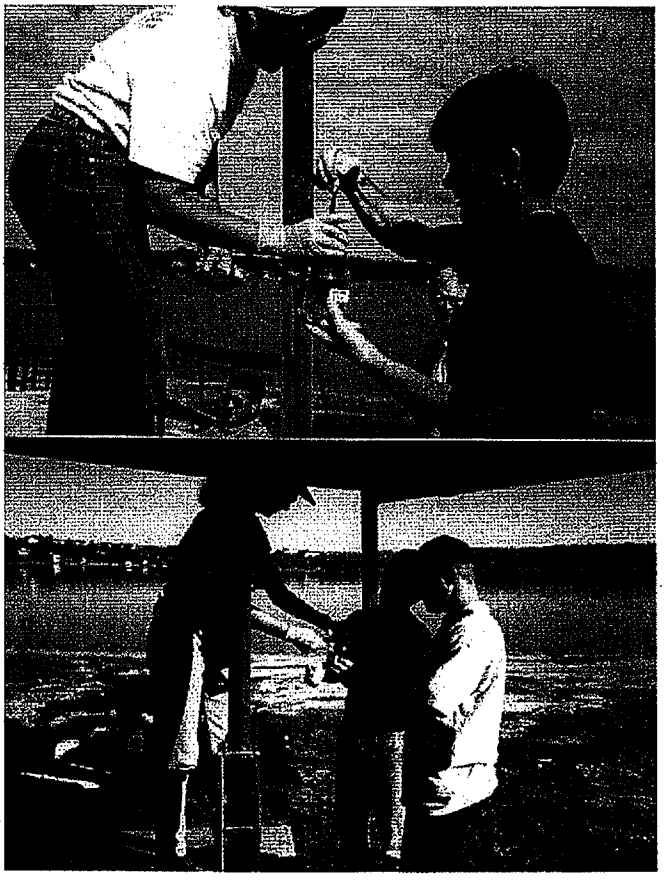


Long Core Borings



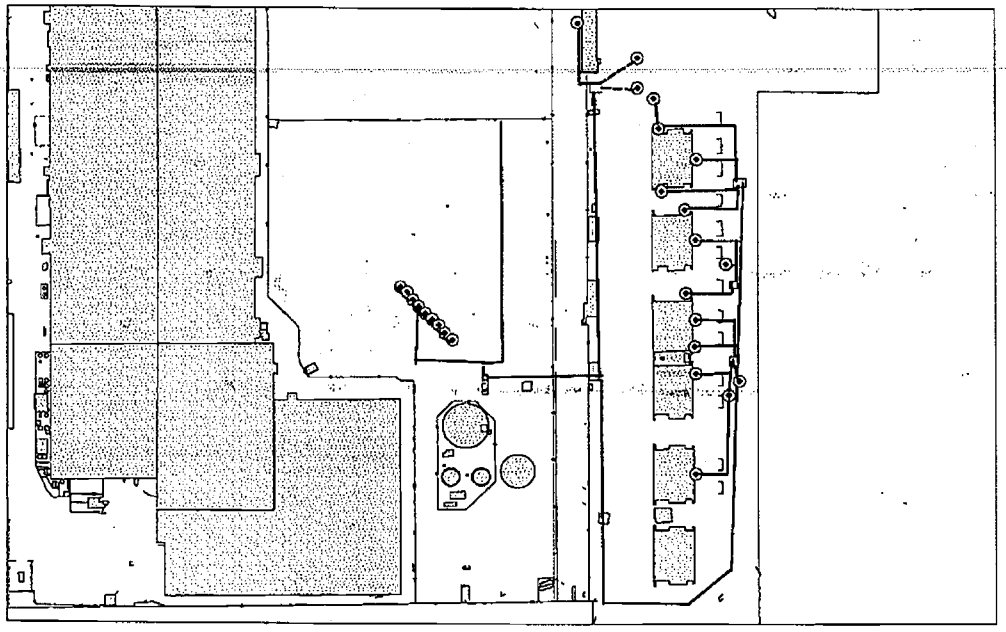
Transferring Sediment to Collection Jars



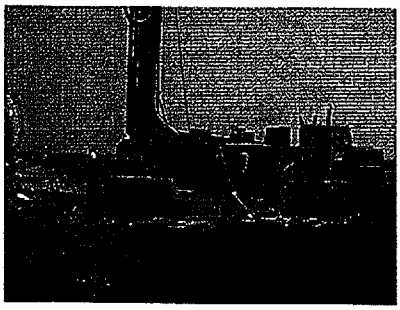


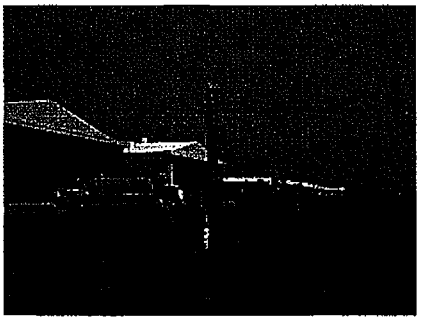
East Parking Lot Remedial Action

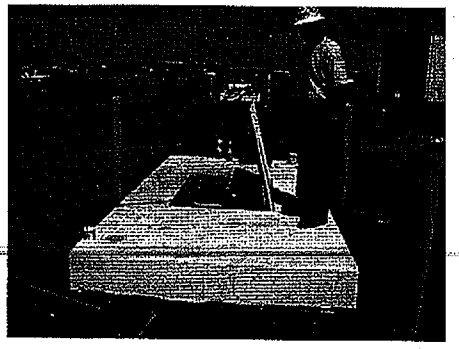
Operational ~~Dec 2000~~ March 2001

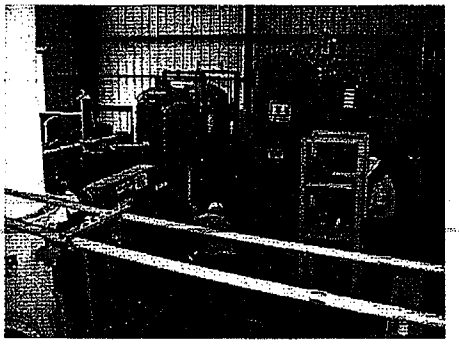


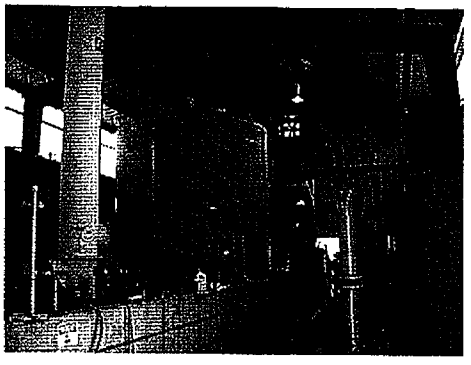
East Parking Lot Groundwater Treatment Sys.

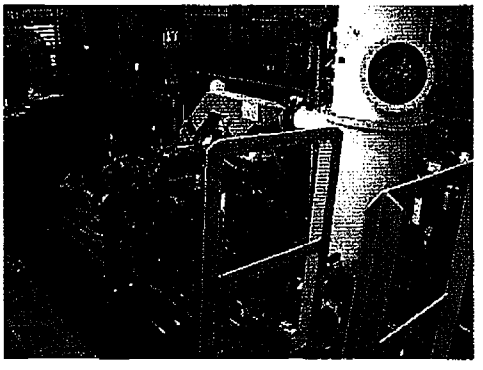


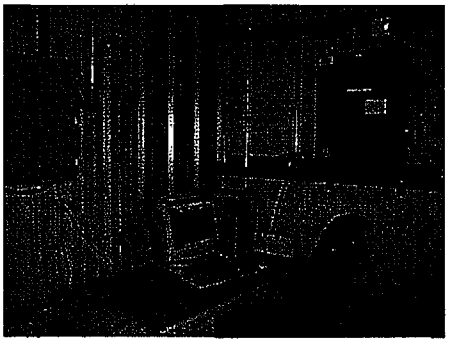


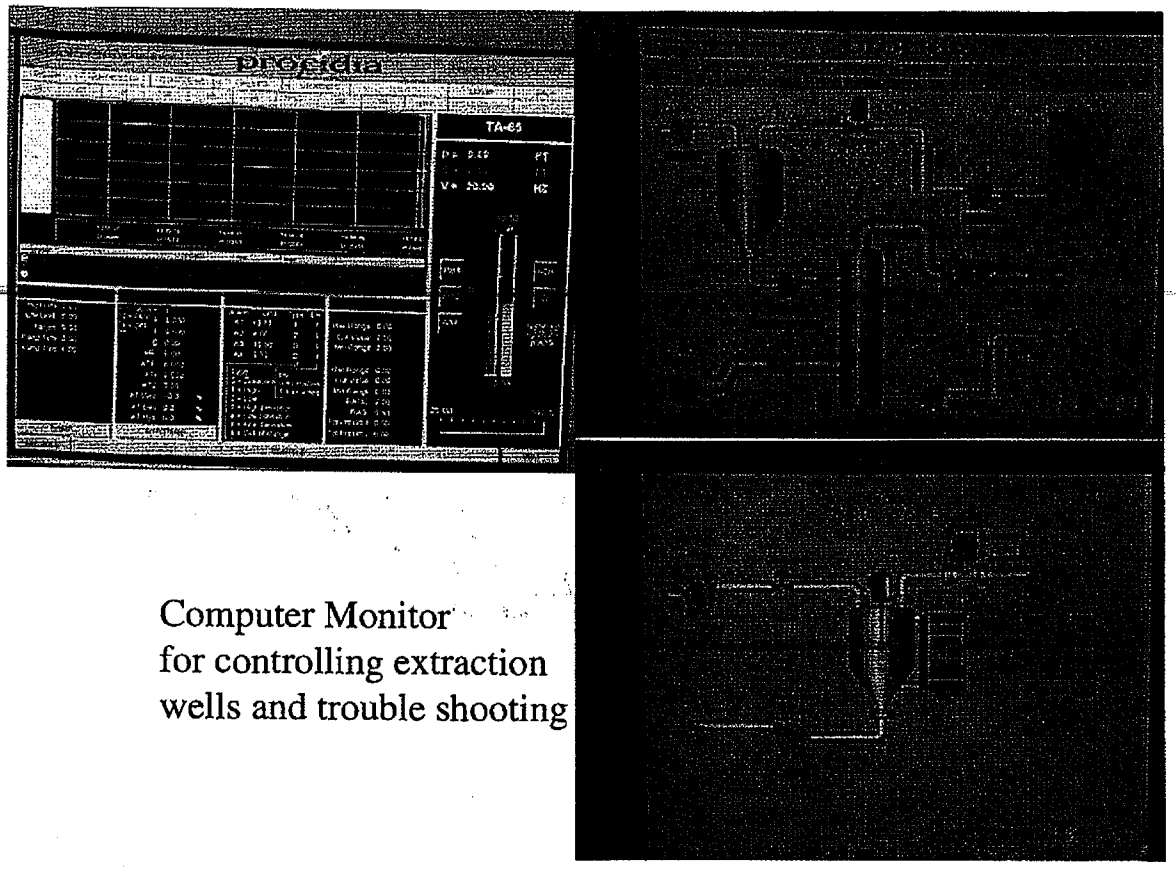






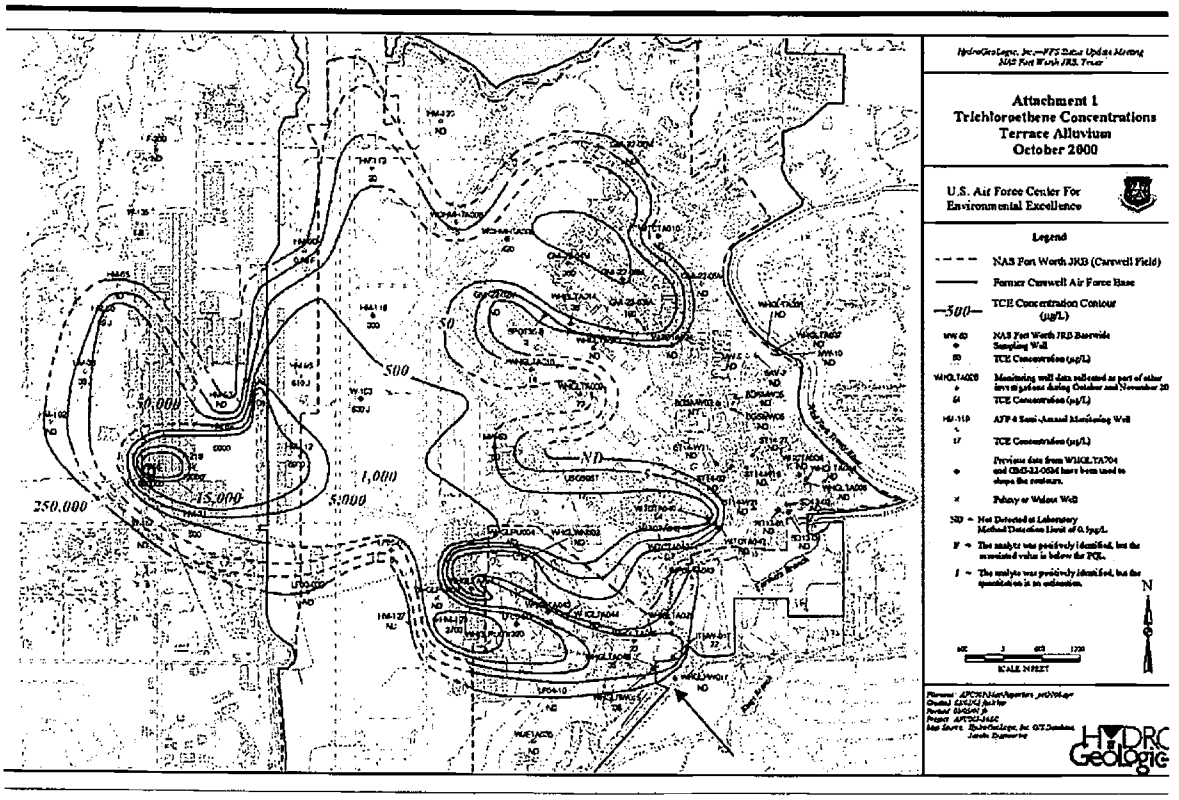


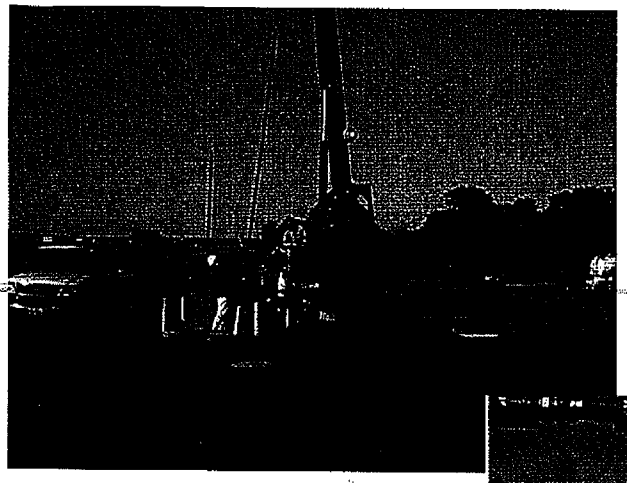




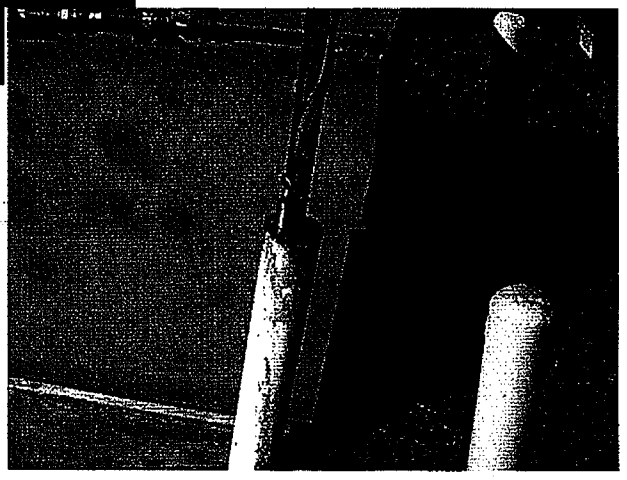
Computer Monitor for controlling extraction wells and trouble shooting

