DJR
12/7/93

PHASE I
ENVIRONMENTAL SITE ASSESSMENT
and
LIMITED SOIL SAMPLING AND ANALYSIS

DYSART DRAINAGE CHANNEL
ASSIGNMENT NO. FCD-037
MARICOPA COUNTY, ARIZONA

Prepared For:

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

Prepared By:

CEC/WRA
4041 North Central Avenue, Suite 1050
Phoenix, AZ 85012-3393

November 30, 1993
WRA File AR390-2073

AR390-2073.at1

CEC WRA
• Certified Environmental Corporation, Inc. •
• Water Resources Associates, Inc. •

November 30, 1993

Ms. Catesby W. Moore
Environmental Program Manager
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, Arizona 85009

SUBJECT: PHASE I ENVIRONMENTAL SITE ASSESSMENT AND LIMITED SOIL SAMPLING AND ANALYSIS, DYSART DRAINAGE CHANNEL, ASSIGNMENT NO. FCD-037, MARICOPA COUNTY, ARIZONA

Dear Ms. Moore:

CEC/WRA is pleased to submit this report of our Phase I Environmental Site Assessment (ESA) and Limited Soil Sampling and Analysis at the subject property. This report is provided in completion of the Scope of Work as described in our proposal dated September 29, 1993, accepted in your letter dated September 30, 1993.

If you have any questions concerning this document, please call either of us at (602) 248-8808. We appreciate the opportunity to complete this important work for the District.

Respectfully submitted,

CEC/WRA

Alan C. Thomas
Manager
Environmental Assessment Services

Edward D. Ricci
Vice President

Enclosure: Phase I ESA Report

cc: WRA File AR390-2073

Phoenix, AZ • Benicia, CA • Salt Lake City, UT • Denver, CO • Sacramento, CA • Lake Forest , CA • Prescott, AZ

AR390-2073.at1
4041 North Central Avenue
Suite 1050
Phoenix, Arizona 85012-3393

Office: (602) 248-8808
FAX: (602) 248-7722
Toll Free: (800) 554-0288

Flood Control District of Maricopa County
Construction and Operations Division
Interoffice Memo

SUBJECT: Dysart Drain - Interceptor Channel

DATE: February 2, 1994

TO: Don Rerick **FROM:** David Gardner

VIA: Catesby Moore

The Phase I assessment of the property for the interceptor channel is complete. Five copies of the report are attached for your use.

The report did not find any significant environmental concerns with this property. A pipe near the center of the property was found and not identified. Identification of this pipe should be made prior to excavation.

We will take no further actions with regard to the interceptor channel portion of this project. If you have any questions, please contact me.

EXECUTIVE SUMMARY

Flood Control District of Maricopa County has retained Certified Environmental Corporation, Inc./Water Resources Associates, Inc. (CEC/WRA) to perform a Phase I Environmental Site Assessment (ESA) and Limited Soil Sampling and Analysis at the Dysart Drainage Channel, Maricopa County, Arizona

The Phase I ESA included a review of selected public environmental and historical records concerning the subject property and adjacent areas. The assessment also included a visual observation of the site in order to confirm aspects of the records review and to identify features suggesting the potential presence of hazardous substances on the subject property, or the potential for migration of hazardous substances from adjacent land onto the subject property.

Based on the results of this assessment, CEC/WRA has developed the following conclusions and recommendations regarding the subject property.

Superfund Sites

CEC/WRA personnel reviewed extensive documentation regarding the Superfund investigation at Luke AFB. To date, 42 specific sites have been identified for investigation. One site, the Drainage Ditch Disposal Area, appears to potentially have a direct impact on the subject property. This site was a former drainage ditch which was used for landfilling general refuse during the 1940's. Buried materials reportedly included concrete rubble, wire, fencing, and waste lumber. Isolated areas of sub-surface hydrocarbon contamination have been detected in this area. In addition, the detection of trinitrotoluene (TNT) at very low levels in isolated spots suggests that munitions residues may have been buried in this area.

Although the landfill does not appear to extend onto the subject property, CEC/WRA recommends that care be exercised when excavating in the area where the drain passes under Northern Avenue. If evidence of hazardous materials is observed, the base environmental staff should be contacted immediately. The District may also wish to request that an explosives expert be available to identify any suspicious items which may be encountered.

Adjacent Petroleum Releases

Review of Luke AFB records indicates that two sub-surface petroleum releases have occurred near the subject property. One is associated with building 353, a facility which was used for the maintenance of large fuel-tanker trucks for many years. The second is a recently discovered release from a large above-ground jet fuel storage tank known as facility 351.

The lateral and vertical extent of soil contamination resulting from the release at building 353 has been determined, and the contamination does not appear to have extended onto the subject property. Remediation of the site by soil vapor extraction is on-going. However, because the point of release was located less than 75 feet away from the Dysart Drain channel, care should be taken during any excavation in the immediate vicinity of the site. If evidence of hydrocarbon contamination is encountered in shallow

→ NO EXCA. REQ'D. AT THIS LOCATION.

surface soils, the work in this area should cease until proper safety precautions have been established and a plan for dealing with the contaminated soils has been coordinated with LAFB authorities. The District should also carefully document any observations of contaminated soils to confirm that they represent existing site conditions, and not conditions which were caused by the District's activities. Sampling and analysis may be required at that time for the purposes of documentation.

The extent of the release from facility 351 has not yet been determined. Soil contamination has been confirmed to a depth of greater than 200 feet. It is not yet known whether groundwater has been impacted by this release, which occurred approximately 400 feet down-gradient from the Dysart Drain channel. Lateral migration of soil contamination more than 400 feet is not likely, and if lateral migration has occurred it is not likely to be encountered during the shallow excavation required for re-engineering of the channel. However, if evidence of hydrocarbon contamination is observed during excavation, the precautions described above should be followed.

Surface Soil Sampling

Because the 160-acre parcel has historically been used for the production of row crops, CEC/WRA recommended that surface soils be screened to quantify potential residues of persistent pesticides and herbicides which were commonly used in the 1940's through the 1960's. The limited program of soil sampling included the collection of four composite surface soil samples from the 160-acre parcel. The samples were analyzed for organochlorine pesticides and herbicides, as well as organophosphorus pesticides.

Only one of the target compounds was detected. The compound 4,4'-DDE, an aerobic degradative product of the pesticide DDT, was detected in each of the composite samples at levels ranging from 34 to 170 micrograms per kilogram (ug/kg). Similar background levels of DDT and its breakdown products are commonly seen in areas of the Salt River Valley where cotton or other crops were grown from the 1940s through the 1960s. The observed concentrations compared favorably with the Arizona Department of Environmental Quality (ADEQ) Health-Based Guidance Level (HBGL) of 4,000 ug/kg of total DDT (including its breakdown products) in soil.

Based on this data, it is the opinion of CEC/WRA that further investigation of pesticide residues in surface soils on the 160-acre parcel is not warranted.

Sediment Sampling

The Phase I ESA confirmed the potential for mobilization of a wide variety of contaminants through surface drainage from the industrial areas of Luke AFB adjacent to the Dysart Drain. Potential contaminants included hydrocarbons, solvents, polychlorinated biphenyls (PCBs), toxic metals, pesticides, and herbicides.

To investigate these concerns, two surface sediment samples were collected from the drain, one from an unlined portion immediately upstream from the point where the drain goes underground, and another from the lined area immediately upstream of the drain's exit from the base at Litchfield Road.

Analysis of these screening samples did not reveal significant concentrations of the target contaminants. Total petroleum hydrocarbons were detected, as expected, but at levels well below 100 milligrams per kilogram (mg/kg). No halogenated or aromatic solvents were detected. Metals were detected only at insignificant levels, and no significant pesticides or herbicides were detected. The compound 4,4'-DDE was detected at a level very similar to that observed in the fields upstream.

The scope of this sampling and analysis does not conclusively address the potential for isolated areas of contamination in the channel, which receives input from several feeder drains. However, the locations of these screening samples were chosen to represent the most likely worst case. The analytical results, when combined with the extensive data obtained through the Luke AFB Superfund investigation, suggest that widespread contamination of the Dysart Drain by surface runoff is not likely. Based on this information, it is the opinion of CEC/WRA that further investigation of the surface sediment is not warranted for the purposes of re-engineering the channel, and is not suggested at this time.

It should also be noted that this sampling does not address the potential for contaminants which might be introduced downstream from Luke AFB. However, the lined portions of the channel downstream of the base appear to have been effectively scoured during high-flow conditions, resulting in a channel which was virtually free of sediment, and thus is unlikely to retain contaminants.

Adjacent Wells

Near building 1365 on Luke AFB, a monitor well is present within approximately ten feet of the south bank of the Dysart Drain channel. Care should be taken during any excavation of this area to ensure that the integrity of the wellhead is not compromised, or that any annular space surrounding the well casing does not collapse, thus creating an opportunity for infiltration of surface water to the sub-surface.

Well Abandonment

One unused water well was observed on the subject property. This well was capped at the surface with a steel plate. CEC/WRA was not able to determine whether the plate was water-tight.

Arizona law requires that all unused wells be capped in accordance with Rule R-12-15-822, or abandoned in accordance with Rule R-12-15-816.

It is important for a property owner to realize that capping a well may not prevent or eliminate all the associated liability, although the requirements of ADWR have been met. Even in the cased portion of a well, there may be a large void area in the annulus outside the casing. If the well provides a means of contaminant migration, the property owner may incur some degree of responsibility, even though the contamination may have been caused by another. The proper abandonment of a well seals the annular space, eliminating the well as a potential means of contaminant migration.

Because the area is to be used as a retention basin, the integrity of the well is very important. CEC/WRA recommends that the well be inspected to determine whether it has been properly abandoned according to ADWR guidelines.

Several other wells appear to be registered on the subject property, although some of the registrations may represent duplicate registrations of the same well. No other wells were observed during the site inspection. If additional wells are encountered during construction of the site, CEC/WRA would recommend that their integrity be evaluated by a qualified hydrogeologist and that they be abandoned if necessary to ensure that they do not provide a conduit for groundwater contamination.

Our site observations did not reveal other significant evidence to suggest the potential presence of petroleum or hazardous substances on the subject property at the time of the assessment. No further investigation, other than that described above, is suggested at this time.

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1.0 INTRODUCTION

1.1 BACKGROUND

The Flood Control District of Maricopa County (FCDMC) has retained Certified Environmental Corporation, Inc./Water Resources Associates, Inc. (CEC/WRA) to perform a Phase I Environmental Site Assessment (ESA) and Limited Soil Sampling and Analysis at the Dysart Drainage Channel in Maricopa County, Arizona. This work was performed in accordance with the Scope of Work outlined in the CEC/WRA proposal dated September 29, 1993, and accepted by the Flood Control District of Maricopa County in a letter letter dated September 30, 1993.

It is CEC/WRA's understanding that FCDMC intends to re-engineer the channel to improve its drainage performance, and that this assessment has been commissioned to document baseline conditions in the channel right-of-way prior to construction activities. The assessment is also intended to identify potential hazards or impediments which may be encountered during excavation of the site.

CEC/WRA also understands that a 160-acre parcel north of Luke AFB is to be acquired for use as a sedimentation basin upstream of the Base. In addition to the pre-construction issues discussed above, this assessment is intended to serve as a due diligence inquiry prior to acquisition of the 160-acre parcel.

1.2 SCOPE OF WORK

This Phase I ESA included a review of selected public environmental and historical records concerning the subject property and adjacent areas. The assessment also included a visual observation of the site in order to confirm aspects of the records review, and to identify features suggesting the potential presence of hazardous substances on the subject property, or the potential for migration of hazardous substances from adjacent land onto the subject property.

The limited program of soil sampling and analysis included the collection of four composite surface soil samples from an agricultural parcel of the property, with analysis for a broad range of pesticides and herbicides. In addition, two samples of surface sediment were collected from the Dysart Drain channel and were analyzed for pesticides, herbicides, toxic metals, solvents, polychlorinated biphenyls (PCBs), and petroleum hydrocarbons.