Plume Monitoring Actions

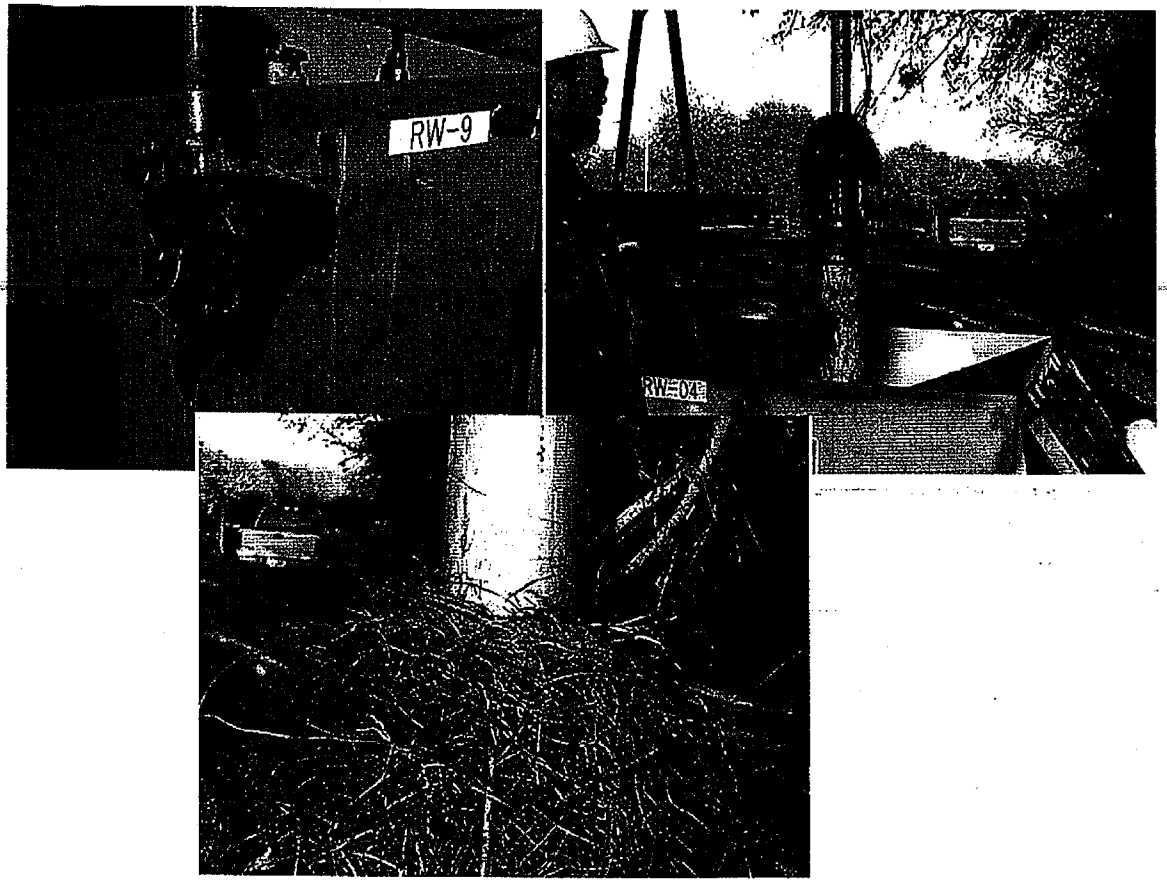


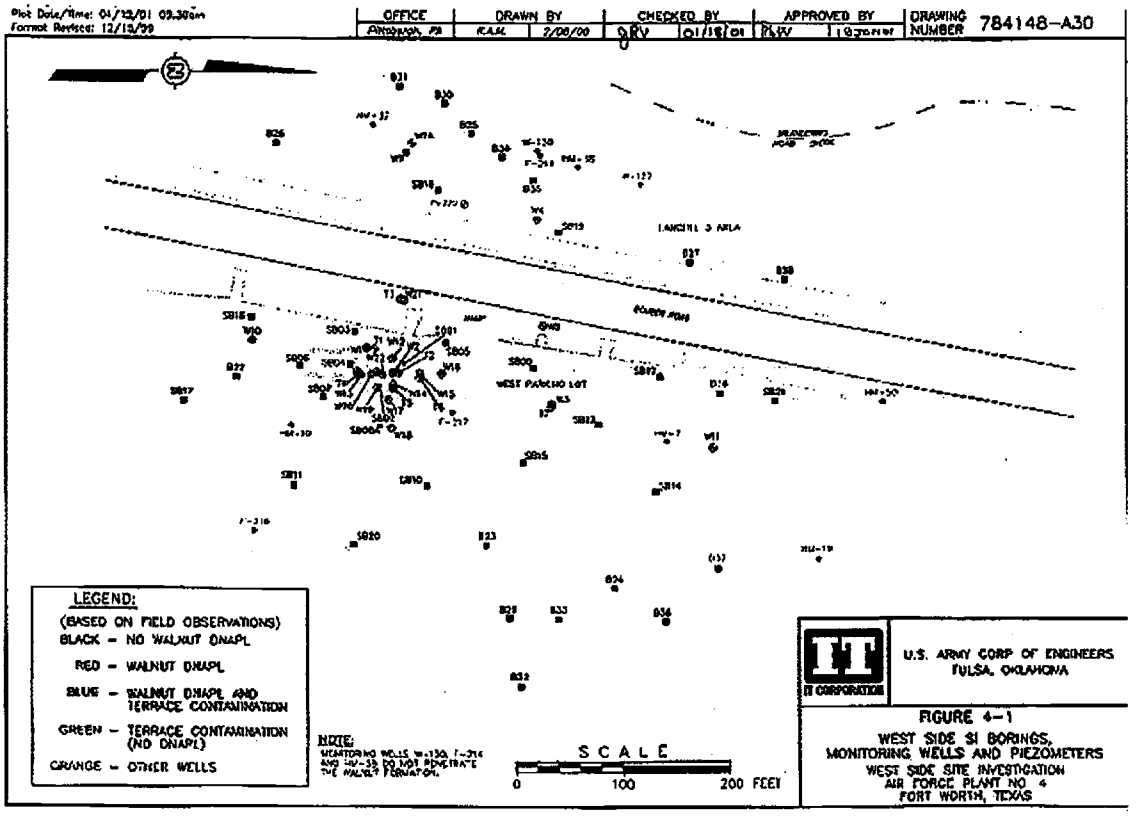


Extraction Well
Maintenance



Tree roots clogging


RW-9
RW-04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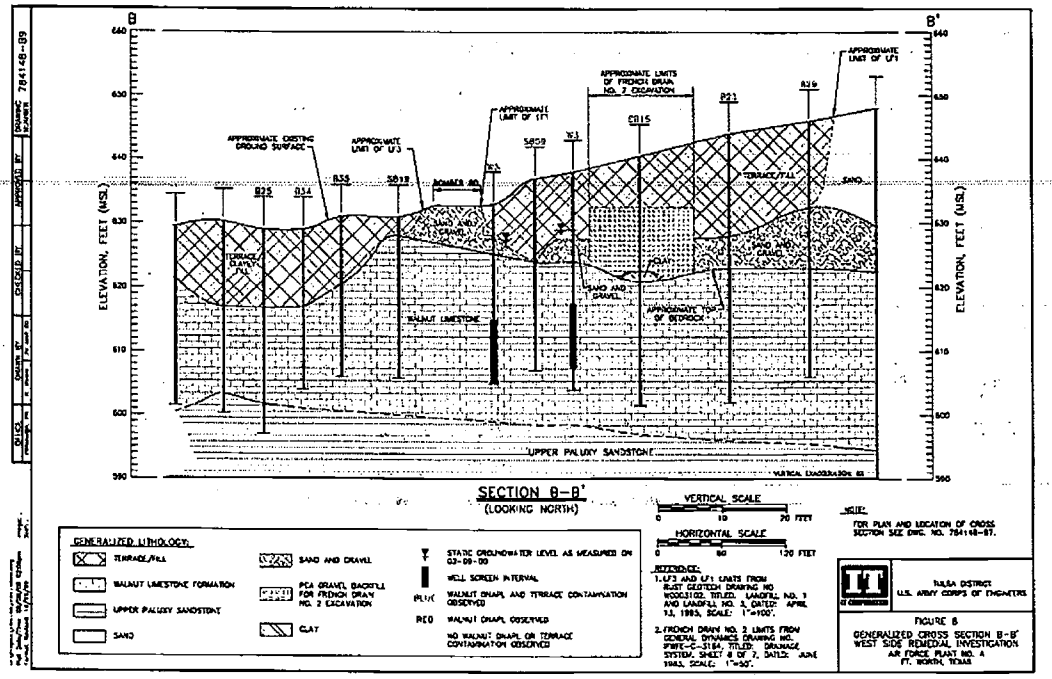
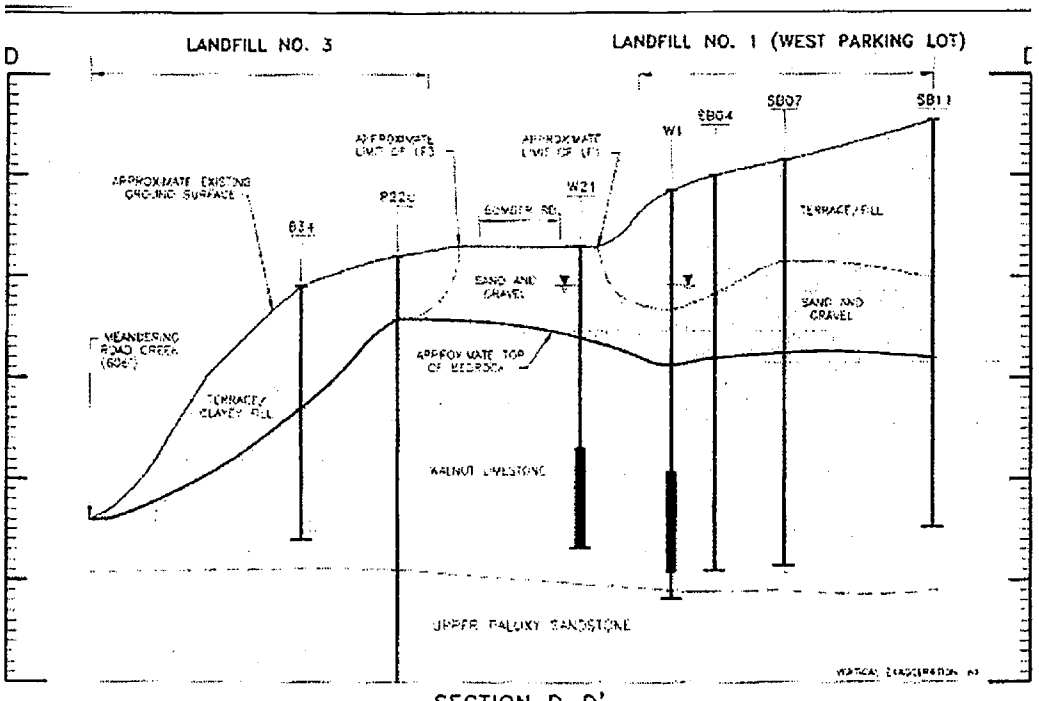
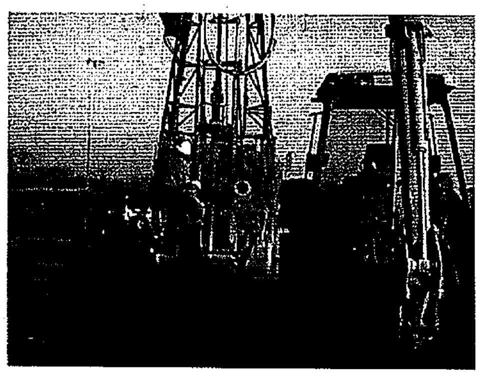
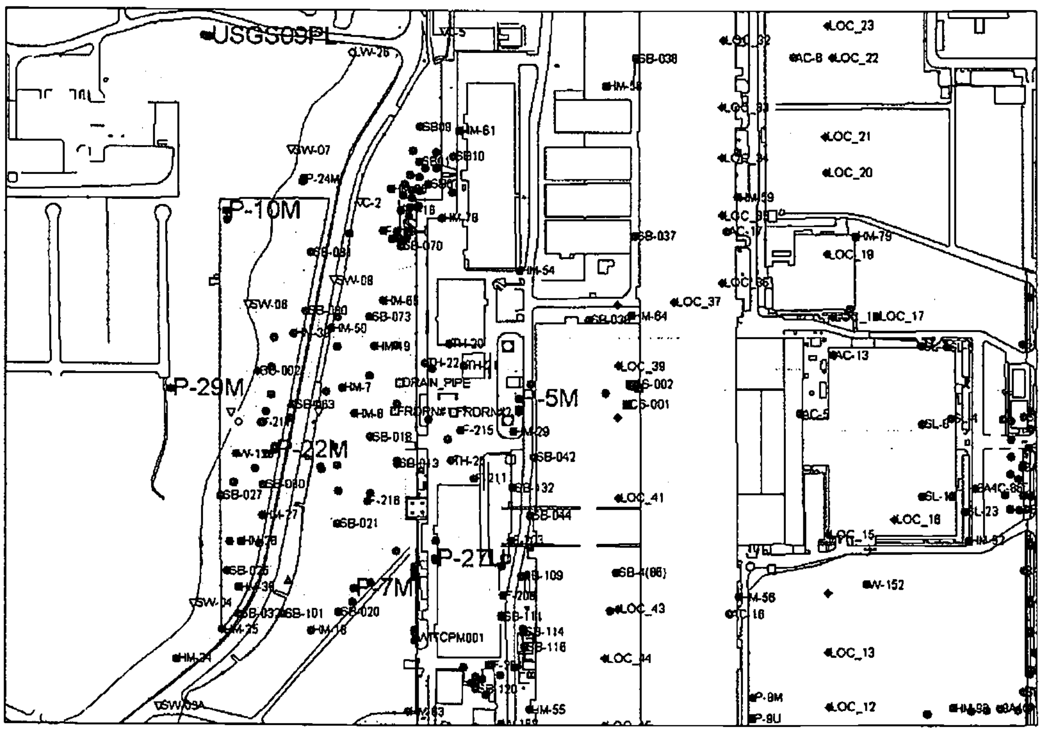
Format Revised: 12/13/99
OFFICE
DRAWN BY
CHECKED BY
APPROVED BY
DRAWING NUMBER 784148-A30
LANDFILL 3 AREA
WEST PARKING LOT
LEGEND:
(BASED ON FIELD OBSERVATIONS)
BLACK - NO WALNUT DNAPL
RED - WALNUT DNAPL
BLUE - WALNUT DNAPL AND TERRACE CONTAMINATION
GREEN - TERRACE CONTAMINATION (NO DNAPL)
ORANGE - OTHER WELLS
NOTE:
SCALE
0
100
200 FEET
IT CORPORATION
U.S. ARMY CORP OF ENGINEERS
TULSA, OKLAHOMA
FIGURE 4-1
WEST SIDE SI BORINGS, MONITORING WELLS AND PIEZOMETERS
WEST SIDE SITE INVESTIGATION
AIR FORCE PLANT NO 4
FORT WORTH, TEXAS

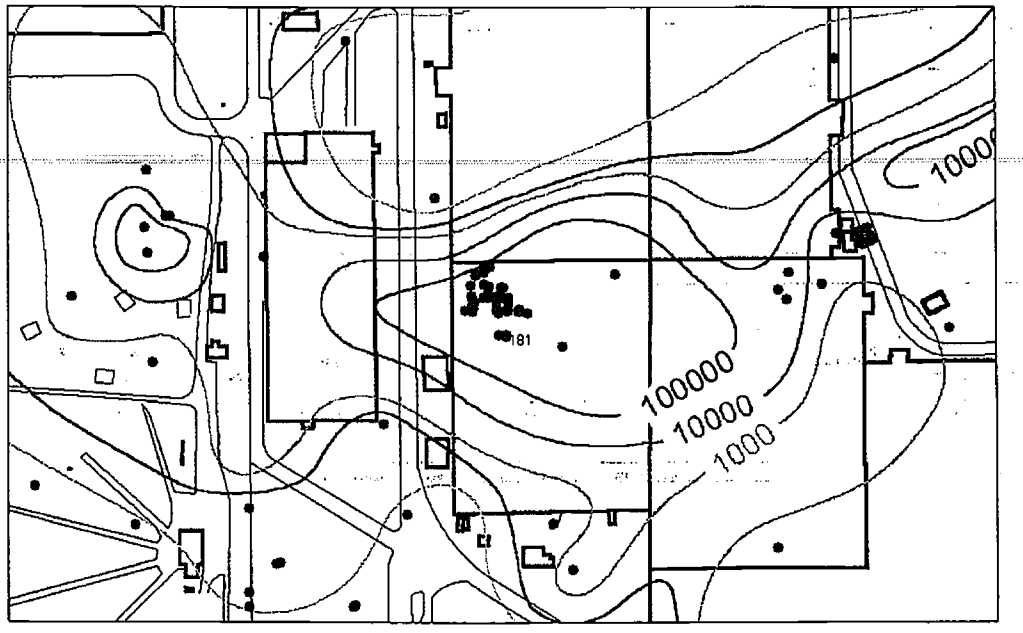

B
B'
ELEVATION, FEET (MSL)
APPROXIMATE EXISTING GROUND SURFACE
APPROXIMATE LIMIT OF LF3
APPROXIMATE LIMIT OF LF1
APPROXIMATE LIMITS OF FRENCH DRAIN NO. 2 EXCAVATION
SB25
B34
B36
SB38
SB39
W1
SB15
B21
B26
TERRACE/FILL
SAND AND GRAVEL
WALNUT LIMESTONE
APPROXIMATE TOP OF BEDROCK
UPPER PALUXY SANDSTONE
SECTION B-B'
(LOOKING NORTH)
VERTICAL SCALE
0 10 20 FEET
HORIZONTAL SCALE
0 60 120 FEET
NOTE:
FOR PLAN AND LOCATION OF CROSS SECTION SEE DWG. NO. 764148-87.
GENERALIZED LITHOLOGY:
TERRACE/FILL
WALNUT LIMESTONE FORMATION
UPPER PALUXY SANDSTONE
SAND
SAND AND GRAVEL
PEA GRAVEL BACKFILL FOR FRENCH DRAIN NO. 2 EXCAVATION
CLAY
STATIC GROUNDWATER LEVEL AS MEASURED ON 03-09-89
WELL SCREEN INTERVAL
WALNUT DRAPE AND TERRACE CONTAMINATION OBSERVED
WALNUT DRAPE OBSERVED
NO WALNUT DRAPE OR TERRACE CONTAMINATION OBSERVED
REFERENCE:
1. LF3 AND LF1 LIMITS FROM RUST GEOTECH DRAWING NO. W0053102, TITLED: LANDFILL NO. 3 AND LANDFILL NO. 1, DATED: APRIL 13, 1993, SCALE: 1"=100'.
2. FRENCH DRAIN NO. 2 LIMITS FROM GENERAL DYNAMICS DRAWING NO. FWFC-C-3184, TITLED: DRAINAGE SYSTEM, SHEET 6 OF 7, DATED: JUNE 1985, SCALE: 1"=50'.
TULSA DISTRICT
U.S. ARMY CORPS OF ENGINEERS
FIGURE 8
GENERALIZED CROSS SECTION B-B'
WEST SIDE REMEDIAL INVESTIGATION
AIR FORCE PLANT NO. 4
FT. WORTH, TEXAS


D
D'
LANDFILL NO. 3
LANDFILL NO. 1 (WEST PARKING LOT)
APPROXIMATE EXISTING GROUND SURFACE
APPROXIMATE LIMIT OF LF3
APPROXIMATE LIMIT OF LF1
B34
B22
SB04
SB07
SB11
W1
W21
SAND AND GRAVEL
TERRACE/FILL
MEANDERING ROAD CREEK (GONE)
TERRACE/ CLAYEY FILL
APPROXIMATE TOP OF BEDROCK
WALNUT LIMESTONE
UPPER PALUXY SANDSTONE
SECTION D-D'
(LOOKING NORTH)

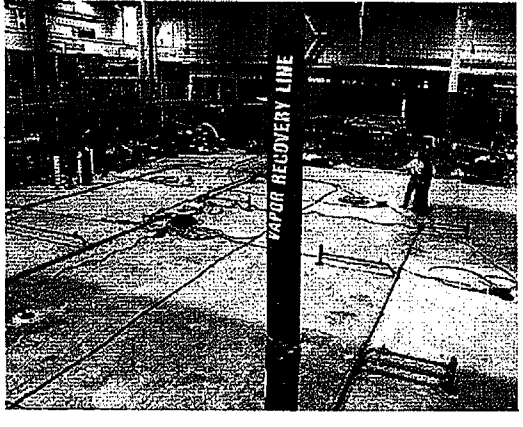


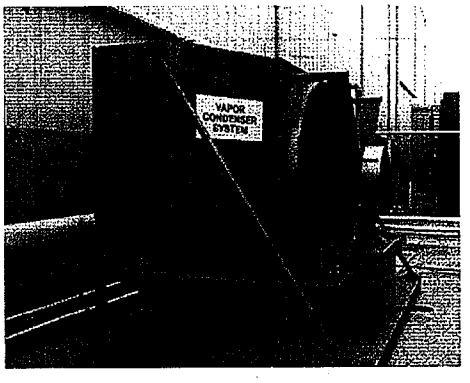

USGS09PL
P-10M
P-29M
P-22M
P-5M
P-27M
P-7M
LOC_23
LOC_22
LOC_21
LOC_20
LOC_19
LOC_17
LOC_37
LOC_39
LOC_41
LOC_43
LOC_18
LOC_13
LOC_12
DRAIN_PIPE

Building 181 Soil Vapor Extraction and SPH



Bldg 181 - Six Phase Heating Pilot study



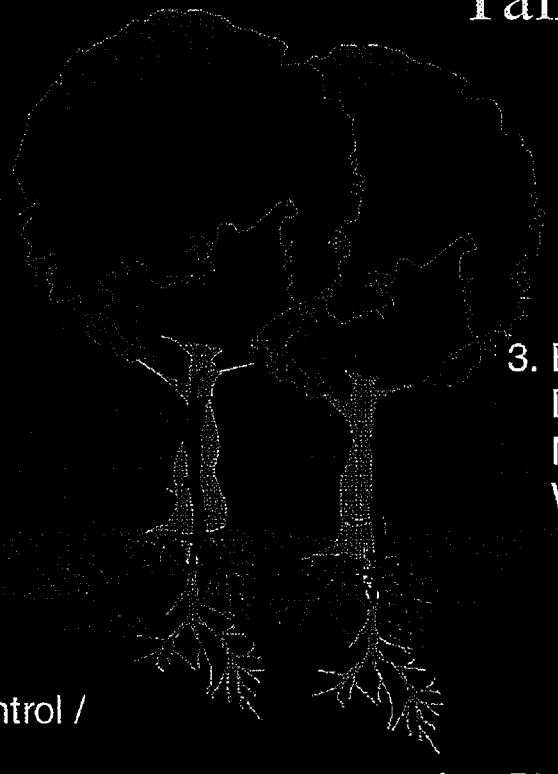


AWAIT REPORT - DUE NOW!!

Project Objective

To generate cost and performance data from field-scale investigations of the use of poplar trees to help cleanup shallow chlorinated-solvent-contaminated ground water for the purpose of technology transfer.

Talk Outline



4. Volatilization

3. Enzymatic Degradation / Mineralization Within Vegetation

1. Hydraulic Control / Influence

2. In-Situ Biodegradation

NAS Fort Worth JRB Installation Restoration Program Update

Michael R. Dodyk, P.E.

February 8, 2001

HYDRO GeoLogic INC.

Installation Restoration Program History

- Carswell AFB officially closed September 30, 1993
  - A large part of the former Carswell AFB was transferred to the Navy and renamed the NAS Fort Worth JRB.
  - Prior to complete property transfer, environmental investigations required potentially contaminated sites related to Air Force activities prior to October 1, 1993 are to be completed; and contaminated sites remediated.
  - The Air Force assigned AFCEE both management and implementation responsibility for completing the IRP on NAS Fort Worth JRB property.

HYDRO GeoLogic INC.

Regulatory and Site Overview

- Former Carswell AFB issued a RCRA Permit on February 7, 1991 (HW-50289)
  - This permit requires a RCRA Facility Investigation (RFI) of all Solid Waste Management Units (SWMUs).
  - AFCEE is investigating a total of 43 SWMUs and 13 AOCs at NAS Fort Worth JRB (11 of these 56 sites have been officially closed by the TNRCC). All other sites are at varying stages of investigation or corrective action.
  - Remaining SWMUs and AOCs include 6 landfills, 9 waste accumulation areas, 3 fire training areas, 15 oil/water separators, 3 fueling stations, a POL tank farm, and various other locations.

HYDRO GeoLogic Inc

Investigation Update - Landfills

- Phase III field work completed in June 2000 at Landfills 1, 2, 3, 6, 7, and 9.
  - Additional field work began last month and is ongoing.
- Landfill RFI Reports planned for submittal to AFCEE this year, pending successful completion of delineation activities.

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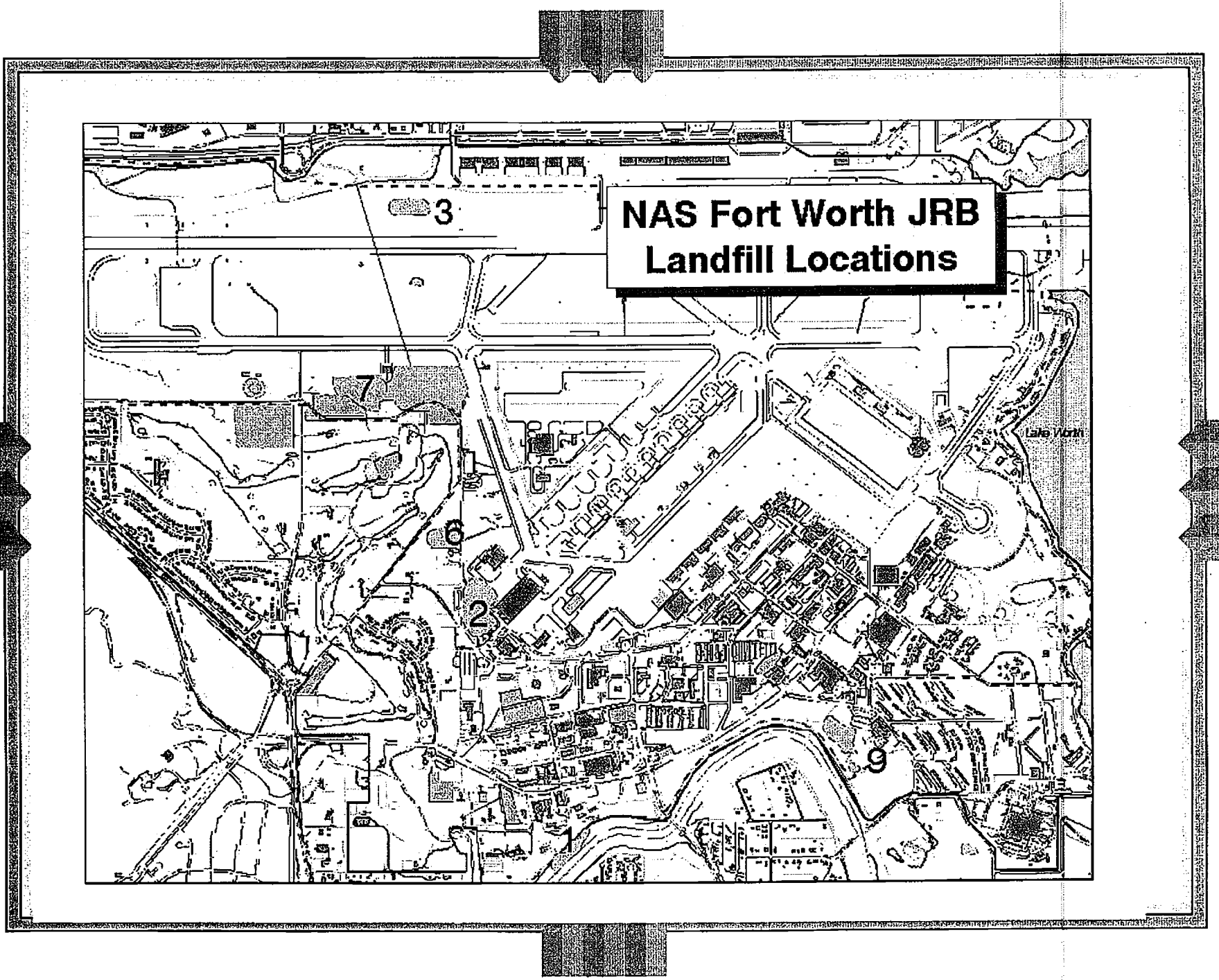
NAS Fort Worth JRB
Landfill Locations
3
7
6
2
1
9
Lake Worth

Investigation Update
Waste Accumulation Areas (WAAs)

- TNRCC approved the RFI Report recommending no further action for 7 WAAs in November 2000.
- Phase II soil and initial groundwater sampling for 9 WAAs completed in June 2000. Second round of groundwater sampling completed in October 2000.
  - Based on these sampling results, 4 WAA sites to be submitted for closure; the 5 remaining sites require additional field work to be conducted in 2001.