1.3 LIMITATIONS

1.3.1 Phase I ESA Limitations

The conclusions presented herein are based on CEC/WRA's interpretation of selected available data. This Environmental Site Assessment does not include an evaluation of occupational health and safety hazards. CEC/WRA is not responsible for the accuracy of data obtained from officials of regulatory agencies nor for discrepancies between our conclusions and future activities at the site which may result in conditions not detected during this investigation. Our interpretations are based upon the review of selected public records, observations of specific field conditions and upon analytical data resulting from samples taken at discrete locations. It should also be recognized that CEC/WRA's work was done in accordance with our understanding of the regulatory standards which existed at the time the work was performed. The presence, nature, or extent of potential contamination on the subject property can only be conclusively

2.0 SITE INFORMATION

2.1 LOCATION

The subject property is an irregularly-shaped parcel of land located in western Maricopa County, Arizona, as shown in Figures 1 and 2. The site contains the existing right-of-way for the Dysart Drainage Channel, which collects surface drainage from a large area near Luke Air Force Base (LAFB). The channel right-of-way is approximately 4 miles in length and ranges from 100 to 135 feet in width. The subject property also contains a small rectangular parcel at the channel's discharge into the Agua Fria River, and a quarter-section of land which is intended for use as a sedimentation basin upstream of Luke AFB.

As shown in Figure 2, the site is located in Sections 1, 2, 3, 4 and 5 of Township 2 North, Range 1 West, and in Section 32 of Township 3 North, Range 1 West of the Gila and Salt River Baseline and Meridian.

2.2 SITE DESCRIPTION

CEC/WRA personnel visited the subject property on October 26, November 9, and November 24, 1993. The site visits were conducted to confirm aspects of the records review, and to visually identify features suggesting the potential presence of hazardous substances on the subject property, or the potential for migration of hazardous substances from adjacent properties onto the subject property. Mr. Dave Gardner, Civil Engineering Technician with the Environmental Branch of the Flood Control District of Maricopa County, was present during the October 26, 1993 site inspection. Mr. Geoff Hamlin and Mr. Jeff Rothrock of the 58 Civil Engineering Squadron Environmental Flight (Luke AFB) accompanied CEC/WRA on the November 9, 1993 site inspection. Mr. Nicholas Durflinger of the LAFB Environmental Flight was the point of contact on the November 24, 1993 site inspection.

Relevant site observations are illustrated in Figures 3 and 4. Selected photographs taken at the time of the site inspections are included as Appendix C.

For ease of reference in the following site description, the subject property will be divided into five sections.

East of El Mirage Road

Then first portion of the subject property to be inspected was the section east of El Mirage Road. This property, which is located in the East Half of Section 1, consists of a 130' wide strip, including the Dysart Drain channel and the associated easements, together with a rectangular parcel of approximately one acre at the channel's outfall to the Agua Fria River.

The spillway (photo # 1) was concrete-lined and had a shallow retention area at its base. The retention area was filled with water at the time of the site inspection. Below the mouth of the spillway was a collection of concrete rubble and rusted steel reinforcing bars (photo # 2). The river bank sloped downward approximately 15 feet below the surrounding grade to become an irregular surface of sand, gravel and cobbles in the river bed (photo # 3). A small lagoon was present in the river bed near the spillway (photo # 4). Non-hazardous trash such as cans, bottles, papers, and landscaping debris was scattered about the area. Some trash had been carried onto the property by floodwaters and was stuck in the trees and bushes.

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Flood Control District of Maricopa County has retained Certified Environmental Corporation, Inc./Water Resources Associates, Inc. (CEC/WRA) to perform a Phase I Environmental Site Assessment (ESA) and Limited Soil Sampling and Analysis at the Dysart Drainage Channel, Maricopa County, Arizona

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Well Abandonment

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Arizona law requires that all unused wells be capped in accordance with Rule R-12-15-822, or abandoned in accordance with Rule R-12-15-816.

It is important for a property owner to realize that capping a well may not prevent or eliminate all the associated liability, although the requirements of ADWR have been met. Even in the cased portion of a well, there may be a large void area in the annulus outside the casing. If the well provides a means of contaminant migration, the property owner may incur some degree of responsibility, even though the contamination may have been caused by another. The proper abandonment of a well seals the annular space, eliminating the well as a potential means of contaminant migration.

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CEC/WRA also understands that a 160-acre parcel north of Luke AFB is to be acquired for use as a sedimentation basin upstream of the Base. In addition to the pre-construction issues discussed above, this assessment is intended to serve as a due diligence inquiry prior to acquisition of the 160-acre parcel.

1.2 SCOPE OF WORK

This Phase I ESA included a review of selected public environmental and historical records concerning the subject property and adjacent areas. The assessment also included a visual observation of the site in order to confirm aspects of the records review, and to identify features suggesting the potential presence of hazardous substances on the subject property, or the potential for migration of hazardous substances from adjacent land onto the subject property.

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1.3 LIMITATIONS

1.3.1 Phase I ESA Limitations

The conclusions presented herein are based on CEC/WRA's interpretation of selected available data. This Environmental Site Assessment does not include an evaluation of occupational health and safety hazards. CEC/WRA is not responsible for the accuracy of data obtained from officials of regulatory agencies nor for discrepancies between our conclusions and future activities at the site which may result in conditions not detected during this investigation. Our interpretations are based upon the review of selected public records, observations of specific field conditions and upon analytical data resulting from samples taken at discrete locations. It should also be recognized that CEC/WRA's work was done in accordance with our understanding of the regulatory standards which existed at the time the work was performed. The presence, nature, or extent of potential contamination on the subject property can only be conclusively

determined through appropriate sampling and analysis. No warranties are expressed or implied concerning potential contaminants or environmental media not addressed through sampling and analysis.

1.3.2 Limitations of Sampling and Analysis

The authorized scope of work included the collection of a limited number of samples which ultimately represent conditions at specific locations. The data is also limited by the scope of laboratory analysis, which addresses only specific target analytes. Although CEC/WRA personnel exercised professional judgement in selecting representative sample locations and recommending analytical methods, it should be understood that no program of sampling and analysis can address the presence, nature, degree or extent of all contaminants in all locations. Sampling and analysis can only serve as a tool to evaluate risk.

2.0 SITE INFORMATION

2.1 LOCATION

The subject property is an irregularly-shaped parcel of land located in western Maricopa County, Arizona, as shown in Figures 1 and 2. The site contains the existing right-of-way for the Dysart Drainage Channel, which collects surface drainage from a large area near Luke Air Force Base (LAFB). The channel right-of-way is approximately 4 miles in length and ranges from 100 to 135 feet in width. The subject property also contains a small rectangular parcel at the channel's discharge into the Agua Fria River, and a quarter-section of land which is intended for use as a sedimentation basin upstream of Luke AFB.

As shown in Figure 2, the site is located in Sections 1, 2, 3, 4 and 5 of Township 2 North, Range 1 West, and in Section 32 of Township 3 North, Range 1 West of the Gila and Salt River Baseline and Meridian.

2.2 SITE DESCRIPTION

CEC/WRA personnel visited the subject property on October 26, November 9, and November 24, 1993. The site visits were conducted to confirm aspects of the records review, and to visually identify features suggesting the potential presence of hazardous substances on the subject property, or the potential for migration of hazardous substances from adjacent properties onto the subject property. Mr. Dave Gardner, Civil Engineering Technician with the Environmental Branch of the Flood Control District of Maricopa County, was present during the October 26, 1993 site inspection. Mr. Geoff Hamlin and Mr. Jeff Rothrock of the 58 Civil Engineering Squadron Environmental Flight (Luke AFB) accompanied CEC/WRA on the November 9, 1993 site inspection. Mr. Nicholas Durflinger of the LAFB Environmental Flight was the point of contact on the November 24, 1993 site inspection.

Relevant site observations are illustrated in Figures 3 and 4. Selected photographs taken at the time of the site inspections are included as Appendix C.

For ease of reference in the following site description, the subject property will be divided into five sections.

East of El Mirage Road

Then first portion of the subject property to be inspected was the section east of El Mirage Road. This property, which is located in the East Half of Section 1, consists of a 130' wide strip, including the Dysart Drain channel and the associated easements, together with a rectangular parcel of approximately one acre at the channel's outfall to the Agua Fria River.

The spillway (photo # 1) was concrete-lined and had a shallow retention area at its base. The retention area was filled with water at the time of the site inspection. Below the mouth of the spillway was a collection of concrete rubble and rusted steel reinforcing bars (photo # 2). The river bank sloped downward approximately 15 feet below the surrounding grade to become an irregular surface of sand, gravel and cobbles in the river bed (photo # 3). A small lagoon was present in the river bed near the spillway (photo # 4). Non-hazardous trash such as cans, bottles, papers, and landscaping debris was scattered about the area. Some trash had been carried onto the property by floodwaters and was stuck in the trees and bushes.

A small natural channel was present on the adjacent property to the northwest of the spillway. Several areas of wildcat dumping (photo # 5) were visible in this channel. The dumping appeared primarily to consist of household refuse, furniture, and landscaping debris, although dumping of hazardous materials could not be precluded.

Moving upstream to the west, the channel itself was concrete-lined, as shown in photo # 6. Several stormwater inlets to the channel were observed, including roadside drains as shown in photo # 7.

Isolated small areas of surface staining were visible on the access road which runs parallel to the channel along its south side. These appeared to be the result of routine oil leaks from vehicles using the road. The stains appeared to be very limited in vertical and horizontal extent.

No other significant staining was observed in this area of the site. No significant odors were noted.

Between El Mirage and Dysart Roads

This portion of the property, which is located in Section 2, consist of the concrete-lined channel itself, along with easements on either side for a total width of 130 feet. Other than occasional inlet pipes from small retention areas along the channel, the only significant features were a natural drainage channel which intersects the Dysart Drain approximately 1500 feet west of El Mirage Road, and the Morton Salt/Amerigas facility near Dysart Road.

The natural channel, which may be seen as a dotted line in Figure 2, flows from northwest to southeast across Section 2. An inlet structure has been constructed in the Dysart Drain to receive drainage from this channel under high-flow conditions (photo # 8). A bypass pipe is present to drain the channel under low-flow conditions. South of the channel in this area, on the adjacent property, was an abandoned tail-water or stock-watering pond, which had since been used for dumping household debris, tires, and trash which did not appear to be hazardous, although this assessment could not be confirmed through visual inspection. An abandoned irrigation valve box was located near the pond (photo # 9).

During the October 26, 1993 site inspection, a work crew was saw-cutting the concrete liner of the drain in this area. A temporary dam had been constructed in the channel, and water was being pumped from the channel to the surface of the adjacent land to the south (photos # 10 and 11).

At the eastern end of this section, the Dysart Drain runs through a salt-mining facility owned by the Morton Salt company. At this facility, high-salinity deep groundwater is pumped to large evaporation ponds (photo # 12), which are located on both sides of the Drain. White surface staining and corrosion of a concrete bridge (photo # 13) suggested a very high salt content in surface runoff from this facility.

The subterranean salt domes resulting from the mining operation are used by another company, Amerigas, for the storage of propane gas. The Amerigas facility is located immediately adjacent to the north of the subject property. One drum storage area (photo # 14) was located along the fenceline adjacent to the channel. The drums appeared to hold primarily oils, greases, and acids. The drum storage area had a concrete secondary-containment facility and appeared to be well-kept. Several above-ground storage tanks (photo # 15) were present at the Amerigas facility. These appeared primarily to contain water or compressed gases.

Numerous small pipes from the Morton and Amerigas facilities discharged to the channel. These pipes appeared to carry surface drainage from isolated low-lying areas of the adjacent properties.

Near the intersection of the channel with Dysart Road, a 4-inch vertical steel pipe had been excavated at the time of the site visit (photo # 16). The pipe appeared to represent access to an irrigation pipeline which runs parallel to the channel on its south side. The pipe contained a valve approximately five feet below the ground surface.

Between Dysart and Litchfield Roads

Continuing upstream to the west of Dysart Road, the channel is concrete-lined as shown in photo # 17. The channel passes north of Luke Elementary School and the Luke AFB family housing area, and south of a large area of fallow farmland. Several pipes or channels (such as that shown in photo # 18) have been installed to allow surface drainage and irrigation overflow to drain into the channel.

In reaction to flooding of the base housing area in 1992, Luke AFB has recently imported fill materials to raise the level of the south bank of the channel in this area. Evidence of this activity is shown in photo # 19.

Continuing to the west, the channel remains concrete-lined, and is bounded by a recreation area and several large parking lots to the south, and by fallow farmland to the north. Several pipelines cross the channel in this area (photo # 20) and numerous pipes are present to drain irrigation overflow (photo # 21) or stormwater from the adjacent recreation areas and parking lots.

The Luke AFB military dog kennel and training area is also located north of the channel in this area. Immediately adjacent to the kennel, the base has constructed a large unlined retention basin approximately 8 feet deep (photo # 22). Base personnel stated that the basin was intended as a temporary emergency measure until the completion of the Dysart Drain re-engineering project.