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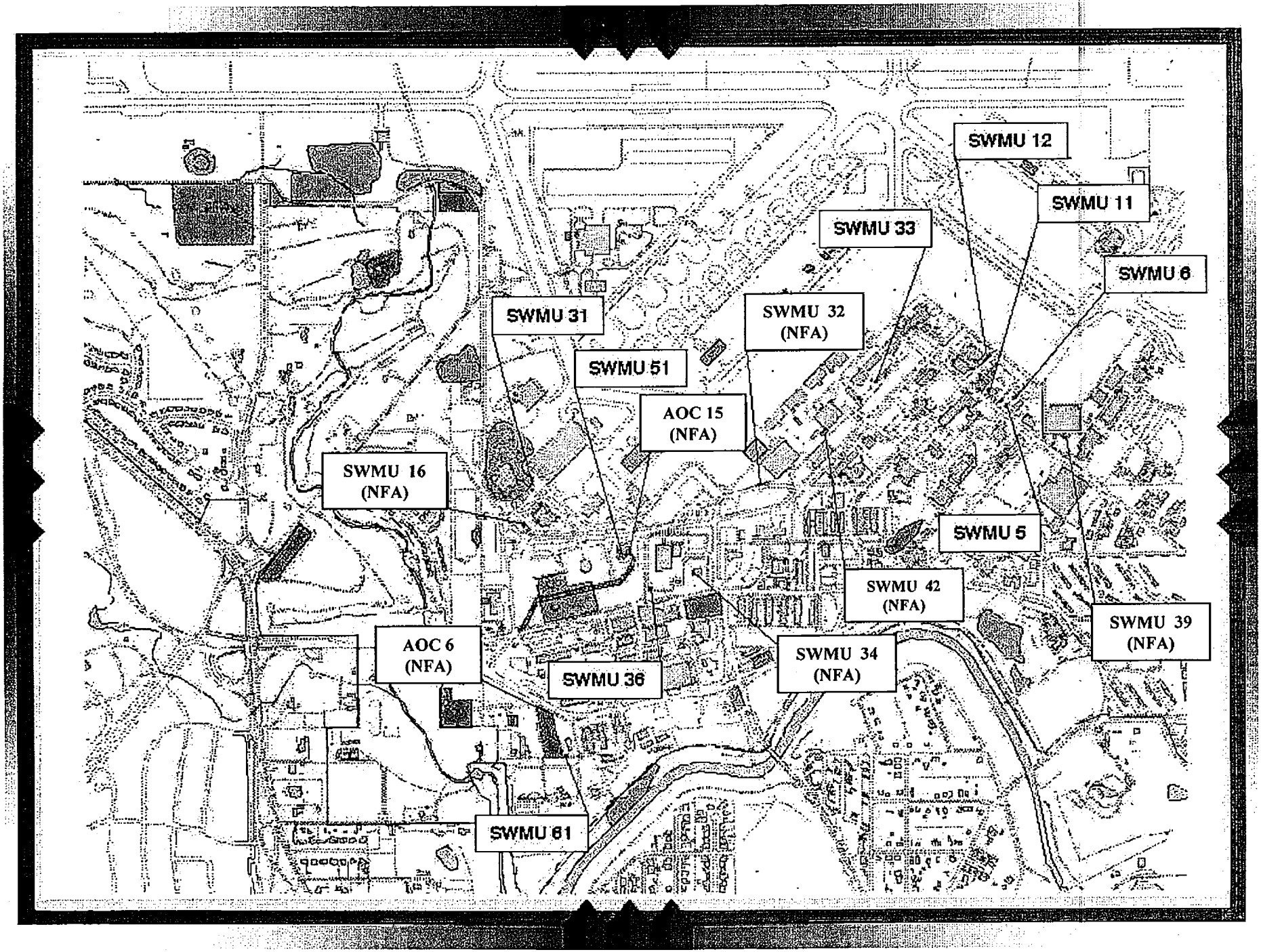
SWMU 12
SWMU 11
SWMU 33
SWMU 6
SWMU 31
SWMU 32
(NFA)
SWMU 51
AOC 15
(NFA)
SWMU 16
(NFA)
SWMU 5
SWMU 42
(NFA)
SWMU 39
(NFA)
AOC 6
(NFA)
SWMU 34
(NFA)
SWMU 36
SWMU 61

SWMUs 19, 20, 21, and AOC 19

- Initial field investigations were completed in June at these sites:
  - SWMUs 19, 20, and 21--Former Fire Training Area 2
  - SWMU 53--Storm water drainage system
  - AOC 19--Suspected former fire training area
- Field Investigation results indicate additional sampling is necessary at each of these sites.
- Phase II field work began this month and is ongoing.

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AOCs 17 and 18 Site Investigation

- Initial field investigations were completed in June 2000 at these sites:
  - AOC 17--Suspected former landfill
  - AOC 18 --Suspected former fire training area
- Field work activities included a geophysical survey and soil sampling.
- Field investigation results indicate that a release from these units has not occurred. RFI Report recommending closure was submitted to TNRCC in December 2000.

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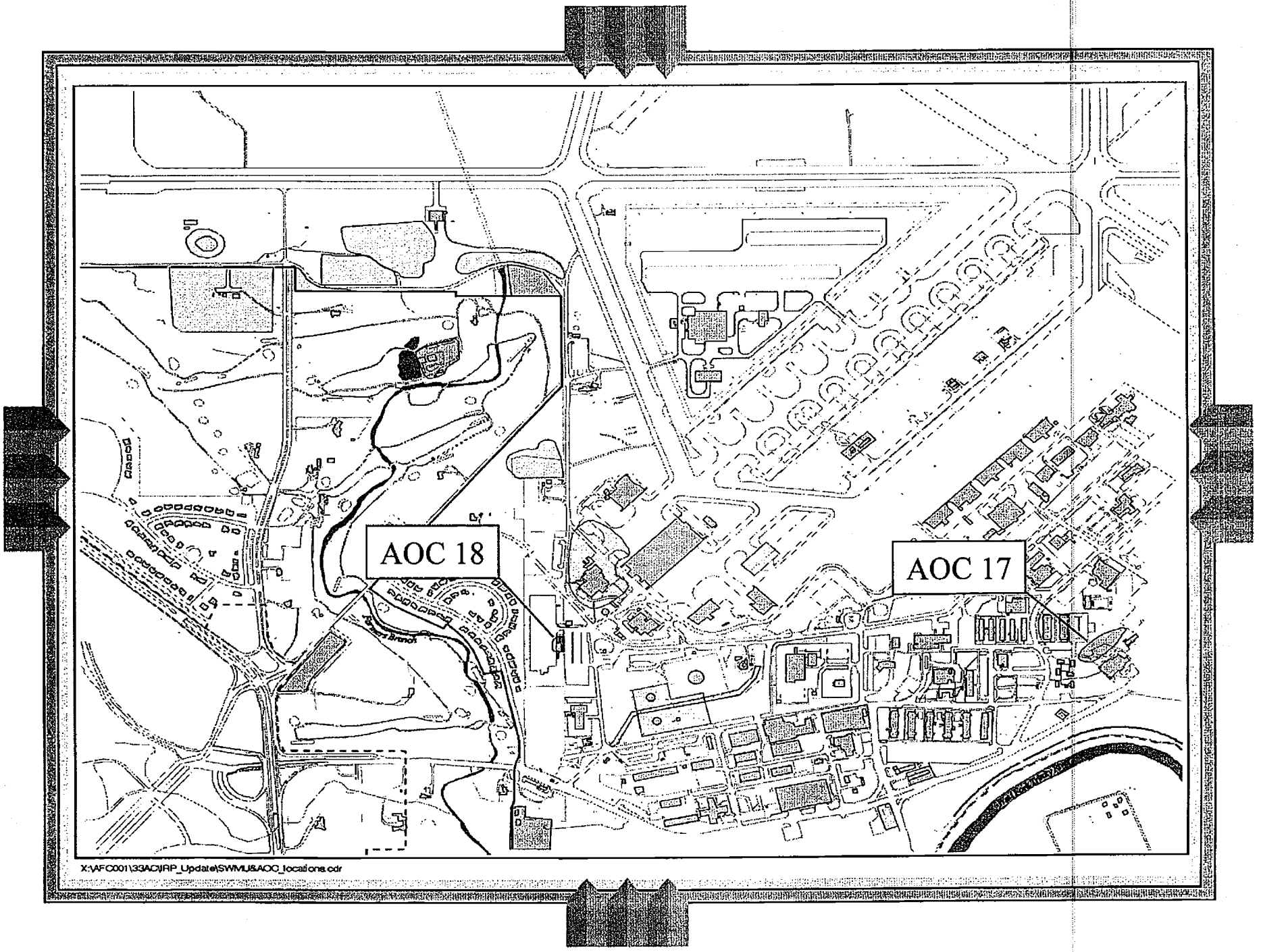
AOC 18
AOC 17
X:\AFC001\33AC\IRP_Update\SWMU&AOC_locations.cdr

Underground Storage Tank (UST) Investigation

- Additional soil and /or groundwater sampling was completed at 6 USTs in 2000. An Investigation Summary for 3 of the 6 USTs will be submitted to the TNRCC in February 2001. A Release Determination Report form for the other 3 USTs will be submitted to the TNRCC in March 2001.

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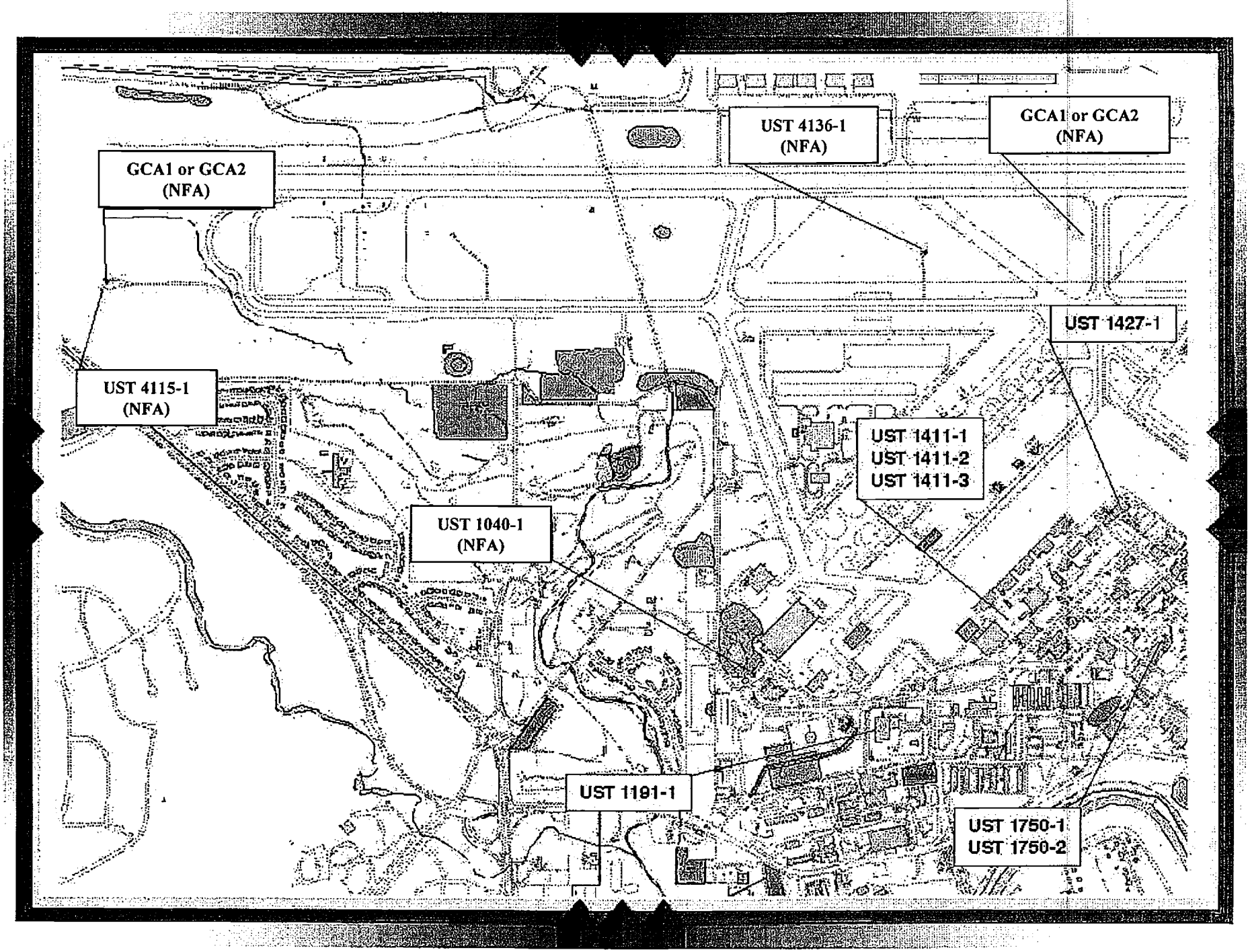
GCA1 or GCA2
(NFA)
UST 4136-1
(NFA)
GCA1 or GCA2
(NFA)
UST 1427-1
UST 4115-1
(NFA)
UST 1411-1
UST 1411-2
UST 1411-3
UST 1040-1
(NFA)
UST 1191-1
UST 1750-1
UST 1750-2

UST Investigation (cont.)

- AOC 1, Former Base Service/Gas Station
  - Semi-annual groundwater sampling was performed in 2000.
  - A 2000 Annual Groundwater Monitoring Report will be submitted to the TNRCC in April 2001.
  - Groundwater monitoring will continue on a quarterly basis in 2001 and a Plan B Evaluation will be prepared.
- SWMU 68, POL Tank Farm, and AOC 7, Former Base Refueling Area
  - Semi-annual groundwater sampling was performed in 2000.
  - An Annual Groundwater Monitoring Report for 2000 will be submitted to the TNRCC with a Site Closure Request form in March 2001.
- AOC 4, Former Fuel Hydrant System
  - Semi-annual groundwater sampling was performed in 2000.
  - An Annual Groundwater Monitoring Report for 2000 will be submitted to the TNRCC with a Site Closure Request form in March 2001.

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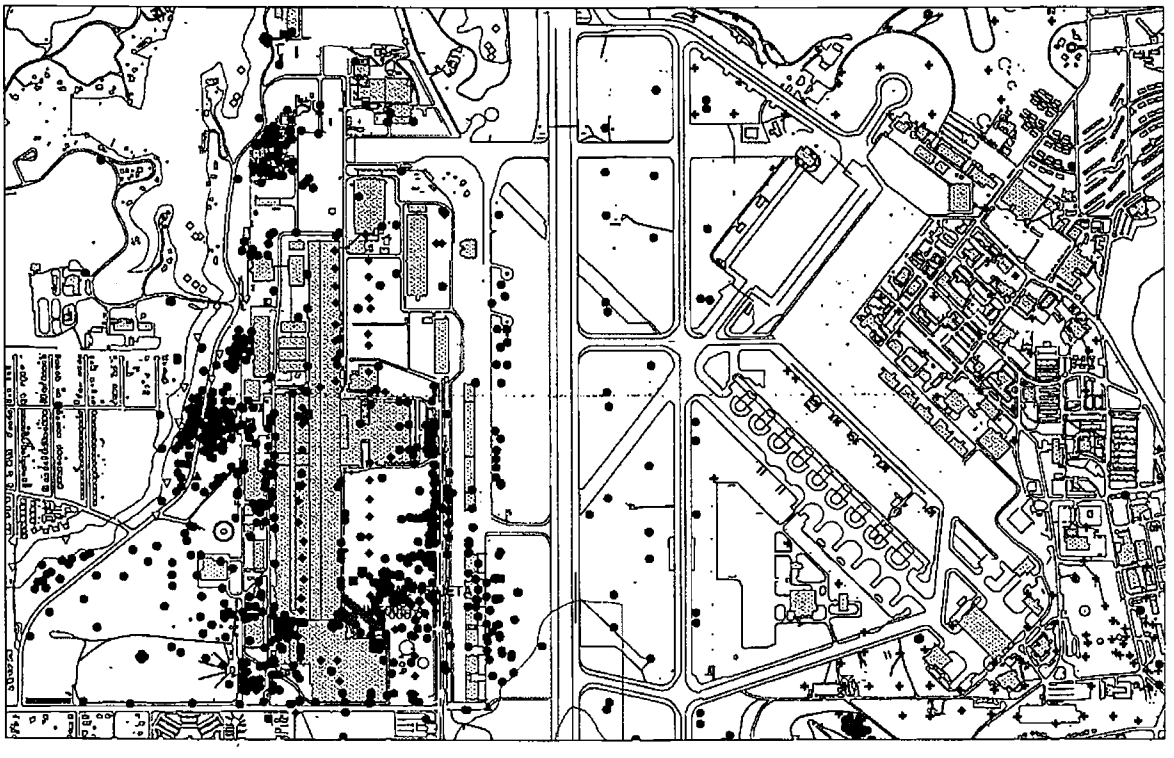
Soil sampling for excavation work at Landfill 9, November 2001

Upcoming Field Work

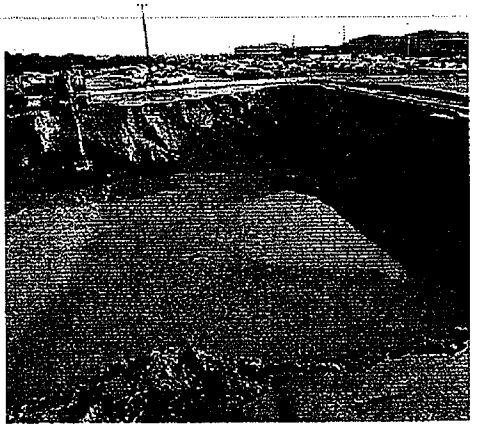
- **This Month:**
  - Completion of the Interim Remedial Actions to remove soil "hot spots" at various Landfills and Waste Accumulation Areas.
- **Next Month:**
  - Installation of additional monitoring wells at SWMUs 19, 20 and 21, Former Fire Training Area No. 2.
- **Early Next Year:**
  - Installation of the permeable reactive barrier for southern lobe of the TCE plume, scheduled to begin in January 2002.

In the Beginning! Drill lots of holes! (of course, these are over 20 yrs)



In the Beginning, continued!

Dig first, ask questions (learn more) later! Now it is NIMBY!



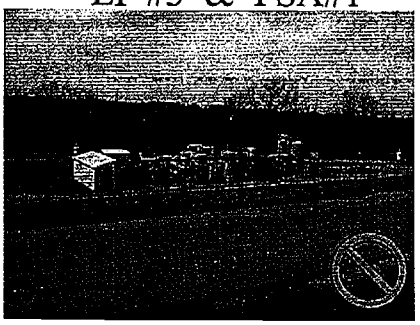
11,000 cu/yds removed in 1983 from Landfill #1

In the Beginning, continued!

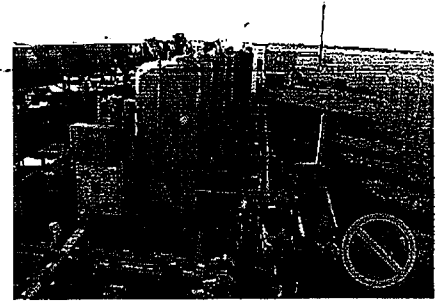
Interim Actions! Building one of a kind treatment systems to prevent migration and exposure! $$$$

- Fewer contractors, not as much competition!
- Migration, fate and transport not well understood!

LF #3 & FSA#1

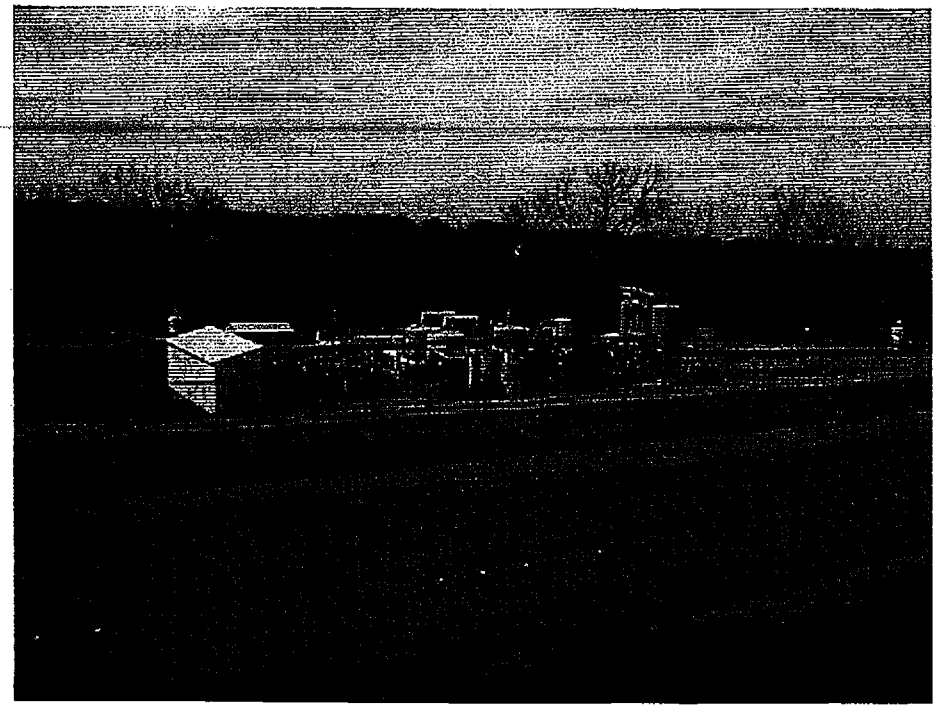


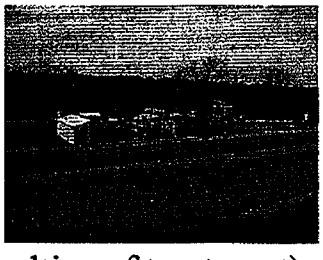
Carswell LF 4/5



Today! Better understanding of migration, toxicity, risk assessment and more contractors!

Remedial Process Optimization Study!





Remedial Process Optimization Study!
- Now required AF (maybe DOD) wide

Concept:

Effectiveness of System (technical difficulties of treatment)
- Goals for treatment, are they realistic.
- Are you getting there!

Efficiency (given long-term O&M Costs!)

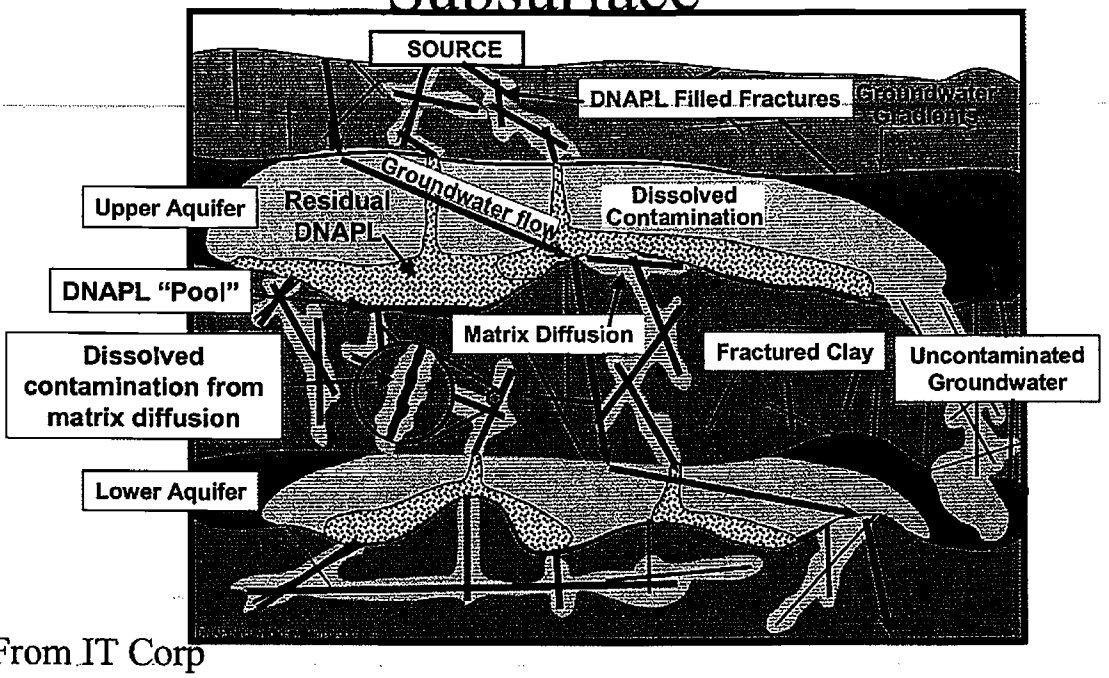
Landfill #3

- High cost, voluntary action by AF.
- No goals for when to operate, when not to!
- Technical difficulties with DNAPL (and fractures too!)

Bottom Line! System turned off, will monitor seeps and surface water, assess future actions.

- Expert consortium to consider site for future study! Proposal submitted.