On-Base Portion of Channel

Continuing upstream to the west, the channel passes under Litchfield Road and enters the controlled area of Luke AFB, before turning to a north-south orientation along the west side of Litchfield Road. The channel is still concrete-lined at this point.

Several storm-water outfalls from the northeast portion of the bases enter the drain at this point. Four large parallel pipes, approximately 30" in diameter, carry stormwater from the bulk fuel storage area and Civil Engineering yard to the west. A four-inch cast iron pipe (photo # 23) appears to have once carried overflow from a floor drain at the adjacent refueling vehicle maintenance facility, although the facility is no longer used.

Several industrial facilities are located on the west side of the drain. The primary hazardous waste storage building for the base (photo # 24) is located in this area. This facility was designed as a hazardous waste storage area and appeared to be well maintained. This area also contained a trailer-mounted soil-vapor extraction unit (photo # 25), which was being used for remediation of a LUST incident at the refueling vehicle maintenance facility (building 353, which is discussed in detail in Section 5.2 of this report).

The base pesticide storage facility was located just north of the refueling vehicle maintenance shop, on the west side of the drain (photo # 26). This facility was properly signed and appeared to be well-maintained. Continuing to the north was a new military vehicle filling station (photo # 27). The USTs associated with this facility were recently installed and utilize up-to-date leak detection systems.

Beyond the military filling station, the lined channel swings back toward an east-west orientation. However, the apparent path of an older, unlined channel continues in the north-south orientation along the west side of Litchfield Road and merges with the main channel in this area (photo # 28). This older channel would collect storm-water from a portion of the northeast corner of the base and would discharge to the Dysart Drain. Several pieces of heavy machinery were stored in this area, as were large piles of construction materials and scrap metal.

Continuing upstream to the northwest, the channel passes a fenced area which contains a large burner. This unit is used to combust fuel vapors from the bulk fuel storage systems. Several small pipes, which area reportedly associated with the burner system, protrude from the ground near the channel in this area. Heavy equipment is stored adjacent to the channel in this area, and small areas of oily surface staining were visible in the equipment storage area. One small above-ground fuel tank was present.

The channel then passes underground through a large concrete box-culvert for approximately 500 feet before emerging in an east-west orientation immediately adjacent to the base perimeter, along the south side of Northern Avenue. The channel is much narrower and shallower in this area, and is no longer concrete-lined upstream of the box culvert.

Across the perimeter road to the south was the North Fire Training Area, a Superfund site which is discussed in detail in Section 6.0 of this report. A soil-vapor extraction system has been installed in this area (photo # 29).

Several agricultural drainage outfalls, ranging from small pipes to large box culverts, pass under Northern Avenue and discharge to the Dysart Drain. Many of the outfalls are heavily clogged with silt (photo # 30).

Continuing upstream to the west, the channel passes a small cluster of buildings which are primarily administrative, although a small above-ground fuel storage tank is present. One monitor well is present immediately adjacent to the channel in this area (photo # 31).

Near the extreme northwest corner of the base, the drain passes through several large culverts under Northern Avenue (photo # 32) before continuing as an unlined open channel along the northern side of the road. The channel's original path continues to the west, however, and forms a low-lying area along the perimeter fence (photo # 33). This area has been identified as a former landfill and has been designated as Superfund site # DP-13, which is discussed in detail in Section 6.0 of this report.

Upstream of Luke AFB and 160-Acre Parcel

At the time of the site visit, the 160-acre parcel was partially planted with mature rosebushes and partially with onions. A portion of the onion crop had recently been harvested and the ground was bare. This portion of the site is shown in photos # 35 and 36. Several irrigation ditches had been installed on the 160-acre parcel. Some were concrete-lined and were rust-stained, presumably from the high iron content characteristic of groundwater in the area. Others were unlined bare-earth ditches which had a typical darkening of the soil at the high-water line (photos # 34 and 37).

The Dysart Drain continues as a very shallow unlined channel along the north side of Northern Avenue. The channel switches to a grouted rip-rap surface and turns north at the northeast corner of Northern Avenue and Reems Road (photo # 38). The discernible channel gradually disappears at this point, as Reems Road itself becomes the stormwater collector for the area.

Near the northwest corner of the 160-acre parcel is a small homestead made up of two mobile homes, several trees, an above-ground water tank and a capped well (photo # 39). Farm machinery and the remnants of an irrigation pumping system area present in this area.

3.0 REGIONAL SETTING

3.1 TOPOGRAPHY

CEC/WRA reviewed selected United States Geological Survey (USGS) topographic maps for the Waddell and El Mirage Quadrangles to confirm field observations of topography and drainage on the subject property. According to the USGS maps, the site lies at approximately 1,100 feet above mean sea level (msl). The subject area property is relatively flat, with a theoretical gradual downward slope toward the east, to the Agua Fria River. However, recent subsidence in the area of Luke AFB has apparently reversed the natural slope to some degree. More varied topography is present nearer the Agua Fria floodplain, on the eastern end of the subject property.

3.2 GEOLOGY AND HYDROGEOLOGY

The subject property lies in the Salt River Valley, a broad alluvial basin within the Basin and Range physiographic province, which includes Southern Arizona. The Basin and Range province is characterized by a series of northwest trending fault-bounded mountain ranges separated by alluvial valleys.

The Salt River Valley is surrounded by mountain composed primarily of granite, metamorphic and volcanic rocks, and minor amounts of sedimentary rocks. The valley floor is generally characterized by basin-fill deposits of varying thickness. The area of the subject property is underlain by irregular fluvial and lacustrine deposits of sand, gravel, silt, and clay extending to approximately 500 feet below ground surface (bgs) (Brown and Pool, 1989).

Review of the Arizona Department of Water Resources (ADWR) Hydrologic Map Series, Report No. 12, indicates that ground-water below Luke AFB occurs at approximately 350 feet bgs. The general direction of ground water flow beneath the base is toward the west-southwest.

Nearer the Agua Fria River, the local influence of the natural channel shifts groundwater flow toward the south-southwest, and groundwater is typically encountered at a much shallower depth of 180 to 210 feet, depending on recent weather conditions.