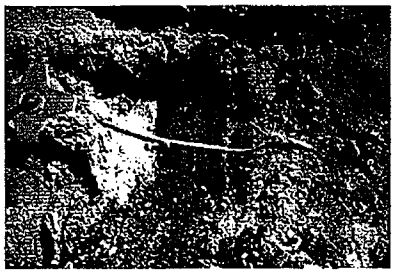
DNAPL Behavior in the Subsurface

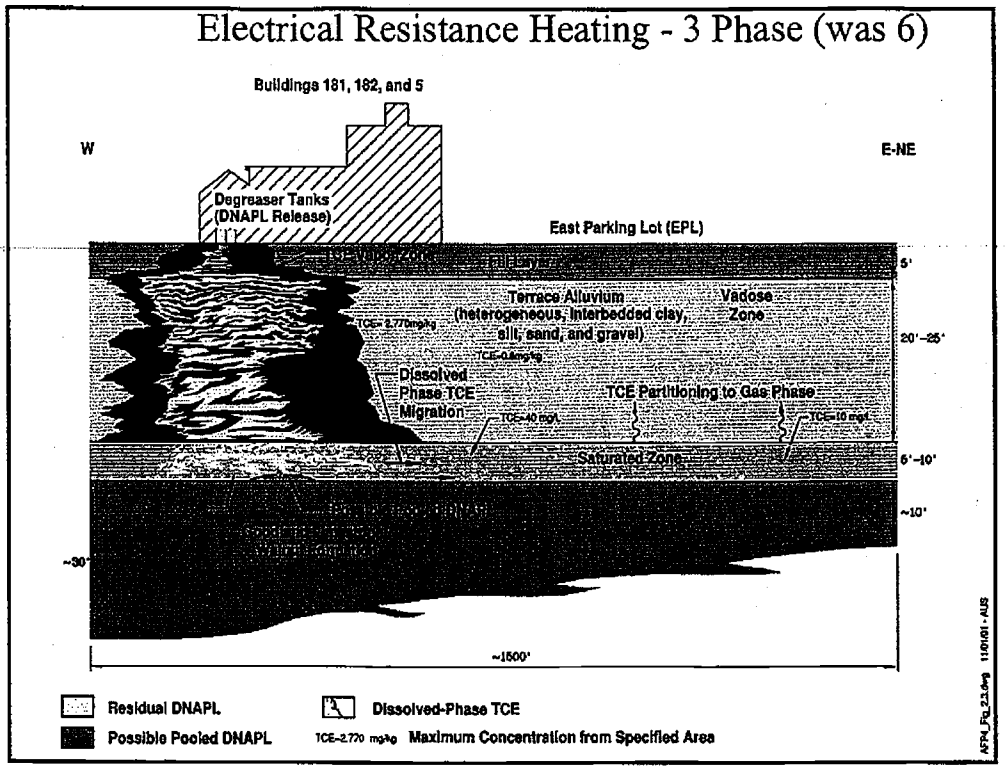


From IT Corp

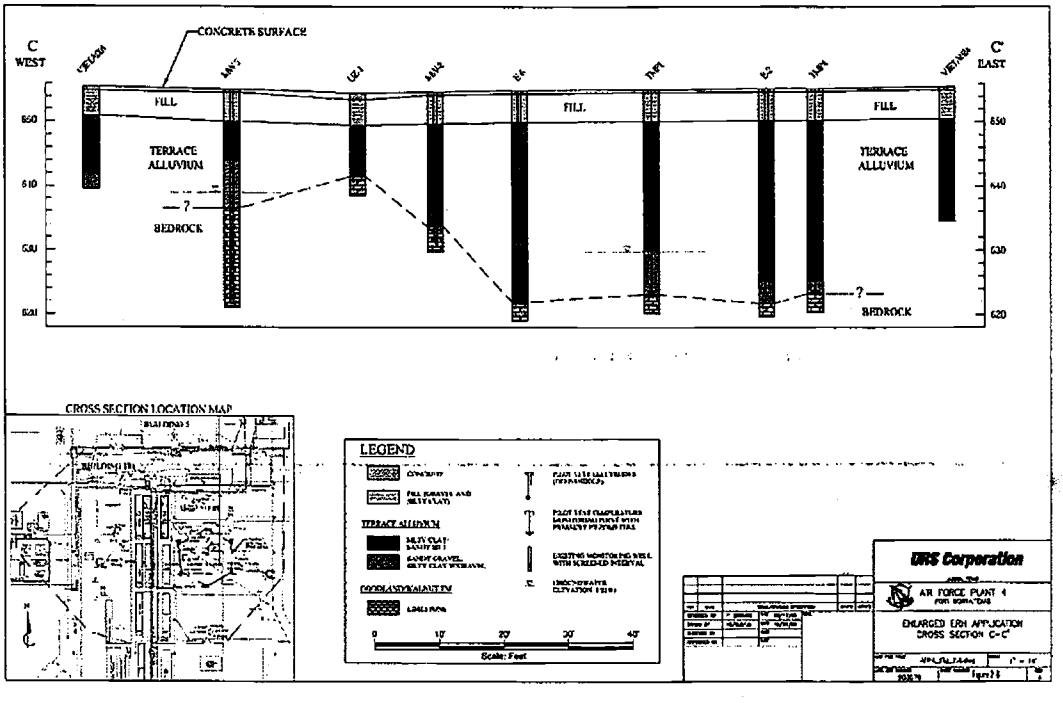
LF4/5 treatment system to be turned off as Permeable Reactive Barrier wall is installed in March/April 2002, and we will assess the reduction in plume concentrations. Over 1000' long, ~25"deep!

Installation of Permeable Reactive Barrier

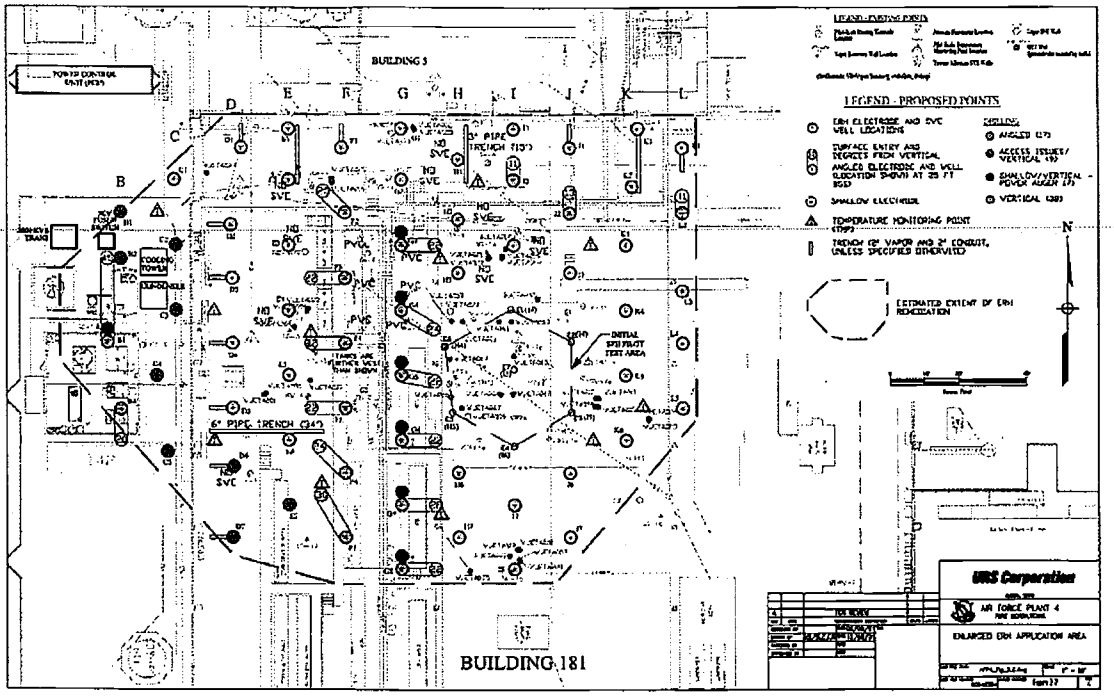




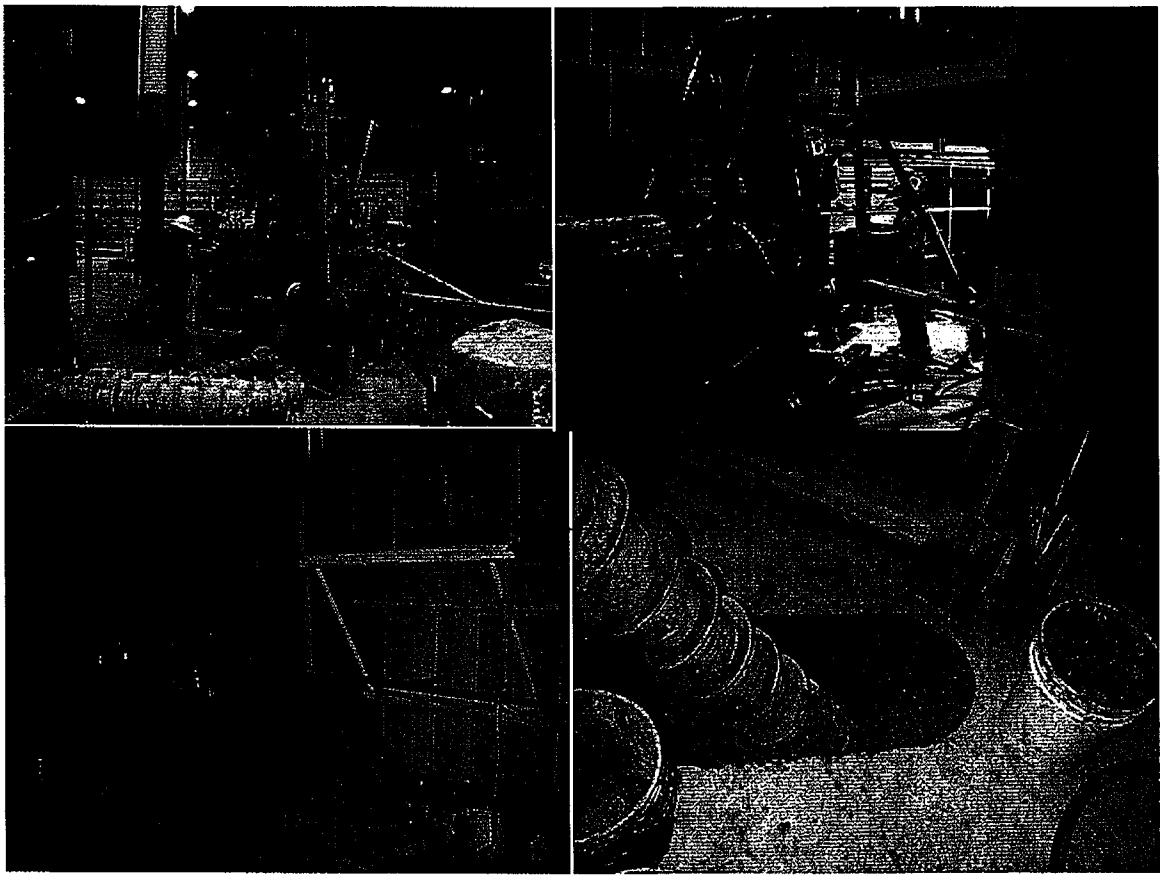
Building 181 and EPL Conceptual Site Model



Enlarged ERH Application Cross Section C-C'



Enlarged ERH Application Area



Web sites of Environmental Interest!

(does not imply an endorsement by the US GOV'T or suggest we will use their technology in the future!)

Electrical Resistance Heating - www.thermalrs.com

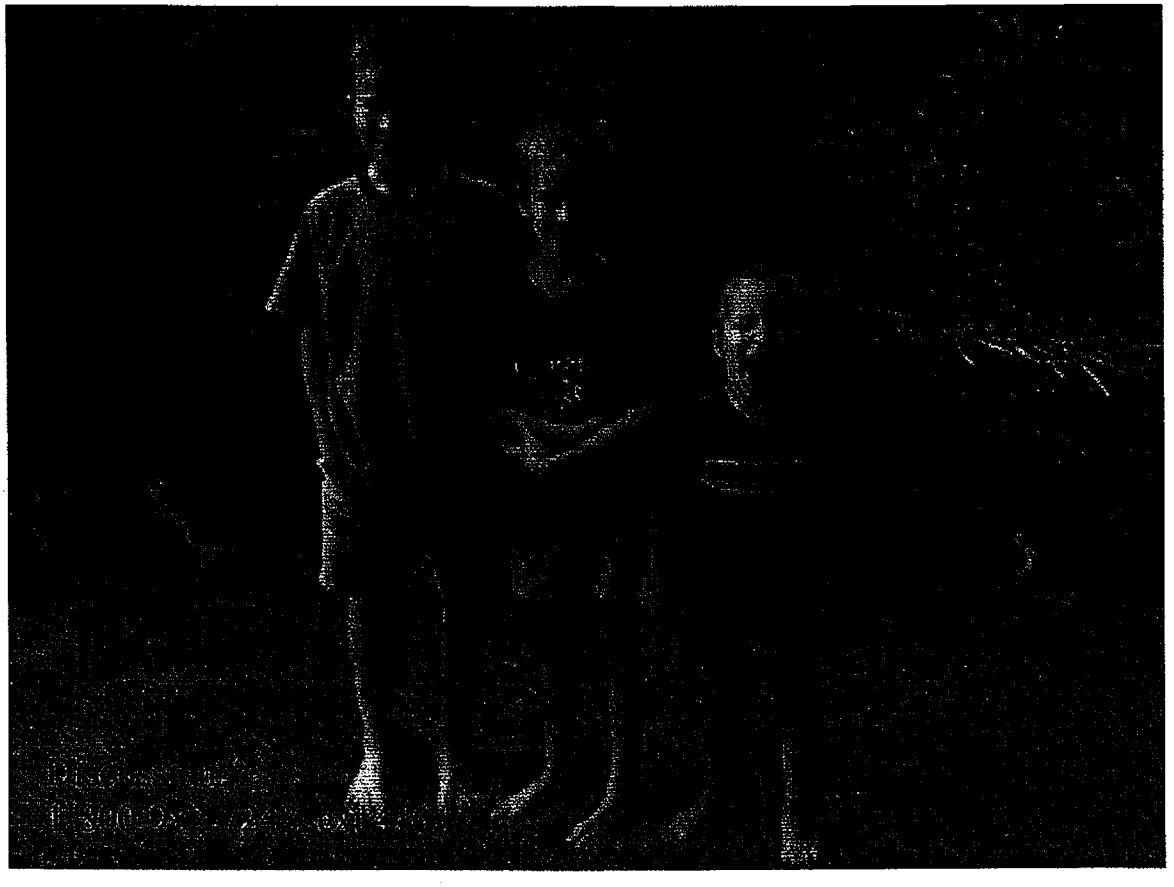
Hydrogen Release Compound - www.regenesis.com

Free Environmental Software - www.ehsfreeware.com

Public Health Assessment AFP 4 - www.atsdr.cdc.gov/HAC/PHA/afp/afp_p2.html

Air Force Museum - www.asc.wpafb.af.mil/museum/

FY02 Budget is IN! Now to start working on FY03. Any Ideas?



U.S. Department of the Interior
U.S. Geological Survey

Water-Quality Trends Using Sediment Cores from White Rock Lake, Dallas, Texas

Introduction

The U.S. Geological Survey National Water-Quality Assessment (NAWQA) Program has three objectives, one of which is "to define trends (or lack of trends) in water quality" (Leahy and others, 1990). Water-quality trends are of interest for at least three reasons: First, trends can improve our understanding of the influence of human activities on water-quality conditions; second, trends can indicate the effectiveness of environmental regulations; and third, trends can provide a warning of additional degradation of water quality in the future. A common approach for determining water-quality trends in streams is to apply statistical tests to historical data; however, historical water-quality data have several limitations. These include lack of data, inconsistent sampling and analytical methods, numerous measurements below detection levels, and questionable accuracy. If historical data are lacking or are inappropriate for statistical trend testing, water-quality records can be partly reconstructed using sediment cores from receiving water bodies such as reservoirs.

The purpose of this fact sheet is to summarize the principal findings documented in a report on water-quality trends in White Rock Creek Basin using dated sediment cores from White Rock Lake (Van Metre and Callender, in press). The study used dated sediment cores to reconstruct water-quality conditions. More specifically, the changes in water quality associated with the watershed's change from agricultural to urban land use and with the implementation of environmental regulations were identified.

Setting

White Rock Lake (fig. 1) is located on White Rock Creek, which is in the northeastern part of Dallas, Tex. White Rock Creek flows approximately south and is a tributary to the Trinity River. The reservoir was constructed in 1912 for water supply and was used for this purpose until 1964. Since then, it has been used primarily for recreation. The original capacity of White Rock Lake was 18,000 acre-feet, but sedimentation had reduced the capacity to 9,000 acre-feet by 1994. The lake has a drainage area of about 100 square miles and an original surface area of 2.0 square miles at normal pool elevation. Parts of White Rock Lake have been dredged four times in its history, most recently in 1974.

The White Rock Creek watershed in 1990 was dominated by urban land use (fig. 2). When White Rock Lake was constructed, land use in the watershed was dominated by agriculture, as can be inferred from a 1920 Soil Conservation Service map (fig. 3). During the agricultural era that ended in the mid-1950s, soil-conservation practices were uncommon; so, by the late-1930s, soil erosion had adversely affected more than 90 percent of the watershed. Intensive growth in population and the associated shift in land use followed World War II (fig. 4).

Figure 1. White Rock Lake, downtown Dallas, and Trinity River, Sept. 25, 1991. In the foreground, sediment-laden water from the previous day's rain is concentrated in the pre-reservoir stream channel and diffuses through the shallow zones to the sides. The boundary separating the sediment-laden water and the clear water in the lower one-half of the lake is believed to be caused by a difference in density related to water-temperature differences between lake water and stream water.

Sediment is washed off the land surface into streams during rain storms. Much of it is deposited in White Rock Lake. Over time, sediments have accumulated to form a thick layer on the bottom of White Rock Lake (more than 8 feet thick in the deepest part of the lake).

The chemistry of discrete slices of the sediment can provide historical information on water-quality conditions (Charles and Hites, 1987) just as tree rings can provide insight to historical climatic conditions.

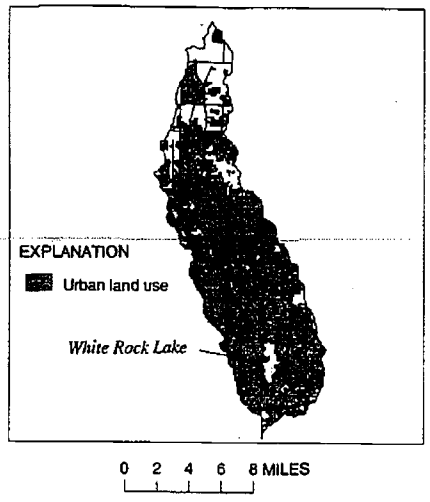


Figure 2. A 1990 land-use map of White Rock Creek Basin prepared by the North Central Texas Council of Governments.

Collecting and Analyzing Sediment Cores

Cores penetrating the whole sequence of reservoir sediment (fig. 5) were collected in July 1994 approximately 0.25 mile north of the dam and in the prereservoir flood plain west of the old White Rock Creek streambed. The sediment cores were collected by a gravity corer and a box corer from a custom-built coring boat. The boat is a 24-foot aluminum-decked pontoon boat with a 15-foot A-frame extending over a cut-out in the front deck. The coring tools are lowered and raised with a hydraulic winch. The gravity corer is 2.5 inches in diameter and can take cores as long as 13 feet. The box corer is 6 inches square and 8 inches tall.

Several cores had to be collected to provide sufficient material for the laboratory analyses. One core was split and its physical characteristics were described on site (fig. 6). Discrete horizontal slices of sediment cores were analyzed for organochlorine insecticides and industrial compounds, cesium-137, major and minor elements, grain size, diatoms, and pollen.

Age Dating

The top of the core was assigned the sampling date (July 1994), and the bottom of the lake sediments was assigned the reservoir construction date (1912). The sediments deposited during 1952–64 were identified by concentrations of radioactive cesium-137, which is a by-product of nuclear weapons testing. Measurable concentrations of this isotope first appeared in the atmosphere in about 1952, with the advent of large-scale weapons testing, and peaked during 1963–64 (fig. 7).

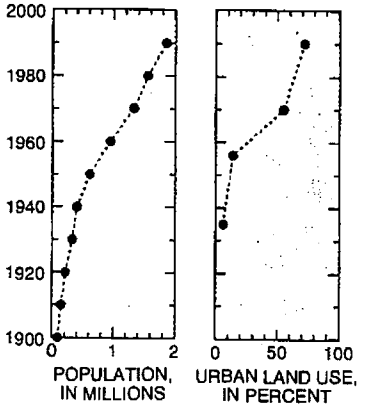


Figure 4. Population in Dallas County and percent urban land use in White Rock Creek watershed.

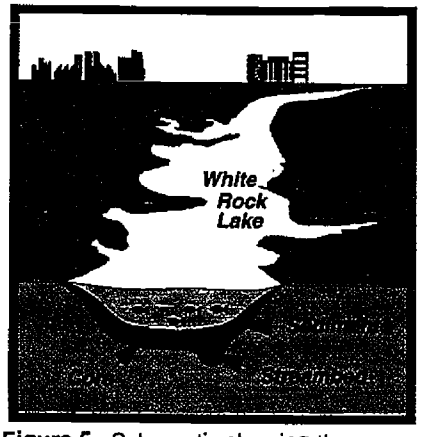


Figure 5. Schematic showing the accumulation of sediment on the bottom of White Rock Lake.

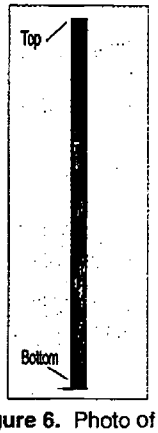


Figure 6. Photo of a sediment core that has been split and readied for sampling.

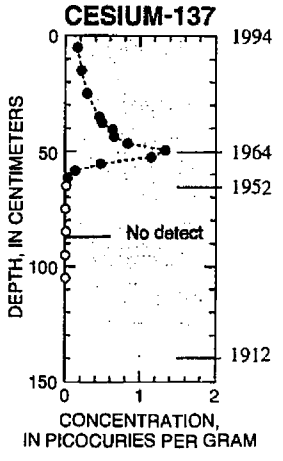


Figure 7. Cesium-137 was used for age dating.

Figure 3. A 1920 map prepared by the U.S. Department of Agriculture, Soil Conservation Service. (Shaded areas indicate riparian vegetation.)

Sedimentation

A change in erosional processes coinciding with urban development is indicated by decreasing sedimentation rates, decreasing vertical variations in particle size, and changes in concentrations of major elements. Using measured porosities and an assumed density of solids of 2.5 grams per cubic centimeter, average sedimentation rates are 1.1, 0.66, and 0.76 grams per square centimeter per year for the periods 1912–52, 1953–63, and 1964–94, respectively. Sedimentation rates and major element concentrations suggest (1) rapid, episodic soil erosion during the agricultural land-use era (1912 to mid-1950s), which is indicated by higher sedimentation rates, generally lower concentrations of calcium, higher concentrations of aluminum, and larger variability in major-ion concentrations and clay content; and (2) a reduction in soil erosion since the onset of urbanization in the mid-1950s, with newer sediments containing progressively less clay, which correlates with a decrease in aluminum and an increase in calcium.

Trace Elements

Concentrations of three trace elements (arsenic, lead, and zinc) were normalized with respect to aluminum by dividing concentration of the element by the concentration of aluminum. Because aluminum is a major element of rock-forming minerals, normalization "corrects" trace metal data for variations in geologic source and allows the highlighting of concentrations that might be related to human activities.

After remaining relatively constant from 1912 to about 1952, normalized concentrations of arsenic, lead, and zinc began to increase (fig. 8). From 1952 to 1994, normalized arsenic concentrations increased by about 75 percent and zinc concentrations increased by about 65 percent. Normalized lead concentrations increased by a factor of about six from 1952 to about 1976, coinciding with rapid urbanization and economic growth in the White Rock Creek watershed and the accompanying increase in use of leaded gasoline. After about 1976, normalized lead concentrations decreased about 60 percent, coinciding with the replacement of leaded gasoline with unleaded gasoline, and reached a relatively constant level in the mid-1980s.

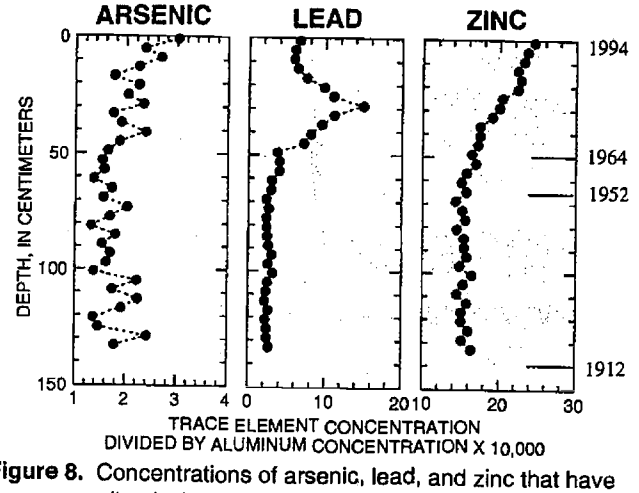


Figure 8. Concentrations of arsenic, lead, and zinc that have been normalized with aluminum.

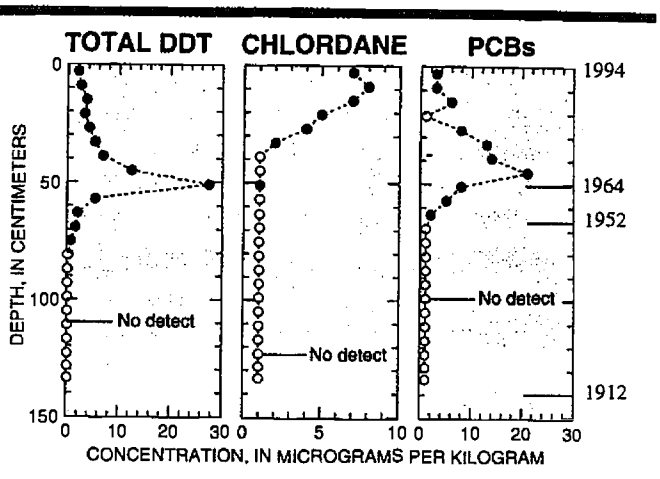


Figure 9. Concentrations of total DDT, chlordane, and PCBs show the use and persistence of organochlorine compounds.

Organochlorine Compounds

DDT, DDE, and DDD

Organochlorine compounds generally are characterized by great persistence and toxicity in the environment.

Use of the organochlorine insecticide DDT began in 1939. Its use peaked in the 1960s and widespread use continued until about 1970, just before its use was banned in 1972. DDT breaks down to DDE and DDD, which also are toxic and are very resistant to further chemical decomposition. DDD was detected in White Rock Lake sediments that were deposited as early as about 1942. DDE was detected in all sediment samples deposited since about 1945. Concentrations of total DDT (sum of DDT, DDE, and DDD) peak in White Rock Lake sediments deposited in about 1963 and decrease by more than a factor of 10 from 1963 to 1994 (fig. 9). Detection of DDD and DDE in the upper parts of the core indicates that DDT metabolites continue to enter White Rock Lake, presumably associated with soils eroded from the basin.

Chlordane

Chlordane, an insecticide, was introduced in 1947. Environmental concerns resulted in a series of U.S. Environmental Protection Agency restrictions beginning with agricultural use in the 1970s and the cancellation of virtually all uses in April 1988. Chlordane was detected in White Rock Lake sediments deposited as early as about 1964. Concentrations continually increase in sediments deposited from about 1970 to a maximum concentration in sediments deposited in about 1990. A slight decline was noted in the most recent (1994) sample. The predominance of urban land use in the basin and the permitted applications indicate that chlordane in White Rock Lake mainly results from applications in urban areas.

PCBs

Polychlorinated biphenyls (PCBs) have been used as plasticizers, as hydraulic lubricants in gas turbines and vacuum pumps, in heat-transfer systems, and as dielectric fluids in electrical transformers and capacitors since the early 1930s. Annual sales peaked in 1970. Following the voluntary ban on PCBs in open systems in 1971, use declined by about 50 percent by 1973. In 1979, all new uses of PCBs were banned. PCBs in the sediment core from White Rock Lake were not detected in sediment deposited before the mid-1940s. Concentrations increase sharply in sediments deposited after about 1950, peak in sediments deposited in the late-1960s, then decrease to about 15 percent of the peak concentration in sediments deposited in about 1994. Changes in PCB concentrations in White Rock Lake sediments

appear to correlate well with sales and regulation of PCBs in the United States.

Implications for Water Quality

The chemical quality of streams and ground water is the result of many natural and human factors. Two human factors that affect the occurrence of contaminants are use and regulation. Intensive use of naturally occurring elements or synthetic chemicals leads to releases of these potential contaminants into the environment and can cause a variety of environmental hazards. Control of the entry of these contaminants into the environment through regulation of their use can greatly reduce the amount of these potential contaminants in the environment; or over time, eliminate them altogether.

The study of the sediment cores from White Rock Lake and a review of the use of the elements and compounds and governmental regulations indicate that:

- Environmental regulations can be successful at eliminating or reducing the entry of some toxic contaminants into aquatic systems. This conclusion is supported by the large decreases in concentrations of lead, DDT, and PCBs in White Rock Lake sediments since restriction of their use. However, the environmental response to regulation can be slow, and in some cases might take decades to complete.

- If a metal such as lead, pesticides such as DDT and chlordane, or industrial organic compounds such as PCBs are in widespread use, the elements or compounds will eventually reach streams. The amount reaching the streams appears to be in proportion to its use.

- Environmentally persistent toxic organic compounds, such as DDT, chlordane, and PCBs, will remain in the environment, often in the sediment of streams and reservoirs, long after uses have been restricted.

Summary

White Rock Lake is a 2.0-square-mile reservoir in Dallas, Tex., and has a drainage area of 100 square miles. The watershed was predominantly agricultural before about 1950. Since then, it has undergone urban development, which dominated land use by 1990.

Cores of sediment deposited from 1912 to 1994 were dated using an isotope of cesium. Sedimentation rates and the percentage of clay-sized particles in sediments have decreased since the early 1950s. Trace-element concentrations also have changed in response to changing land use. About a six-fold increase in normalized lead concentrations occurs in sediments deposited from 1952 to about 1976, followed by about a 60-percent decline in sediments deposited since the advent of unleaded gasoline. Zinc increases by about 65 percent in sediments deposited from about 1952 to 1994. No organochlorine compounds were detected in sediments deposited before about 1942. The DDT metabolites DDD and DDE were detected in all sediment samples deposited after about 1945. Total DDT peaks in sediments deposited in about 1963, about the time the use of DDT peaked. Concentration of total DDT in the most recent sample (1994) has decreased by more than a factor of 10 from the peak concentration. Chlordane concentrations increase in sediments deposited during the 1970s and 1980s and peak in sediments deposited in about 1990. Agricultural use of chlordane was restricted in the 1970s; however, urban use continued until virtually all uses were cancelled in 1988. Concentrations of PCBs first appear in sediments deposited in about 1950 and peak in sediments deposited in the late-1960s, followed by a decrease to about 15 percent of the peak concentration in the sample of 1994 sediments.

References

Charles, M.J., and Hites, R.A., 1987, Sediments as archives of environmental pollution trends, *in* Hites, R.A., and Eisenreich, S.J., eds., Advances in chemistry series 216—Sources and fates of aquatic pollutants: Washington, D.C., American Chemical Society, 558 p.

Leahy, P.P., Rosenshein, J.S., and Knopman, D.S., 1990, Implementation plan for the National Water-Quality Assessment Program: U.S. Geological Survey Open-File Report 90–174, 10 p.

Van Metre, P.C., and Callender, E., in press, Water-quality trends in White Rock Creek Basin from 1912–94 identified using sediment cores from White Rock Lake reservoir, Dallas, Texas: Journal of Paleolimnology.

—P.C. Van Metre, L.F. Land, and C.L. Braun

Information on technical reports and hydrologic data related to the NAWQA Program can be obtained from:

Project Chief
Trinity River Basin NAWQA Study
U.S. Geological Survey
8011 Cameron Road
Austin, Texas 78754–3898

The National Water-Quality Assessment Program

The U.S. Geological Survey began the NAWQA Program in 1991 to assess the status and trends in the quality of the Nation's streams and aquifers. The program is designed to enhance understanding of natural and human factors that influence water quality, and consists of studies in 60 major river basins and aquifers of the United States. Together, the 60 studies compose about one-half of the land area of the United States and 60 to 70 percent of the water use and population served by public water supplies. The similar design of each study and use of consistent methods allow comparisons at regional and national scales. This information is being used to guide policy and to manage water resources at the national, State, and local levels.

USGS
science for a changing world

In cooperation with the City of Austin

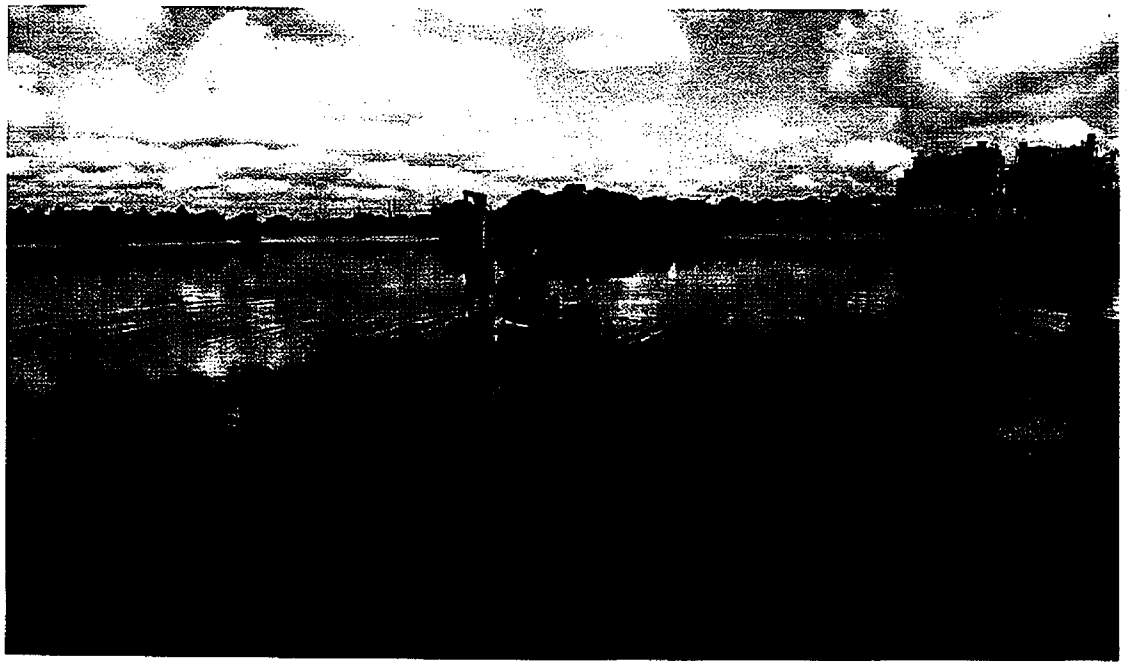
Town Lake Bottom Sediments: A Chronicle of Water-Quality Changes in Austin, Texas, 1960–98

One of the most spectacular fish kills of recent years occurred in the Colorado River below Austin, Texas, in 1961. Shortly after daylight on Sunday morning, January 15, dead fish appeared in the new Town Lake in Austin and in the river for a distance of about 5 miles below the lake. None had been seen the day before. On Monday there were reports of dead fish 50 miles downstream. ... By January 21, fish were being killed 100 miles downstream .... During the last week of January the locks on the Intracoastal Waterway were closed to exclude the toxic waters from Matagorda Bay and divert them into the Gulf of Mexico.

... investigators in Austin noticed an odor associated with the insecticides .... The manager of the (chemical) plant admitted that quantities of powdered insecticide had been washed into the storm sewer recently and, more significantly, he acknowledged that such disposal of insecticide spillage and residues had been common practice for the past 10 years.

.... For 140 miles downstream from the lake the kill of fish must have been almost complete, for when seines were used later in an effort to discover whether any fish had escaped they came up empty. Dead fish of 27 species were observed, totaling about 1000 pounds to a mile of riverbank.

Rachel Carson, 1962, Silent Spring



Town Lake, the last in the chain of Highland Lakes on the Colorado River, runs through the center of Austin, Texas. On any given day, grebes and coots dot the water, rowers skim alongside, and the sparkle of the sun on the water can be admired from the adjacent hike and bike path and from the windows of nearby office buildings. During the summer months, crowds gather along the shores of Town Lake to watch as many as 1 million Mexican Free-Tail bats emerge from under the Congress Avenue bridge. But below the lazily moving azure water lies a bed of sediment about 1 meter (m) thick—sediment that has been deposited gradually since the reservoir was formed in 1959 and that has been recording changes in water quality since that time. What can this sediment tell us about the history of water quality in the Colorado River? And what does it say about the effects of the rapid urbanization of Austin and the future health of our environment?

U.S. Department of the Interior
U.S. Geological Survey

USGS Fact Sheet FS–183–99
December 1999

What We See in Town Lake

To answer these questions, the U.S. Geological Survey (USGS), in cooperation with the City of Austin, collected a sediment core in 1998 (collection methods explained in "How We Sample"). The core penetrated the entire 1 m of Town Lake sediment and contains evidence of the 1961 DDT spill described in "Silent Spring." The graph below (fig. 1a) shows DDT and its breakdown products, DDD and DDE, measured in the core. The large peaks near the bottom of the core mark the 1961 spill. Concentrations jump sharply from the first sample at the bottom of the core to the next sample up, estimated to date from 1961, then go even higher in the sample dated as 1963. Since 1963, total DDT concentrations (DDT + DDD + DDE) in the lake sediment have decreased 90 percent, from 430 micrograms per kilogram (µg/kg) at the peak to 42 µg/kg in sediment deposited in 1998.

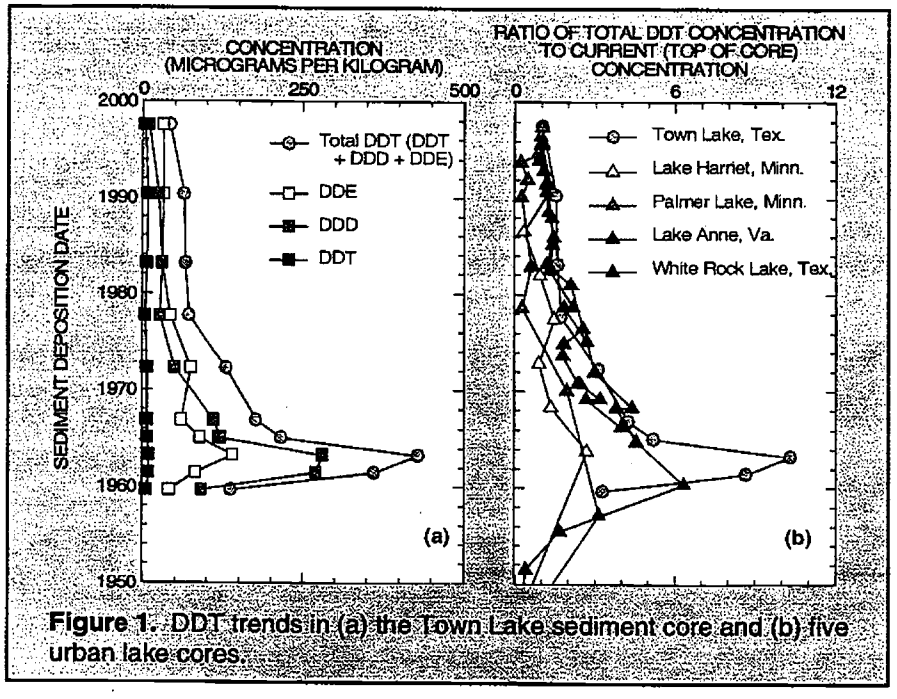


Figure 1. DDT trends in (a) the Town Lake sediment core and (b) five urban lake cores.

DDT use was ubiquitous in the United States in the 1950s and 1960s, and sediment cores from many lakes show a large DDT peak in the early 1960s (Van Metre and others, 1998). Is the peak in Town Lake any different? One way to find out is to compare the DDT trend in the Town Lake core with DDT trends in other urban lakes and reservoirs (fig. 1b). The peak concentration in Town Lake is about 10 times greater than the concentration in newer sediment at the top of the core. The average peak in the four other lakes compared on figure 1b is four times greater than concentrations in newer sediment. This comparison indicates that the spill in Town Lake left behind DDT concentrations that are two to three times the concentrations that might be expected on the basis of "normal" DDT use in the 1950s and 1960s.

Historical use of other hydrophobic (incapable of dissolving in water; literally, "water fearing") contaminants are also recorded in the Town Lake sediments—in particular, lead and the organic compounds polychlorinated biphenyls (PCBs), chlordane, and polycyclic aromatic hydrocarbons (PAHs) (fig. 2). Like DDT, use of lead and PCBs was widespread during the early years of Town Lake but subsequently was reduced or eliminated by regulatory action. Chlordane, although restricted by regulatory action, remains at relatively high concentrations in recent sediments. In contrast, PAHs, which originate from numerous urban sources, are not regulated.

Lead concentrations in the Town Lake sediment core follow a trend pattern similar to that shown by other urban U.S. lakes. Lead in gasoline caused large increases in lead concentrations in urban lakes and streams in the 1960s and early 1970s. Lead concentrations peaked in urban reservoir and lake cores in the mid-1970s and then decreased with the introduction of unleaded gasoline (Callender and Van Metre, 1997). Concentrations in the Town Lake core have decreased by about 70 percent since 1970 (fig. 2a), a direct and encouraging response to the elimination of lead in gasoline.

PCBs had widespread industrial and commercial uses, primarily as insulation fluids for transformers and in appliances. PCB concentrations in sediment from most urban lakes peaked in the mid-to-late 1960s, at the height of their use, then decreased following restrictions imposed in 1971 (Van Metre and others, 1997, 1998). The pattern in Town Lake is similar, with a peak concentration of 96 µg/kg in the early 1960s decreasing by about 70 percent to 31 µg/kg in 1998 (fig. 2b). Thus, for these persistent contaminants (DDT, lead, PCBs), restricting their use has resulted in large decreases in Town Lake.

Chlordane is an organochlorine pesticide of the same general class as DDT. Use of most organochlorine pesticides was restricted or banned in the 1970s. Agricultural use of chlordane was restricted in 1974; however, urban use (primarily for termites and ants) was permitted until 1988. Even after 1988, use of existing stocks in the possession of home owners was allowed. On the basis of a nationwide survey of pesticide use in 1990, this continued use was substantial, rivaling the

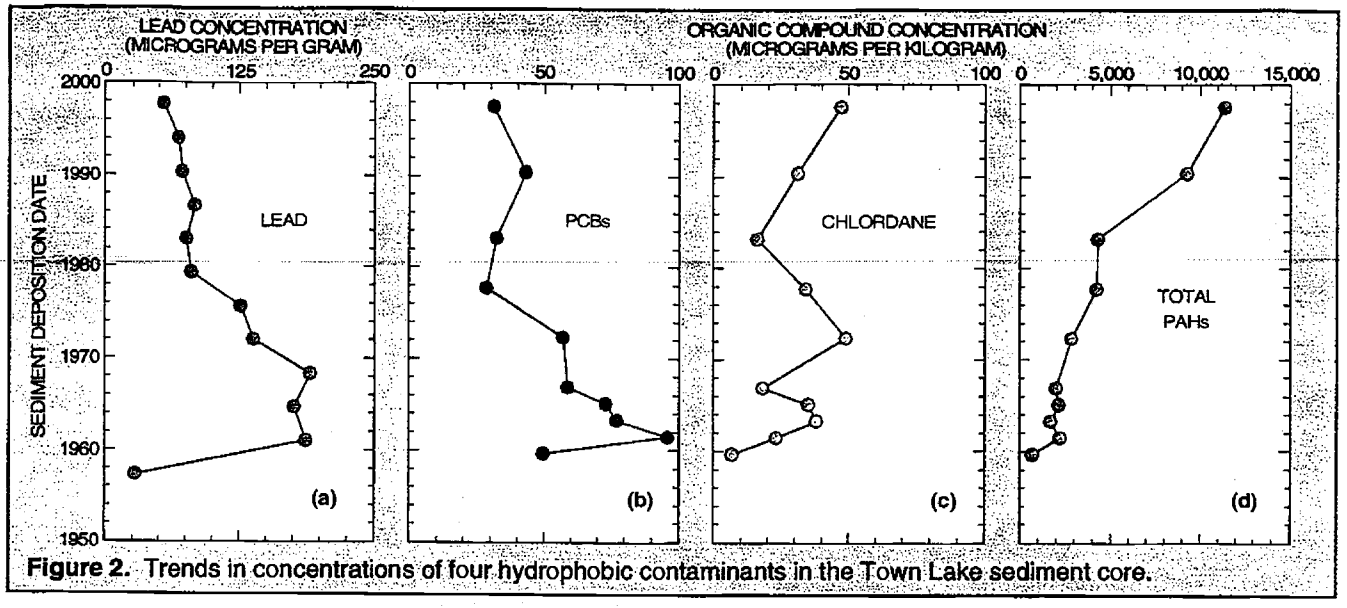


Figure 2. Trends in concentrations of four hydrophobic contaminants in the Town Lake sediment core.

early-1970s agricultural use (Whitmore and others, 1992). Chlordane is of particular concern in Town Lake; high levels of chlordane in fish have resulted in a fish consumption advisory imposed by the Texas Department of Health (1996). Chlordane concentrations in Town Lake sediment were relatively high in the 1960s and early 1970s, then decreased in the 1980s (fig. 2c). A small peak in the early 1960s, coincident with the DDT spill, possibly could indicate some chlordane released by the spill. A second peak in the early 1970s was coincident with substantial agricultural use in the United States and with chlordane peaks in some other urban (Van Metre and others, 1998) and agricultural (Van Metre and others, 1997) reservoir and lake cores. More surprising is the increase at the top of the core, indicating continued input of chlordane to Town Lake in the 1990s. Recent input was confirmed by analysis of suspended-sediment samples collected by the USGS in Shoal Creek (tributary to Town Lake) in November 1997 and March 1999. Chlordane concentrations in 10 suspended-sediment samples ranged from 9 to 340 µg/kg (U.S. Geological Survey, Austin, Tex., unpub. data), compared to a concentration of 47 µg/kg at the top of the Town Lake sediment core.