3.3 GROUNDWATER QUALITY

Extensive water quality data has been developed for Luke AFB as part of the Superfund investigation and during routine drinking water monitoring. Groundwater in the area is generally high in fluorides, iron, salinity, and total dissolved solids. Luke AFB personnel provided monitoring data for the most recent five quarters for wells MW-110, MW-111, and MW-119, all of which are located near the Dysart Drain channel. Organic compounds have been detected at very low levels (generally less than 5 parts per billion) in ground water. The detected compounds include various trihalomethanes, 1-2-dichloropropane, toluene, 1,2-dichloroethane, and bis (2-ethylhexyl) phtalate. No clear pattern of groundwater impact has emerged. The source of these compounds has not yet been determined, and continued investigation is planned.

3.4 METEOROLOGY

The Salt River Valley lies in the northeastern part of the Sonoran desert, characterized by hot summers and cool winters. The average daily maximum temperature is 105 F in July and 65 F in December, while daily minimum temperatures average 80 F in July and 39 F in December. Annual rainfall averages approximately 7.5 inches on the valley floor, with most of the precipitation occurring during two rainy seasons. In winter, occasional storm systems moving inland from the Pacific Ocean result in widespread rainfall of light to moderate intensity. Summer storm events are typically caused by warm air masses moving northward from the Gulf of Mexico and the west coast of Mexico. Summer rainfall events are generally more localized and highly variable in intensity. Potential annual lake evaporation has been measured at 72 inches of water and thus may be approximately 10 times annual rainfall in the Salt River Valley (Brown and Pool, 1989).

4.0 HISTORICAL LAND USE

In order to investigate the history of the subject property, CEC/WRA reviewed selected aerial photographs, historical maps, and reports of previous investigations of the property.

4.1 HISTORICAL AERIAL PHOTOGRAPHS

Aerial photographs available from Landiscor and Rupp Aerial Photography were reviewed for an evaluation of historical conditions on the subject and adjacent properties. The photo sequence for the subject property begins in 1949. A summary of our observations is provided below:

03-27-49 The 160-acre parcel is active farmland. A small pond is visible near the northeast corner of the parcel. Luke AFB is present in its early form, and consists primarily of many rows of long, barracks-style buildings. The base is confined to the west side of Litchfield Road; the current community center and family housing areas are not present. A drainage channel, apparently the predecessor of the Dysart Drain, is visible running from west to east along the north perimeter of the base, then turning and running from north to south along the east perimeter of the base, on the west side of Litchfield Road. It is not clear whether this channel is concrete-lined. No drainage channel is visible in the area between Litchfield Road and the Agua Fria River. This area is a combination of active farmland and native desert. Neither the Morton Salt plant nor the Luke School have been constructed. A natural drainage channel cuts across Section 2, from northwest to southeast. A large pond and corral are visible near the channel bed.

01-03-58 The subject property and surrounding areas are very similar to their configuration in the 1949 photograph. The bulk fuel storage facility has been constructed on the base, approximately 500 feet west of the current path of the Dysart Drain. The gravel mining operations in the Agua Fria River bed are visible.

01-21-64 The Dysart Drain is visible in its current configuration along the north and east perimeter of the base, then turning east and heading toward the Agua Fria River. Landfilling operations are evident at the extreme northwest corner of the base. A large circular above-ground tank (apparently a water tank) is visible adjacent to the channel along the north perimeter of the base. The LAFB family housing area has been constructed.

10-09-67 The subject and adjacent properties appear to be similar to their configuration in the 1964 photo. A small homestead is visible in the northwest corner of the 160-acre parcel. The landfilling at the northwest corner of the base continues. A small industrial facility (DPDO) has been constructed north of the channel in the extreme northeast corner of Luke AFB. The recreation area has been built along the south side of the channel, east of Litchfield Road. The land has been cleared for the Morton Salt complex, but no facilities have been built.

01-11-73 Very little change from the 1967 photo, except that the base hospital has been constructed south of the channel and the Civil Engineering complex has been built on-base west of the channel. The Morton Salt facility has been built south of the channel. A few small buildings and a single evaporation pond are visible. Sand and gravel mining operations continue in the Agua Fria River bed.

12-14-78 The Morton salt facility has been expanded to the north side of the channel. Several small buildings and a second evaporation pond are visible. Otherwise, very little change from the 1973 photo.

12-07-83 The DPDO facility at the northeast corner of the base appears to have been abandoned. Otherwise, no significant change occurs from the 1978 photo.

12-30-86 The Morton Salt facility has been expanded, and the Amerigas facility has been constructed. otherwise, little change from the 1983 photo.

12-31-89 Very little change occurs from the 1986 photo.

12-26-91 Very little change occurs from the 1989 photo.

4.2 HISTORICAL CITY DIRECTORIES AND MAPS

Because of the size and nature of the subject property, because it has no definitive street address, and because of its remote location relative to central Phoenix, a search of historical City directories and Sanborn Fire Insurance maps was impractical.

4.3 U. S. GEOLOGICAL SURVEY TOPOGRAPHIC MAPS

CEC/WRA reviewed the USGS 7.5 minute topographic maps for the Waddell Quadrangle, dated 1974, and the El Mirage Quadrangle, dated 1975, to evaluate evidence of historical development on the subject property. This review indicated that at the time the maps were developed, the subject property was developed in its current configuration. Other than to record a well near the northwest corner of the 160-acre parcel, the maps did not reveal further information beyond that gained from aerial photographs.

5.0 REGULATORY RECORDS REVIEW

5.1 U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

CERCLA Federal Superfund Sites - CEC/WRA reviewed the EPA list of "Superfund" program National Priorities List (NPL) sites in Arizona, dated June 20, 1993. This review indicated that a portion of the subject property is located on a listed Superfund site, Luke Air Force Base (LAFB). A thorough discussion of the LAFB Superfund site and its potential impact on the subject property is provided in Section 6.0.

The subject site is not located within a 2-mile minimum search distance of any other federal NPL sites.