PAHs, in contrast to trends in the regulated or banned contaminants, show dramatic increases during the past 20 years in the Town Lake core (fig. 2d). This pattern is repeated, to varying degrees, in lakes with urbanizing watersheds across the United States (Van Metre and Callender, 1999). PAHs are trace contaminants that occur naturally in crude oil, coal, and other hydrocarbons. They also are produced by combustion of hydrocarbons, resulting in many urban sources including: industrial and power plant emissions; car and truck exhaust; tires; and asphalt roads and roofs. Eliminating PAHs from urban runoff is difficult because of their varied sources. PAHs are an environmental concern because they are toxic to aquatic life and because several are suspected carcinogens (Björseth and Ramdahl, 1985; Long and Morgan, 1990).

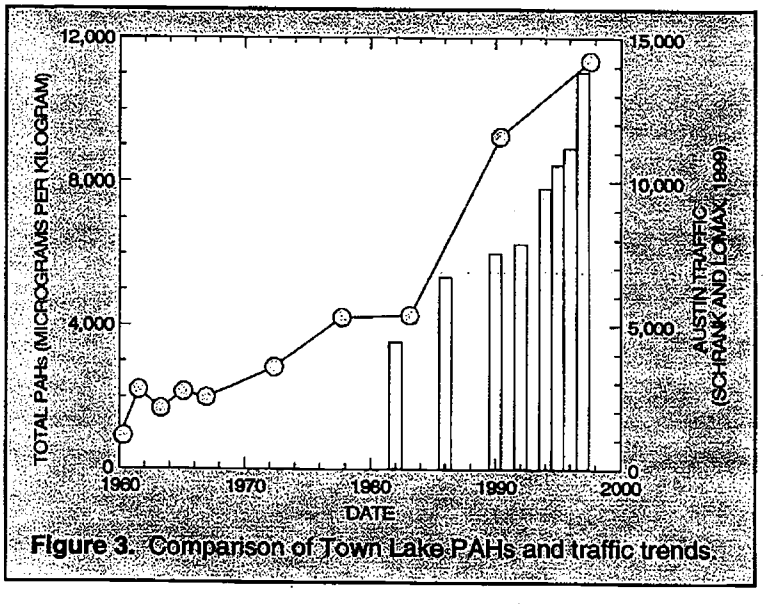


Figure 3. Comparison of Town Lake PAHs and traffic trends.

Total PAH concentrations in recently deposited sediment in Town Lake are about 16 times the concentrations in 1960, increasing from about 700 µg/kg in 1960 to 11,400 µg/kg in 1998 (fig. 2d). The increase corresponds with increases in traffic in greater Austin (Schrank and Lomax, 1999; fig. 3). From 1982 to 1996, PAH concentrations in the sediment core and automobile use (expressed as total miles driven on Austin roads) both increased by about 2.5 times (fig. 3). The relation of PAH concentrations to Austin traffic is evidence of the importance of non-industrial sources of PAHs to streams and lakes and indicates that vehicle emissions, road and tire wear, and engine oil leaks could be major sources of PAHs.

Overall Trends

The trends in the Town Lake sediment core tell us that, in some respects, water quality is improving in the Colorado River in Austin. These decreasing trends are obviously good news. The decreasing trends in DDT, lead, and PCBs coincide with regulatory restrictions, often combined with voluntary reductions in use resulting from public awareness and concern.

Unfortunately, not all the contaminant trends in the Town Lake core are decreasing, chlordane and PAHs being obvious examples. Sales of chlordane have been banned since 1988; however, it could take years for concentrations to drop substantially. It is taking an average of about 10 years for persistent contaminants like DDT and chlordane to decrease by one-half in U.S. reservoirs and lakes (Van Metre and others, 1998). The picture is more troubling for PAHs, which are unregulated. The correlation of PAH concentrations to traffic rates in the Town Lake watershed (fig. 3) implies that limiting water-quality degradation in urbanizing lakes and streams might not be achieved by controlling land-use practices if traffic volume continues to grow unchecked.

Overall trends in sediment quality in Town Lake are not immediately apparent because both increasing and decreasing trends occur. The different groups of contaminants were compared by normalizing (dividing) all contaminant concentrations by the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (Environment Canada, 1995). The lower level guidelines currently known as the interim sediment quality guidelines were used. Individual metals and organic compounds were normalized to yield a value called a toxicity index. These toxicity indexes were then summed for related groups of contaminants (metals, organochlorine compounds, and PAHs), then plotted (fig. 4). These guidelines use a broadly accepted approach for identifying levels of contaminants in sediment that are expected to adversely affect aquatic life. The guidelines are not related directly to human health. This normalization allows comparison of the relative toxicity of metals, organochlorine compounds, and PAHs.

The graph (fig. 4) shows trends for the three major groups of contaminants measured in the sediment core. The higher the toxicity index, the more toxic the sediment is expected to be—thus, a decrease over time means sediment quality is improving. This graph indicates that the worst overall sediment quality in the past 40 years is associated with the DDT spill in 1961. Overall sediment quality improved from 1961 until about the mid-1980s, mostly because of large decreases in DDT and PCBs, both organochlorine compounds. Since the mid-1980s, however, the sediment toxicity index has been increasing, in large part, because of the large increase in PAHs. This increase in toxicity indicates that improvements in sediment quality caused by reductions in the use of many organochlorine pesticides and PCBs are being offset by increases in PAHs, probably traffic related, as Austin grows.

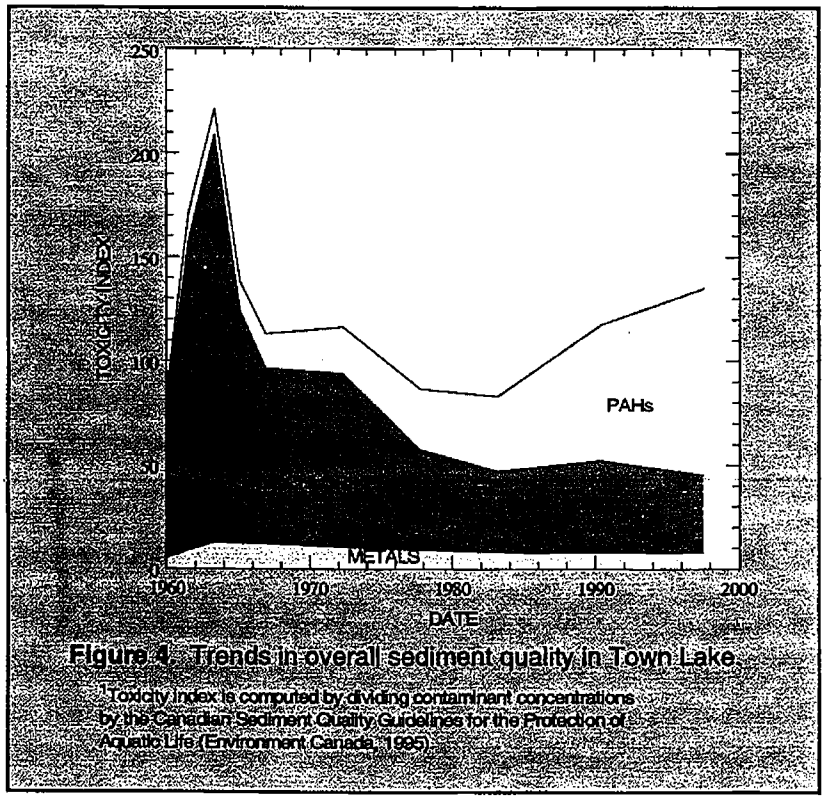


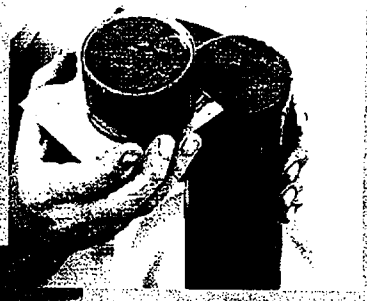
Figure 4. Trends in overall sediment quality in Town Lake.

Toxicity index is computed by dividing contaminant concentrations by the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (Environment Canada, 1995).

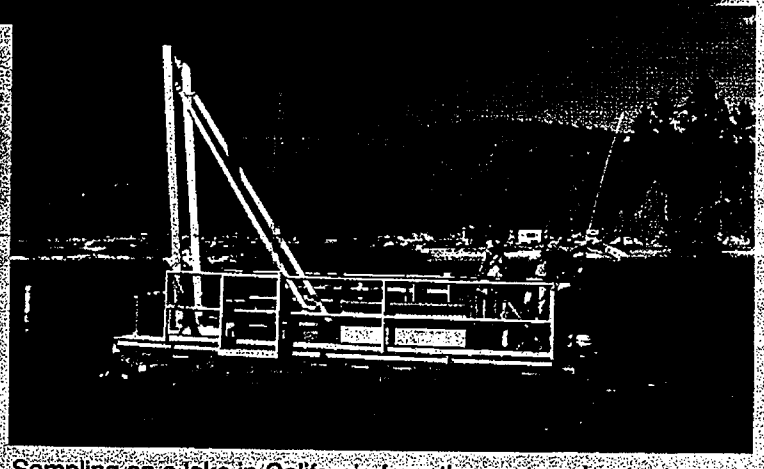
How We Sample

Three basic types of coring tools were used: piston corers, gravity corers, and box corers. The piston and gravity corers both collect relatively long (as much as 3.5 m), 6-centimeter (cm) diameter tubes of mud. The box corers collect a sample as much as 1-m long, 14-cm square and have jaws that close at the bottom to hold the sample in. The Town Lake cores were collected from a raft (see picture on left) and, on larger lakes, are collected from a pontoon boat (see picture at bottom). After collection, a core is sub-sampled by pushing the sediment up through the plastic liner and slicing thin layers of sediment off the top (see picture on right). The chemistry of the samples is measured using various analytical methods. Cesium-137 for age dating is measured by radioactive counting (Van Metre and others, 1998). Metals are measured by inductively-coupled plasma/atomic emission spectroscopy and graphite-furnace atomic adsorption (Fishman and Friedman, 1989). Organic compounds are measured by gas chromatography/mass spectrometry (Furlong and others, 1994; Foreman and others, 1995). Ages of sediment layers in the Town Lake core were assigned on the basis of the cesium-137 profile and core lithology similar to the approach used by Van Metre and others (1997).

Retrieving a gravity core from the bottom of Town Lake.



Slicing a 5-centimeter long subsample from a core for laboratory analysis.



Sampling on a lake in California from the pontoon boat.

The NAWQA Program

The Town Lake study was done by the USGS National Water-Quality Assessment (NAWQA) Program's Reconstructed Trends study. More than 50 lakes have been sampled nationally for this study since 1992 (fig. 5). With the exception of the larger-than-normal DDT peak, trends in the Town Lake sediment core are similar to trends in sediment cores from many other U.S. urban lakes. In general, concentrations of regulated and banned contaminants such as DDT, PCBs, and lead have decreased greatly coincident with reductions in use. Chlordane trends in the United States vary regionally, with continued larger concentrations in urban lakes in the South and upper Midwest and decreasing trends in the Northeast (Van Metre and others, 1997, 1998). Trends in some "unregulated" metals and organic compounds are also variable and, in some cases, continue to increase with urban growth. Arsenic and zinc, for example, are increasing in many lake sediment cores concurrent with urbanization (Van Metre and Callender, 1999). PAH trends, on the other hand, are very consistent in lakes in areas of new urban growth—increasing in all urbanizing lakes where sediment cores have been collected for the NAWQA Program.

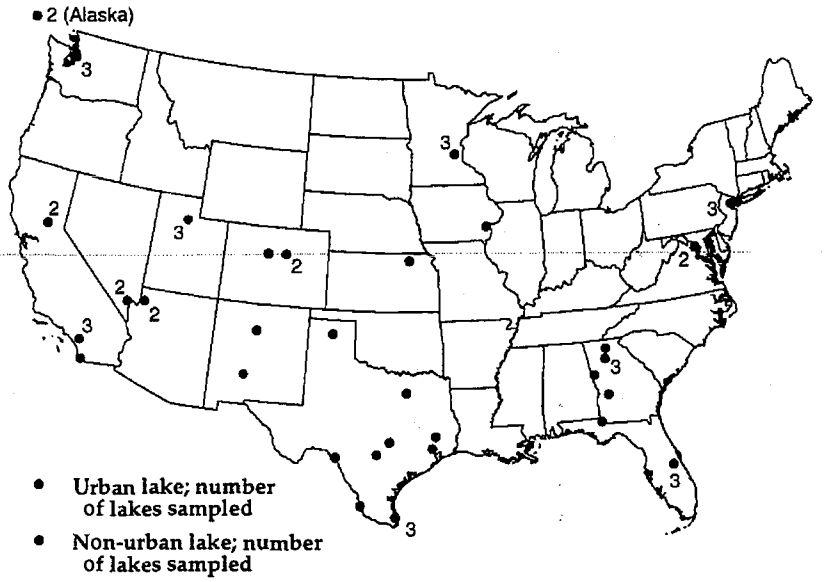


Figure 5. Sites sampled during 1992–99 for the USGS reconstructed trends study.

References

Björseth, Alf, and Ramdahl, Thomas, 1985, eds., Handbook of polycyclic aromatic hydrocarbons—v. 2, Emission sources and recent progress in analytical chemistry: New York, Marcel Dekker Inc.

Callender, Edward, and Van Metre, P.C., 1997, Reservoir sediment cores show U.S. lead declines: Environmental Science and Technology, v. 31, no. 9, p. 424A–428A.

Carson, Rachel, 1962, Silent spring: Boston, Houghton Mifflin, 386 p.

Environment Canada, 1995, Interim sediment quality guidelines: Ottowa, Ontario, Ecosystem Conservation Directorate, Evaluation and Interpretation Branch, 63 p.

Fishman, M.J., and Friedman, L.C., eds., 1989, Methods for determination of inorganic substances in water and fluvial sediments: U.S. Geological Survey Techniques of Water-Resources Investigations, book 5, chap. A1, 545 p.

Foreman, W.T., Connor, B.F., Furlong, E.T., Vaught, D.G., and Merten, L.M., 1995, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of organochlorine pesticides and polychlorinated biphenyls in bottom sediment by dual capillary-column gas chromatography with electron-capture detection: U.S. Geological Survey Open-File Report 94–140, 78 p.

Furlong, E.T., Vaught, D.G., Merten, L.M., Foreman, W.T., Gates, P.M., and Koleis, J.C., 1994, Methods of analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of semivolatile organic compounds in bottom sediment by solvent extraction, gel permeation chromatographic fractionation, and capillary-column chromatography/mass spectrometry: U.S. Geological Survey Open-File Report 95–719, 67 p.

Long, E.R., and Morgan, L.G., 1990, The potential for biological effects of sediment-sorbed contaminants tested in the National Status and Trends Program: National Oceanic and Atmospheric Administration, Technical Memorandum NOS OMA 52, 175 p.

Schrank, D.L., and Lomax, T.J., 1999, The 1999 annual mobility report—Information for urban America: College Station, Tex., Texas Transportation Institute, Texas A&M University, accessed December 28, 1999, at URL http://mobility.tamu.edu/study/report.stm

Texas Department of Health, 1996, Fish advisories and bans: Texas Department of Health, Seafood Safety Division, 18 p.

Van Metre, P.C., and Callender, Edward, 1999, Trends in sediment quality in response to urbanization, *in* Morganwalp, D.W., and Buxton, H.T., eds., U.S. Geological Survey Toxic Substances Hydrology Program—Proceedings of the Technical Meeting, Charleston, S.C., March 8–12, 1999—v. 2—Contamination of hydrologic systems and related ecosystems: U.S. Geological Survey Water-Resources Investigations Report 99–4018B, p. 471–475.

Van Metre, P.C., Callender, Edward, and Fuller, C.C., 1997, Historical trends in organochlorine compounds in river basins identified using sediment cores from reservoirs: Environmental Science and Technology, v. 31, no. 8, p. 2,339–2,344.

Van Metre, P.C., Wilson, J.T., Callender, Edward, and Fuller, C.C., 1998, Similar rates of decrease of persistent, hydrophobic and particle-reactive contaminants in riverine systems: Environmental Science and Technology, v. 32, no. 21, p. 3,312–3,317.

Whitmore, R.W., Kelly, J.E., and Reading, P.L., 1992. National home and garden pesticide use survey, final report: Research Triangle Institute, RTI/5100/17–01F, 140 p.

—P.C. Van Metre and B.J. Mahler

Photographs by C.E. Ranzau

Information on technical reports and hydrologic data related to this study can be obtained from:

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NAS Fort Worth JRB Installation Restoration Program Update

Michael R. Dodyk, P.E.

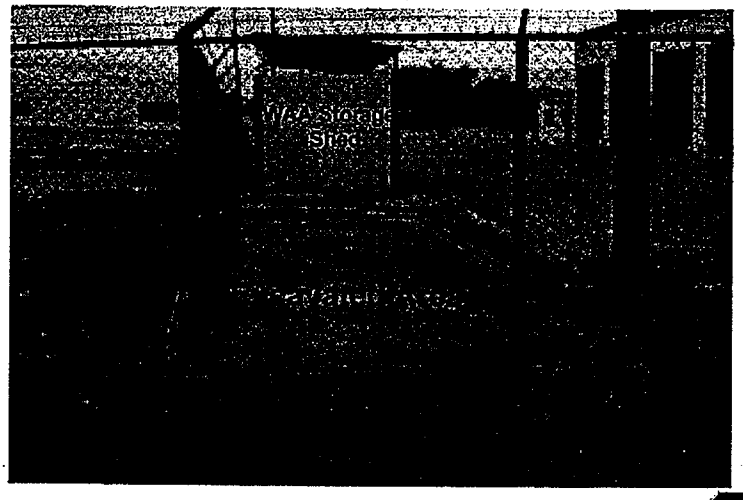
February 7, 2001

Site Closure Update

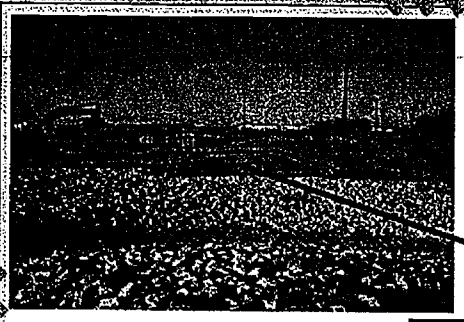
- One site submitted for and granted closure by TNRCC since the November 2001 RAB meeting:
  - Solid Waste Management Unit (SWMU) 26, Landfill 3
  - To date, the Air Force has received closure on 48 of 88 total SWMUs and AOCs basewide.

Field Activities

- Soil "hot spot" excavation work continued at various Landfills and Waste Accumulation Areas.
- Soil and groundwater sampling conducted at SWMUs 49 and 50, former aircraft washing areas.
- Soil and groundwater sampling conducted at SWMU 19, the former fire training area.
- Groundwater sampling conducted at AOC 1, the base service station.
- Sediment and surface water sampling conducted at SWMU 54, the storm water interceptors.

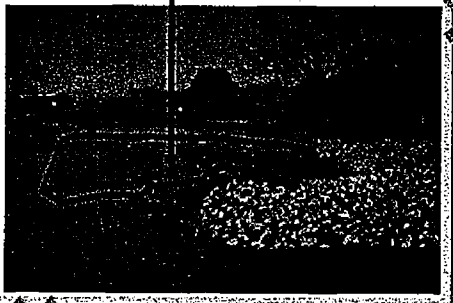


Interim Remedial Action –SWMU 61, Looking SE
January 2002



Interim Remedial Action
SWMU17B/Landfill 7
Looking North
January 2002

Excavated Area



Interim Remedial Action
SWMU17B/Landfill 7
Looking East
January 2002

Upcoming Field Work

- **This Month:**
  - Site preparation work will be conducted for the installation of Permeable Reactive Barrier (PRB).
- **March 2002:**
  - PRB installation will begin along the western side of the Carswell Golf Course March 4th and continue for 4 weeks.
- **April 2002**
  - Semi-annual basewide groundwater sampling will occur.
- **Summer 2002:**
  - Installation of a groundwater remediation system at the base gas station (AOC 1).

Documents Submitted to TNRCC

- Final Baseline Risk Assessment Southern Lobe of Trichloroethene Plume (November 2001)
- Draft Final Permeable Reactive Barrier Construction and Performance Monitoring Work Plans (January 2002)
- Plan A for Building 1427 UST
- Response to TNRCC for Buildings 1518, 1750, and 1191 USTs Release Determination Report
- Release Determination Report for Building 1411 UST

Continued Progress

- Risk Assessment and Focused Feasibility Study of the southern lobe of the TCE plume continued.
- Design work for the permeable reactive barrier (PRB) for the southern lobe TCE plume continued.

Last Month

- Work Plan for Paluxy well installation submitted to AFCEE for review.
- Draft Technical Report for AOC 2 submitted to AFCEE for review.
- Draft Site Investigation Report for AOC 20 submitted to AFCEE for review.

Continued Progress (cont.)

- Draft RFI Report for Building 1655 Oil/Water Separator was submitted to AFCEE for review.

Next Month

- Draft RFI Report for Landfills 2, 6, 7, and 9 to be submitted to AFCEE for review.
- Draft RFI Report for Waste Accumulation Areas 5, 6, 12, 31, and 61 to be submitted to AFCEE for review.
- Draft 2001 Semi-Annual Groundwater Sampling Report to be submitted to AFCEE for review.

NAS Fort Worth JRB, Texas

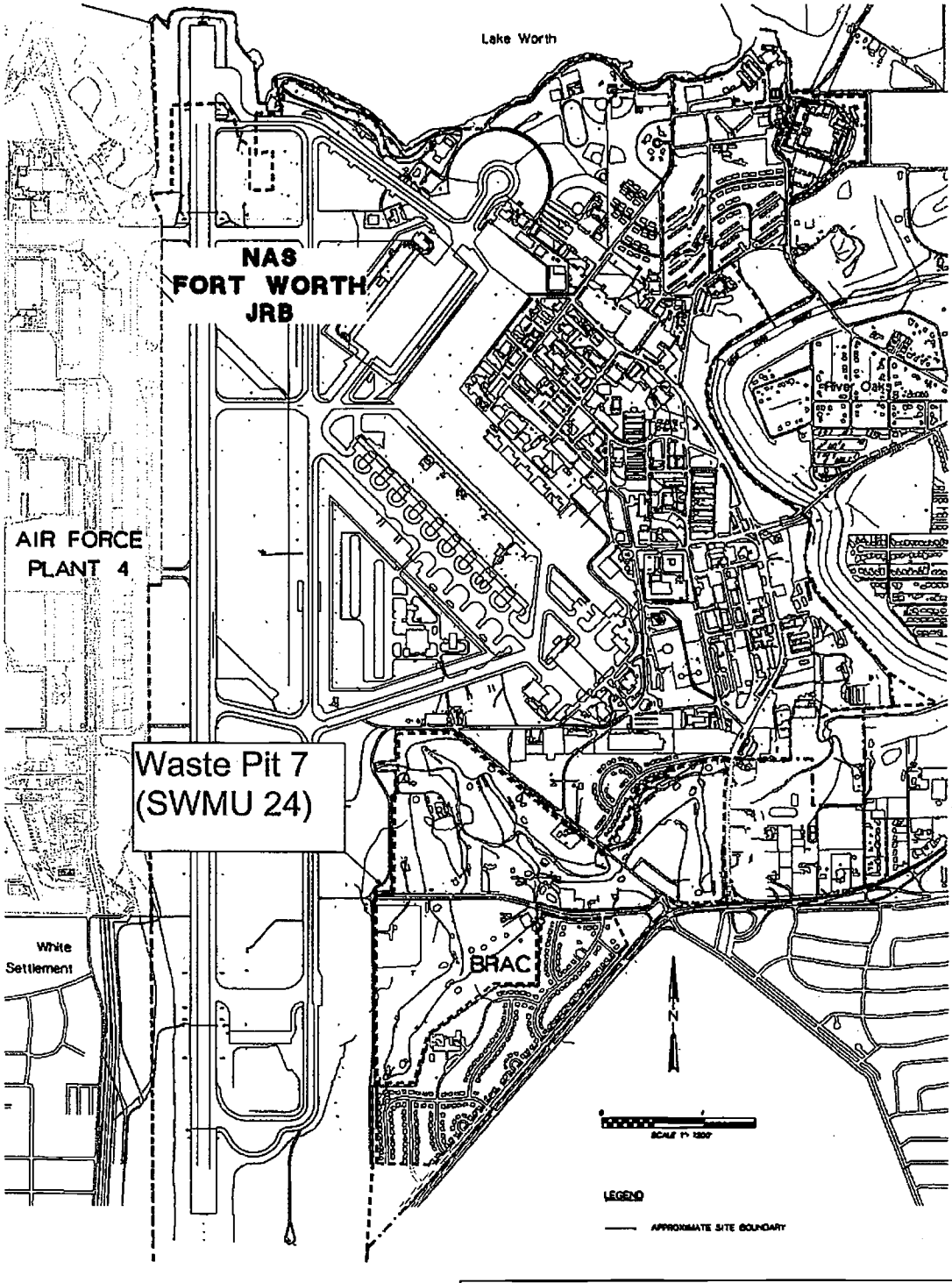
DNAPL Investigation at Waste Pile 07 (SWMU 24)

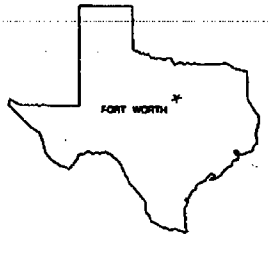
CH2MHILL

WP07 DNAPL Investigation

Purpose

To perform an investigation designed to identify whether TCE DNAPL is present in the subsurface associated with WP07, and if it is found to be present, to delineate its extent and to screen potential remedial alternatives.





NAS FORT WORTH JRB, TEXAS
Waste Pile 07 (SWMU 24)

SITE LOCATION MAP

WP-07 GROUNDWATER INVESTIGATION

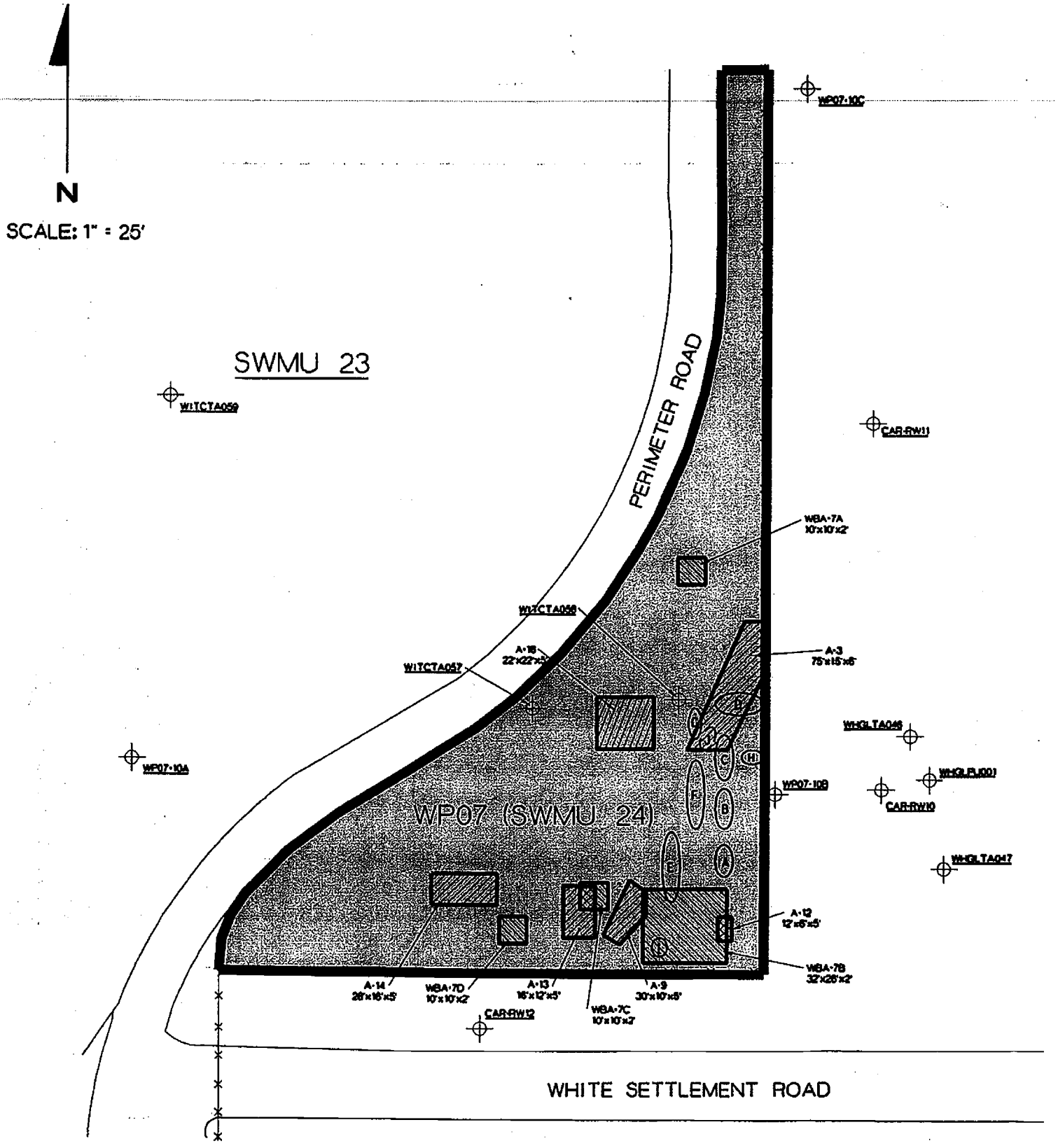
Reviewed by: D. Davis	Figure No: FIGURE 2-1	
	Project No: 168712.02.01.01	
Drawn by: K Harkins	File Name: 38581129.dgn	Date: 01/017/02

CH2MHILL

WP07 DNAPL Investigation

Investigation History

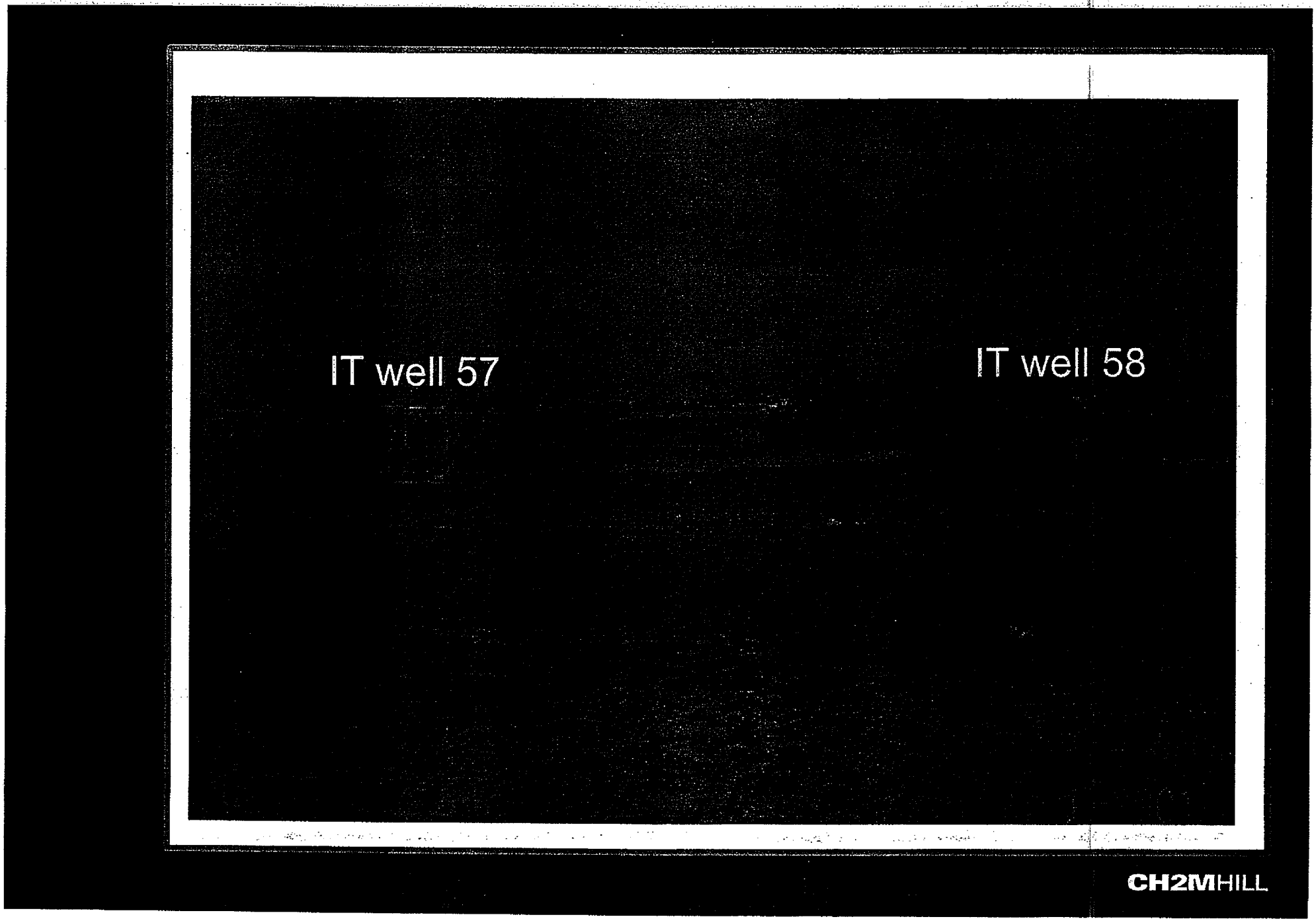
- IRP Phase II, Radian (1986, 1989) --WP wells
- Geophysical Survey & Initial Drum Removal, USACE (1991)
- AFP4 Phase I GW Sampling, GMI (1992)
- SWMU 24 RFI, HGL (1997-2000)
- WP07 Soil Remedial Action & Drum Removal, IT (2000) -- IT wells
- CPT/MIP Investigation along Perimeter Road, HGL/USACE (2001)


N
SCALE: 1" = 25'
SWMU 23
WP07 (SWMU 24)
PERIMETER ROAD
WHITE SETTLEMENT ROAD
W1TCTA059
WP07-10C
CAR-RW11
WBA-7A
10'x10'x2'
W1TCTA056
W1TCTA057
A-18
22'x22'x2'
A-3
75'x15'x6'
WHGLTA046
WP07-10A
WP07-10B
WHGLPU001
CAR-RW10
WHGLTA047
A-12
12'x6'x5'
WBA-7B
32'x26'x2'
A-14
26'x16'x5'
WBA-7D
10'x10'x2'
A-13
16'x12'x5'
A-9
30'x10'x6'
WBA-7C
10'x10'x2'
CAR-RW12

WP07 DNAPL Investigation

Summary of Previous Results

- Initial drum removal reported 34 drums, ~131 gal TCE & 169 gal TCE-contaminated liquid (excavated soil up to ~1.3 ppm).
- During RFI soil sampling, TCE measured from ND to ~220 ppb.
- 2nd drum removal confirmation samples generally ranged from ND to 0.009 ppb, w/one at 0.632 ppb.
- Groundwater concentrations historically have ranged from ND to 6.4 ppm (IRP).


IT well 57
IT well 58
CH2MHILL


CH2MHILL

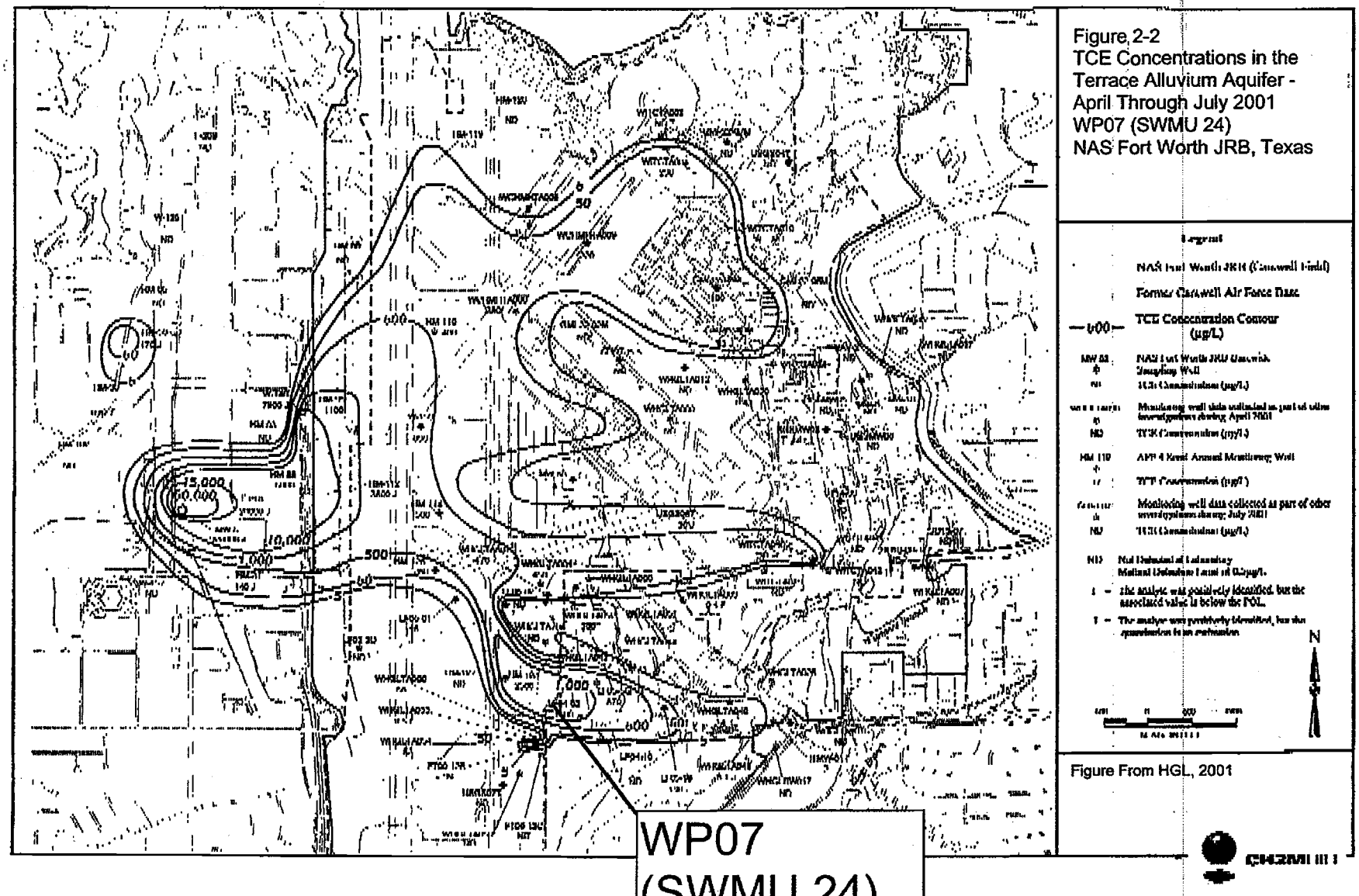


Figure 2-2
TCE Concentrations in the Terrace Alluvium Aquifer - April Through July 2001
WP07 (SWMU 24)
NAS Fort Worth JRB, Texas

Headquarters U.S. Air Force

Integrity - Service - Excellence

Carswell Off-Base BRAC UPDATE Restoration Advisory Board

Charles C. Pringle, BEC

7 FEBRUARY 2002

U.S. AIR FORCE

U.S. AIR FORCE

Carswell Off-Base/Agenda

- **Program Update**
  - **Sanitary Sewer System Field Work Update - Apr Start**
  - **Off-Site Weapons Storage Area FOST Update - Feb Rvw Start**
  - **RCRA Permit Renewal Update - Tech. Rvw In Progress**
- **Property Transfer Updates**
  - **Kings Branch Housing Area Transfer, Oct. 2000, 40 Acres**
  - **Federal Bureau of Prison Transfer, Dec. 2000, 145 Acres**
  - **Stables Transfer, Aug. 2001, 50 Acres**
  - **Golf Course/LF 6 Lease Expansion, Oct 2001**
  - **WSA FOST - Feb Rvw Start, 247 Acres**

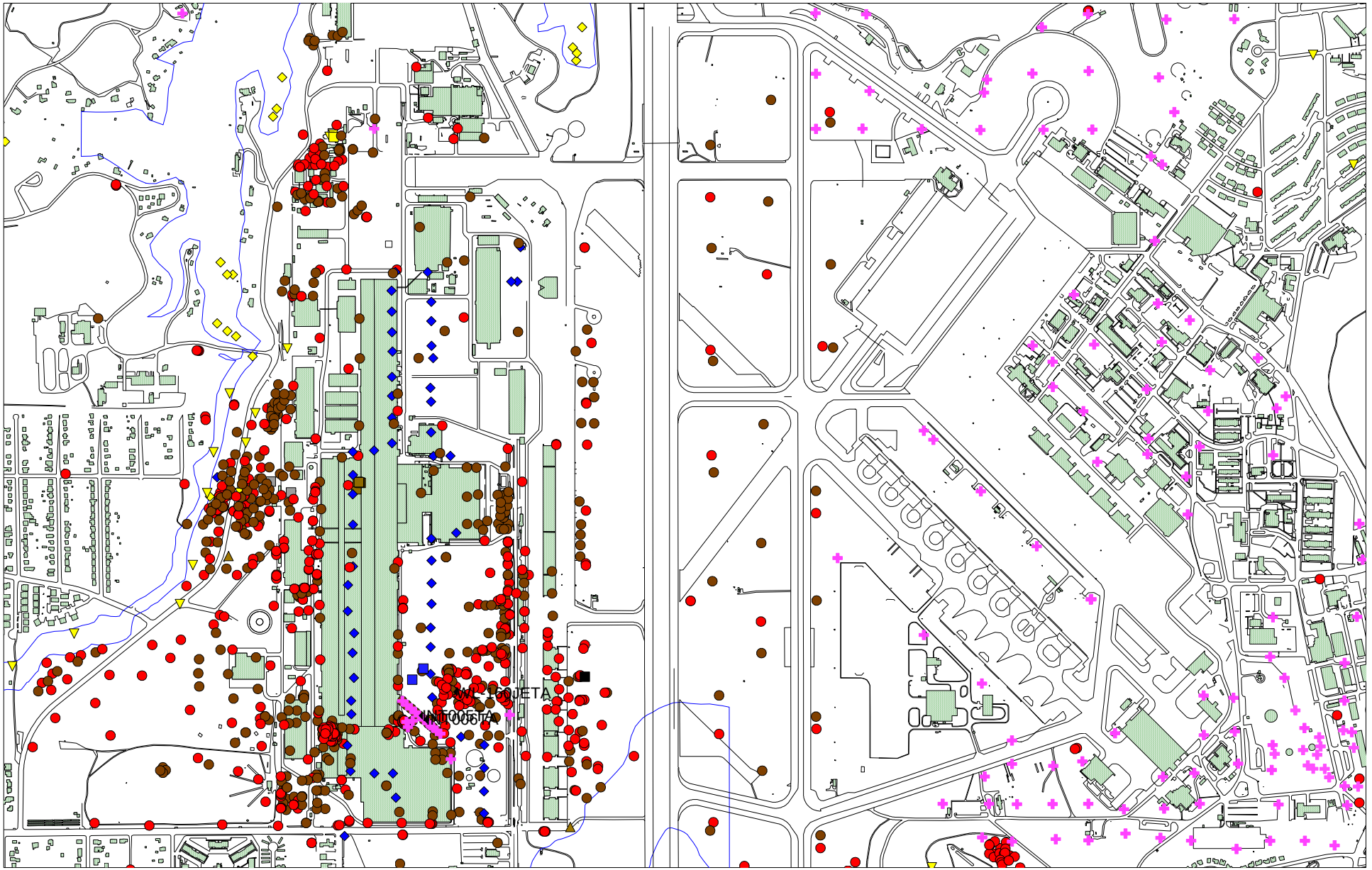
U.S. AIR FORCE

Property Transfer Update

- **Federal Bureau of Prison Hospital - 145 Acre Parcel**
  - **Transferred to the Dept of Justice (DOJ) for the Federal Bureau of Prisons on December 15, 2000.**
  - **DOJ accepted the property on Jan 29, 2001.**
- **Kings Branch Housing Area - 40 Acre Parcel**
  - **Completed transfer in October 2000 to Westworth Redevelopment Authority.**
- **Stables - Approx 50 Acre Parcel**
  - **Transfer accomplished August 2001.**


Air Force Plant 4 - RAB
February 7, 2002
George Walters
Wright-Patterson AFB OH
LF4/5
EPL
BLD181
LF3
History of Installation Restoration
- Remedial Process Optimization
Electrical Resistance Heating
Tree Coring for TCE!
Web Sites of Interest

In the Beginning! Drill lots of holes! (of course, these are over 20 yrs)



In the Beginning, continued!

Dig first, ask questions (learn more) later! Now it is NIMBY!

11,000 cu/yds removed in 1983 from Landfill #1

In the Beginning, continued!

Interim Actions! Building one of a kind treatment systems to prevent migration and exposure! $$$$

- Fewer contractors, not as much competition!
- Migration, fate and transport not well understood!

LF #3 & FSA#1

Carswell LF 4/5

Today! Better understanding of migration, toxicity, risk assessment and more contractors!

Remedial Process Optimization Study!

Remedial Process Optimization Study!
- Now required AF (maybe DOD) wide

Concept:

Effectiveness of System (technical difficulties of treatment)
- Goals for treatment, are they realistic.
- Are you getting there!

Efficiency (given long-term O&M Costs!)