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) - The U.S. EPA CERCLIS list is used to track activities or sites which have been reported to the EPA as candidates for investigation under the federal Superfund program. Review of the CERCLIS list, dated June 9, 1993, indicated that the subject property is located within a 1-mile minimum search distance of three listed CERCLIS sites. One of these is the LAFB site which was previously discussed. Specific information on the listed sites is provided below:

EPA ID #	Facility	Address	Action	Approximate Location Relative to Site
AZO570024133	Luke AFB	Glendale Ave. & Litchfield Rd.	final NPL listing	portion of subject property
AZ1141190065	Glendale Landfill	Glendale Ave. & 115th Ave.	status not determined	3/4 mile southeast
AZD983467895	American Continental Corp.	Northern Ave. & 115th Ave.	no further action planned	3/4 mile northeast

CEC/WRA reviewed the ADEQ files regarding the Glendale Landfill and American Continental Corporation sites. The available documentation did not suggest that these sites are likely to have impacted the subject property, which is located across the Agua Fria River.

Facility Index System - The USEPA Facility Index System (FINDS) is an inventory of facilities regulated by the EPA. Review of the FINDS listing, dated September 15, 1993, revealed four listed sites within a 0.5-mile minimum search distance of the subject property. Specific information regarding the FINDS facilities is listed below:

EPA ID #	Facility	Address	Approximate Location Relative to Site
AZD8057090060	USAF Luke Air Force Base	Glendale Ave. & El Mirage Rd.	1/2 mile south
AZ4572190029	USAF Luke Waste Annex DRMO	Glendale Ave. & El Mirage Rd.	1/2 mile south

EPA ID #	Facility	Address	Approximate Location Relative to Site
AZ4971524133	USDOD DLA DRMO Luke AFB	7011 N. El Mirage Rd. Bldg. 1200	1/2 mile south
AZD983467895	American Continental Corporation.	115th Ave. & Northern Ave.	3/4 mile northeast

RCRA Database - The EPA Resource Conservation and Recovery Act (RCRA) database includes facilities that are involved in the generation, transport, treatment or disposal of hazardous waste and have been assigned an EPA identification number. Inclusion of a facility on this list does not necessarily mean that the site is contaminated or causing contamination. Review of the RCRA database indicated one registered RCRA facility within a 0.5-mile minimum search distance of the subject property. Specific information regarding the RCRA facility is listed below:

EPA ID #	Facility	Address	Approximate Location Relative to Site	Category
AZDO570024133	USAF Luke AFB	58 CSG DEEV	subject site is a portion of Luke AFB	large quantity generator

SARA Title III Notifiers - The Superfund Reauthorization and Amendments Act (SARA) requires facilities which use, handle or store significant quantities of hazardous substances to prepare plans for potential emergencies involving those substances. SARA also requires the facilities notify the public concerning these plans and to register with the USEPA. Review of the USEPA Toxic Release Inventory for 1987 through 1990, indicated that no SARA Title III facilities occurred within a 0.5-mile minimum search distance of the subject property.

Emergency Response Notification System - The EPA Emergency Response Notification System (ERNS) stores information on releases of oil and hazardous substances. Releases are recorded in ERNS when they are initially reported to the federal government by any party. A review of the ERNS database dated January 2, 1993 indicated that the subject property was not specifically listed. Six incidents at Luke AFB were listed without specific locations. Five incidents were recorded as miscellaneous aviation fuel releases ranging from 200 to 650 gallons. One incident was a waste oil release of unrecorded quantity.

A seventh recorded incident was an asbestos release from a 1988 cooling tower fire near building 1150. Although this incident occurred less than 200 feet south of the subject property, base environmental personnel stated that the incident primarily resulted in an airborne release, and is not likely to have impacted the subject property.

5.2 ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ)

Water Quality Assurance Revolving Fund (WQARF) - The WQARF program is a state equivalent to the federal Superfund program. Review of the ADEQ list of WQARF sites indicates that the subject property is not located within a two-mile minimum search distance of any WQARF site or study area.

Arizona CERCLA Information and Data System (ACIDS) - The ACIDS list is a state equivalent to the CERCLIS list, and is used a tool for managing the CERCLA and WQARF programs. Four listed ACIDS sites are located within a 1-mile minimum search distance of the subject property. Information regarding these sites is summarized in the table below.

EPA ID #	STATE ID #	Facility	Address	Location Relative to Site
AZD 980636088	0099	Glendale Landfill	115th and Glendale Avenues	0.75 miles southeast
AZ1141190065 (sic)	1005	Glendale Landfill	115th and Glendale Avenues	0.75 miles southeast
AZD983467895	0742	American Continental Corporation	115th and Northern Avenues	0.75 miles northeast
AZD980882062	0142	Tanita Farms, Inc.	NW 1/4, Sect. 12, T2N, R2W	0.5 mile west

Underground Storage Tanks - According to the ADEQ list of registered underground storage tanks (USTs), 7 registered UST facilities are located on or within a 0.5-mile minimum search distance of the subject property. The ADEQ information regarding these registered tanks is listed below:

ADEQ Registration Number	Facility Name/Address	Number of USTs	Status	Approximate Location Relative to Site
0-005340	US Air Force-Luke Air Force 58 SG/DEV	97	14 removed 8 closed 75 current	subject property is a portion of Luke AFB
0-001169	Circle K # 42 13827 W. Glendale Ave.	3	removed	0.5 mile south
0-001528	Circle K # 1908 13839 W. Glendale Ave.	2	current	0.5 mile south
0-005666	Circle K # 7963 13110 W. Glendale Ave.	2	current	0.5 mile south
0-002271	City Landfill 115 Ave. & Glendale Ave.	1	current	0.75 mile southeast
0-001752	Malco M & M Self Service 13812 W. Glendale Ave.	3	removed	0.5 mile south

ADEQ Registration Number	Facility Name/Address	Number of USTs	Status	Approximate Location Relative to Site
0-005708	Leyton Woolf 8805 Reems Rd.	1	current	0.25 mile north

Leaking Underground Storage Tanks - Review of the ADEQ list of leaking underground storage tanks (LUSTs) indicates that 8 reported LUST incidents have occurred within a 0.5-mile minimum search distance of the subject property. Information regarding the leaking tanks is listed below:

ADEQ Case #	Facility Name/Address	Date Reported	ADEQ Status	Approximate Location Relative to Site
005340*4715.0241	US Air Force - Luke Air Force 58th SG/DEV Base Exchange Gas Station	11-10-86	closed 04-29-87	0.2 miles south
005340*4715.0330	US Air Force - Luke Air Force 58th SG/DEV Bldg 299	08-18-87	closed 11-01-89	0.2 miles south
005340*4715.1351	US Air Force - Luke Air Force 58th SG/DEV Bldg 353	07-17-90	open	adjacent to west
005340*4715.2723	US Air Force - Luke Air Force 58th SG/DEV Bldg 351	03-18-93	open	0.1 mile west
005340*4715.2742	US Air Force - Luke Air Force 58th SG/DEV Bldg 405	03-24-93	open	0.5 mile southwest
005340*4715.2774	US Air Force - Luke Air Force 58th SG/DEV Bldg 1132	04-21-93	open	0.3 mile south
005340*4715.2854	US Air Force - Luke Air Force 58th SG/DEV Bldg 1114	03-30-93	open	0.2 mile south
001752*4715.2150	Malco M & M Self Service 13812 W. Glendale Ave.	01-09-92	open	0.5 mile south

CEC/WRA personnel reviewed the open LUST files available from ADEQ. Based on the information contained in the ADEQ files, two incidents appeared to have a potential impact on the subject property.

The first is associated with building 353, a facility which was used for the maintenance of large fuel-tanker trucks for many years. The second is a recently discovered release from a large above-ground jet fuel storage tank known as facility 351.

The lateral and vertical extent of soil contamination resulting from the release at building 353 has been determined, and the contamination does not appear to have extended onto the subject property. Remediation of the site by soil vapor extraction is on-going.

The extent of the release from facility 351 has not yet been determined. Soil contamination has been confirmed to a depth of greater than 200 feet. It is not yet known whether groundwater has been impacted by this release, which occurred approximately than 400 feet down-gradient from the Dysart Drain channel.

Open/Closed Landfills - CEC/WRA reviewed the ADEQ lists of reported municipal solid waste landfills (MSWLF), private solid waste landfills (PSWLF), rubbish landfills (RLF), and closed solid waste open dumps (CSWOD).

One closed solid waste landfill, known as the Design Master Homes site, is located at 115th Avenue, 1/2 south of Olive Avenue. This site, which is listed in the CERCLIS and ACIDS databases as the American Continental Corporation landfill, is located approximately 3/4 mile northwest of the subject property.

One active municipal landfill is located approximately 3/4 mile southeast of the subject property. This facility is the Municipal Glendale Landfill.

No other listed facilities are located within two miles of the subject property.

Registered Dry Wells - Arizona rules require owners to register all dry wells on their property with ADEQ. The Water Permits Unit of ADEQ maintains a list of all dry wells that have been registered with the State to date. According to ADEQ records, there are five registered dry well sites within a 0.5 mile radius of the subject property. Specific information regarding the registered dry well sites is listed below:

Facility	Address	Number of Dry Wells	Approximate Location Relative to Site
Luke AFB	Litchfield Rd. and Glendale Ave.	1	unknown
NCO Open Mess	D & F Streets, 2nd & 3rd Streets, Luke AFB	4	1/8 mile southwest
Luke Elementary School	7300 North Dysart Road	3	adjacent to south
Retail Center	SE corner Litchfield Rd. & Glendale Ave.	4	1/2 mile south
MacDonald's Restaurant	NE corner Litchfield Rd. & Glendale Ave.	1	1/2 mile south

RCRA Compliance Log - The Resource Conservation and Recovery Act (RCRA) Compliance Log, maintained by ADEQ, lists facilities which have been reported to be in violation of RCRA hazardous waste regulations. Review of the log indicated that Luke AFB, with its waste storage annex near the Agua Fria River, has an extensive RCRA compliance history. Most of the documentation regarded waste characterization, container labeling, and waste storage. However, a recent report entitled RCRA

Facilities Assessment (Geraghty & Miller, 1993) focused on historical RCRA compliance as it may have impacted property conditions on the base. Several areas of concern were identified in the vicinity of the Dysart Drain. However, upon further investigation only one of these areas was found to warrant physical investigation. This area represented a suspected surface release of hydrocarbons associated with building 353. Initial investigation of this site, which is located approximately 150 feet from the channel, suggests that the resulting hydrocarbon contamination is limited to shallow sub-surface soils. This site is not expected to impact the subject property.

No other listed facilities were located within a 0.5-mile radius of the subject property.

5.3 ARIZONA DEPARTMENT OF WATER RESOURCES (ADWR)

According to the Arizona Department of Water Resources (ADWR), there are 52 registered wells located on the subject property or within a one-half mile radius. In addition, ten wells may be located within a 0.5-mile radius, although their exact location is unknown. Specific information concerning the wells is listed below:

Location	Owner	Registration Number	Depth (ft)	Diameter (in)	Well Use	Drill Date	Approximate Distance from Subject Property
B(2-1)1	H.W. Mason	WR 634963	350	8	W	1982	unknown
B(2-1)1BAB	E. Lee	WR 634572	300	6	W	1982	½ mile north
B(2-1)1BBA	A. A. Hullihen	WR 629354	300	8	W	1982	½ mile north
B(2-1)1BBB	Jack Talley	WR 514423	380	10	W	1986	½ mile north
B(2-1)1	O.W. Harper	WR 518426	340	8	W	1987	unknown
B(2-1)1BBB	Harold Mason	WR 803781	350	8	W	1986	½ mile north
B(2-1)1BC	I.D. Quass	WR 800659	371	12	W	1983	unknown
B(2-1)1CAB	Tanner Land Co.	WR 522729	807	16	W	1982	⅛ mile southeast
B(2-1)1CAB	Tanner Co.	WR 605119	450	16	W	1982	⅛ mile southeast
B(2-1)1CAB	The Tanner Companies	WR 605120	858	12	W	1982	⅛ mile southeast
B(2-1)1CCC	U.S. Air Force	WR 609883	596	8	W	1982	½ mile south
B(2-1)1DBC	Ariz. Municipal Corp.	WR 605121	700	10	W	1982	⅜ mile southeast
B(2-1)2	AmeriGas	WR 528938	450	6	N	1990	unknown
B(2-1)2ABA	Goodyear Tire	WR 527897	306	20	U	1990	½ mile north
B(2-1)2ACA	Goodyear Tire	WR 527898	538	20	U	1990	¼ mile north
B(2-1)2B	Suncor Development	WR 611736	720	20	W	1982	unknown
B(2-1)2BAA	Goodyear Tire	WR 527942	555	20	U	1990	½ mile north
B(2-1)2BBB	Goodyear Tire	WR 527895	605	20	U	1990	½ mile north

Location	Owner	Registration Number	Depth (ft)	Diameter (in)	Well Use