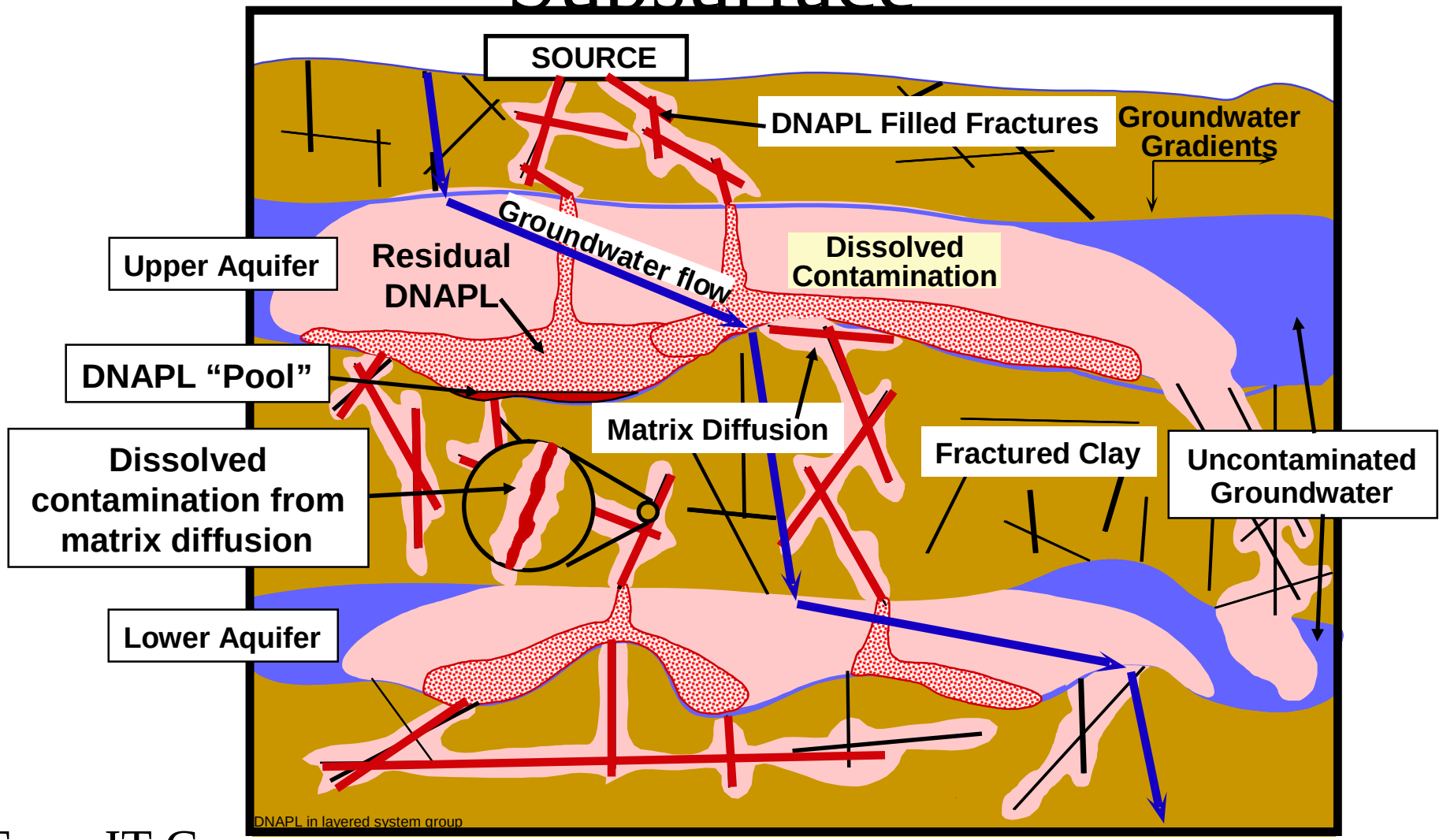
Landfill #3

- High cost, voluntary action by AF.
- No goals for when to operate, when not to!
- Technical difficulties with DNAPL (and fractures too!)

Bottom Line! System turned off, will monitor seeps and surface water, assess future actions.

- Expert consortium to consider site for future study! Proposal submitted.

DNAPL Behavior in the Subsurface

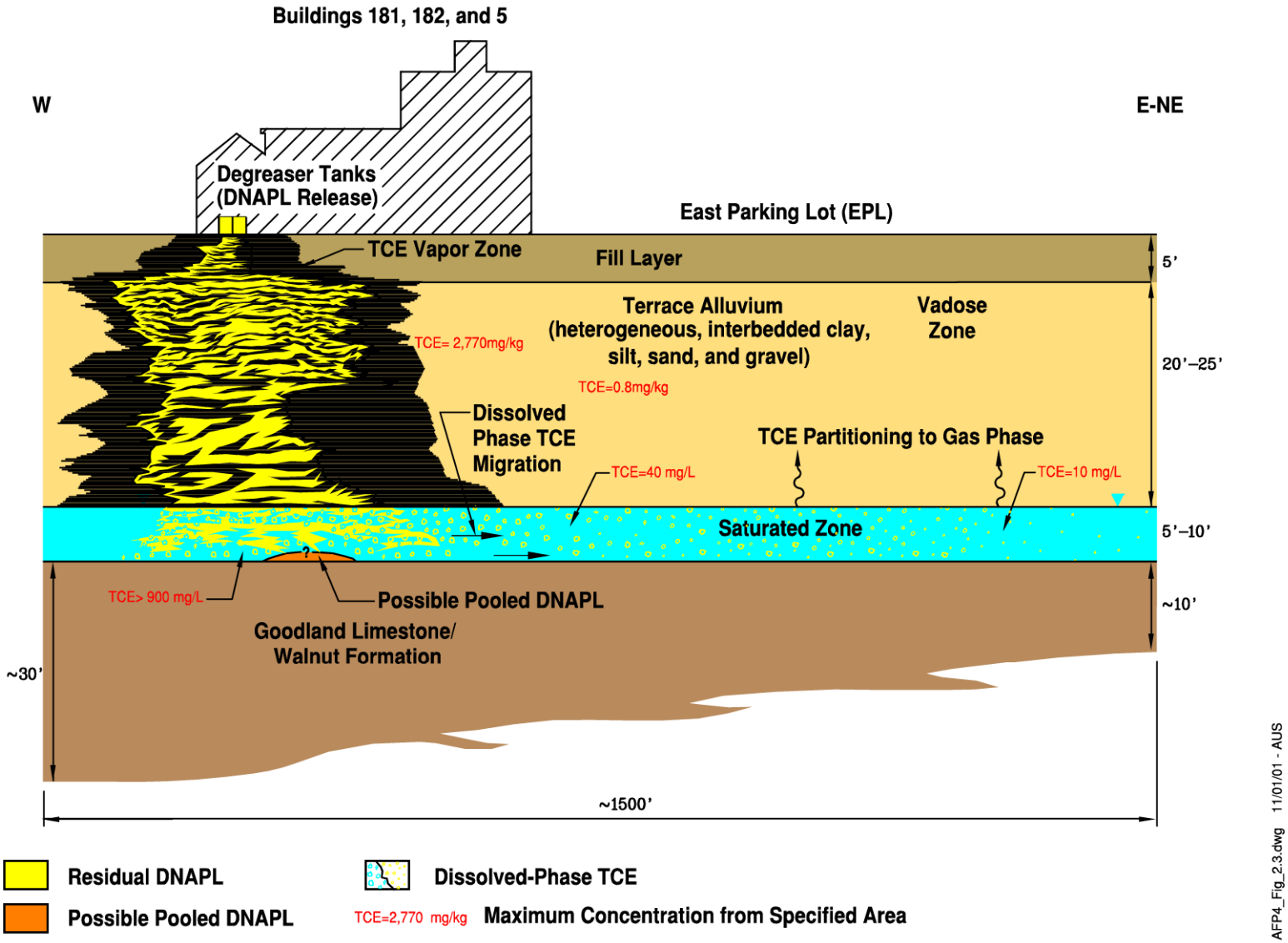


From IT Corp

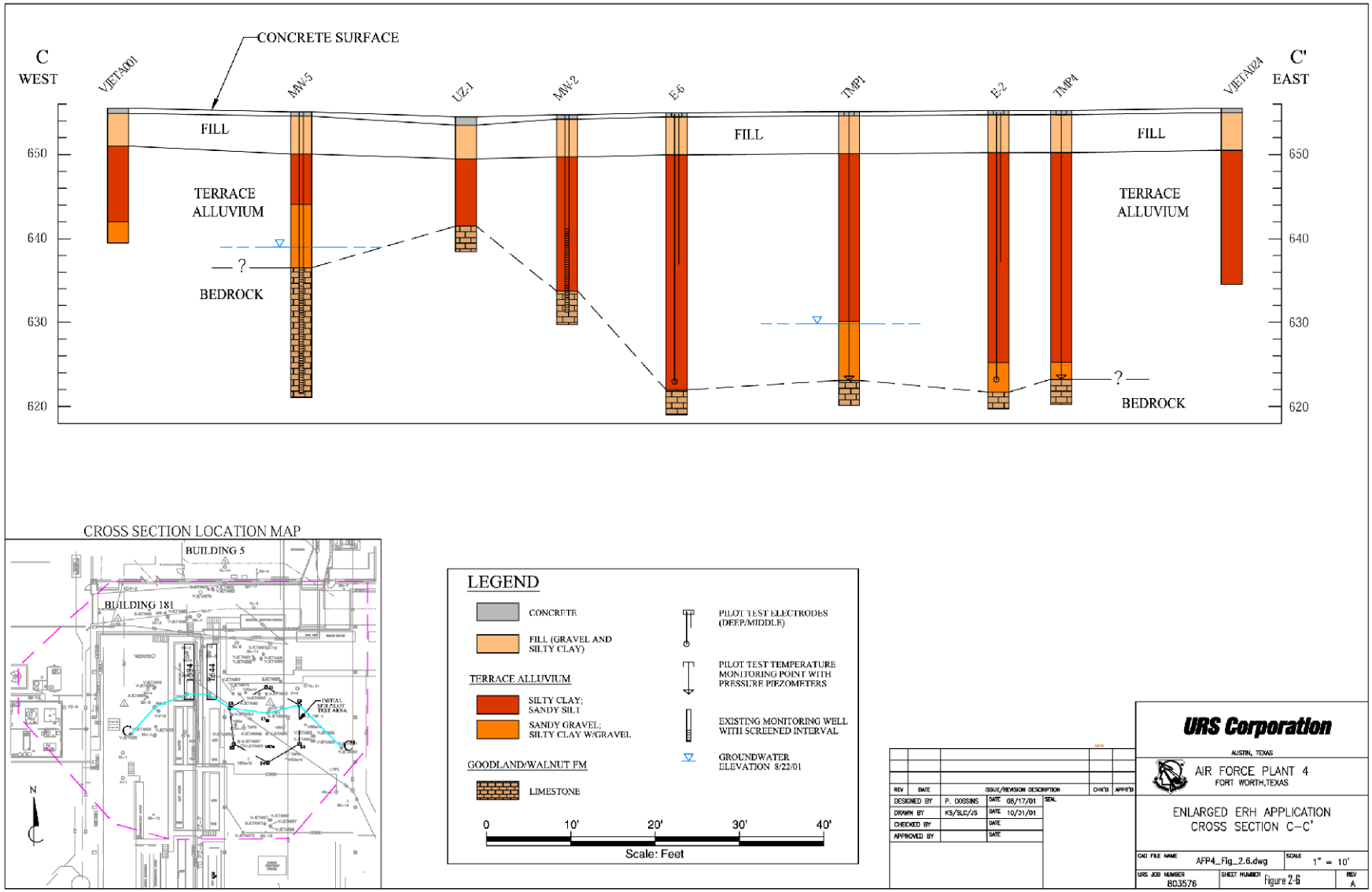
LF4/5 treatment system to be turned off as Permeable Reactive Barrier wall is installed in March/April 2002, and we will assess the reduction in plume concentrations. Over 1000' long, ~25"deep!

Installation of Permeable Reactive Barrier

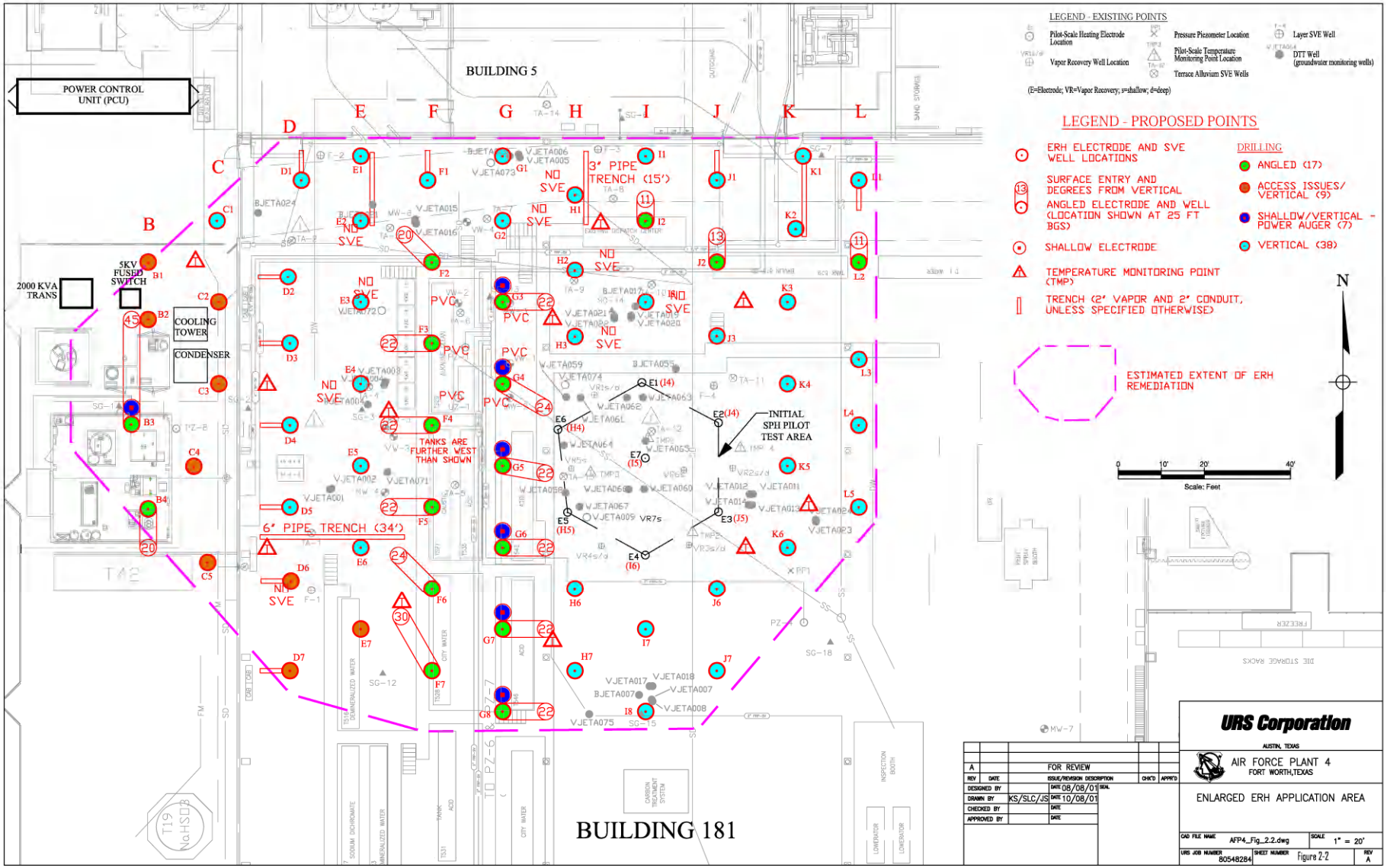
Electrical Resistance Heating - 3 Phase (was 6)



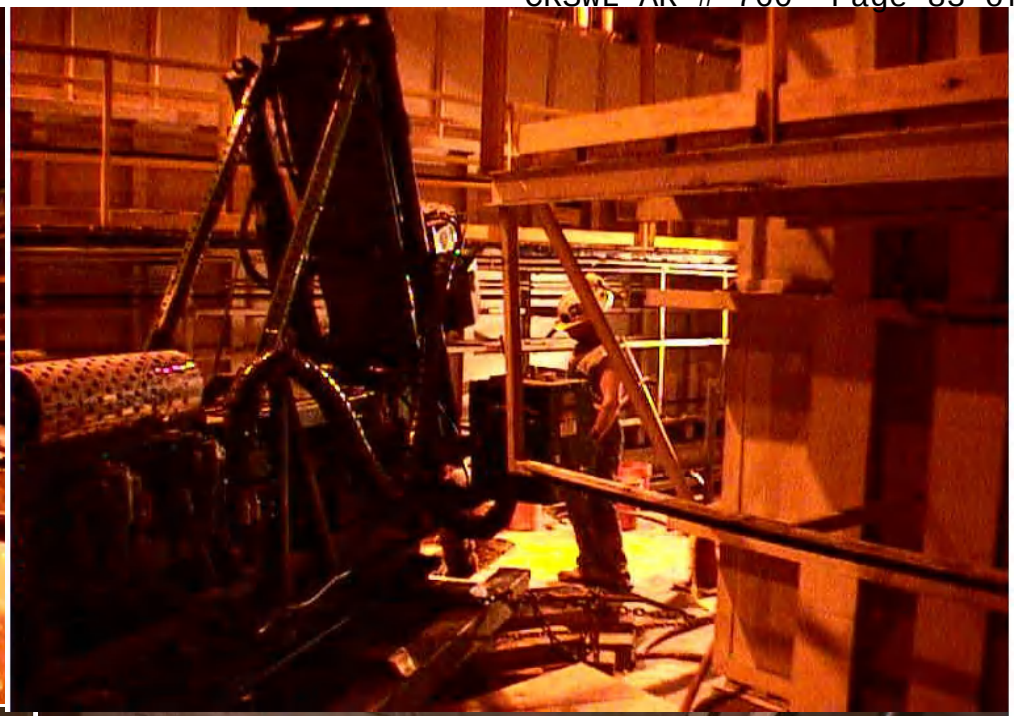
Building 181 and EPL Conceptual Site Model



Enlarged ERH Application Cross Section C-C’

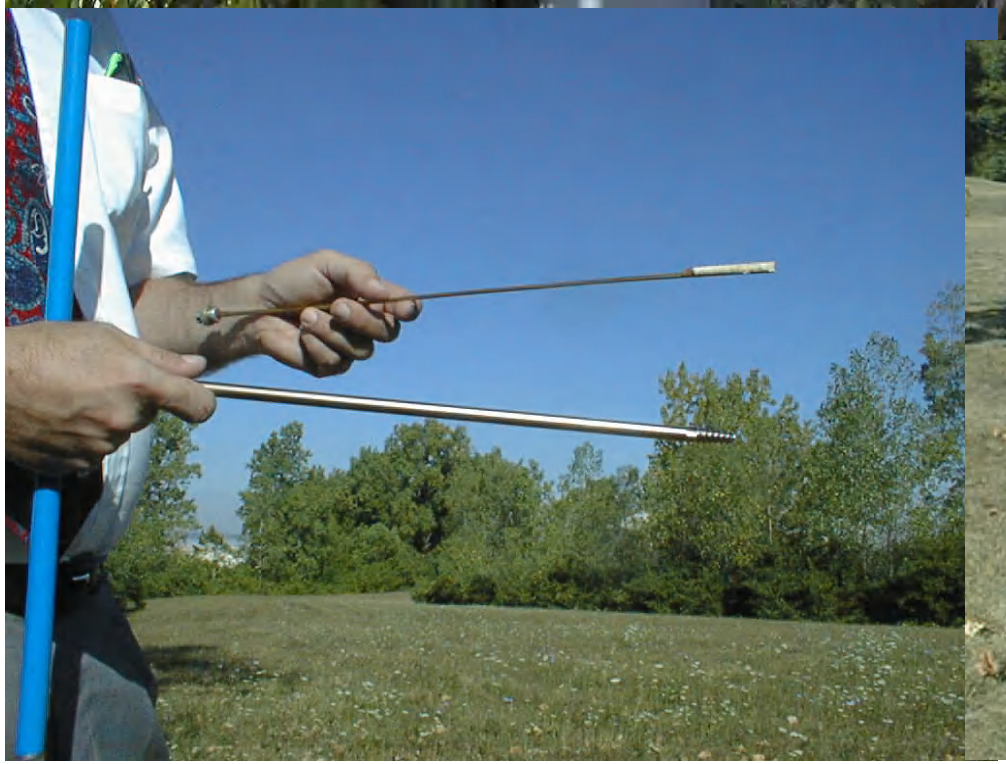


Enlarged ERH Application Area



Another way to sample groundwater!

Greg Harvey - the tree guy!



Web sites of Environmental Interest!

(does not imply an endorsement by the US GOV'T or suggest we will use their technology in the future!)

Electrical Resistance Heating - www.thermalrs.com

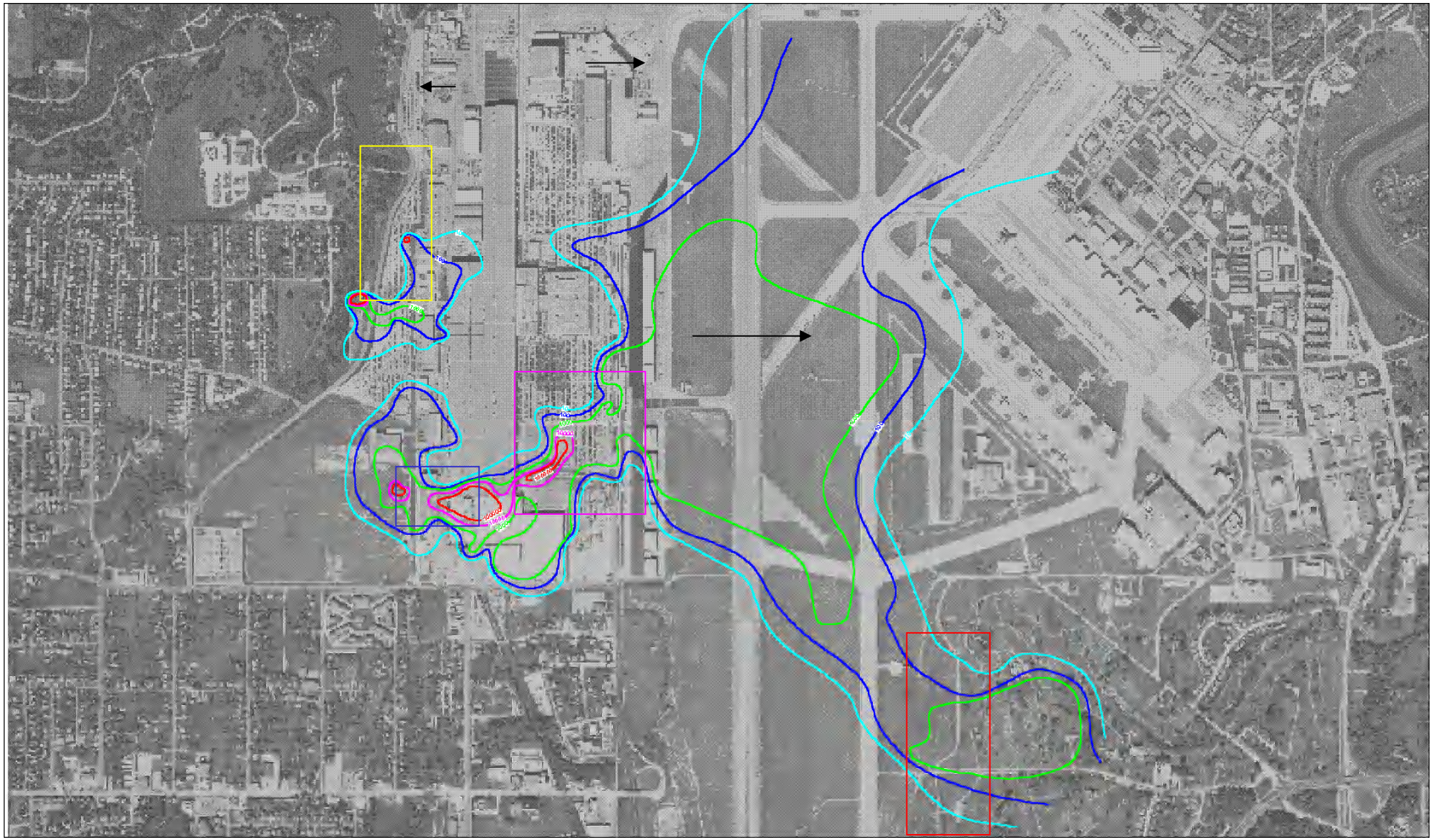
Hydrogen Release Compound - www.regenesis.com

Free Environmental Software - www.ehsfreeware.com

Public Health Assessment AFP 4 -
www.atsdr.cdc.gov/HAC/PHA/afp/afp_p2.html

Air Force Museum - www.asc.wpafb.af.mil/museum/

FY02 Budget is IN! Now to start working on FY03. Any Ideas?




Harvey's Kids (and he has one more!)
Discussion??
1-800-982-7248, ext 416

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE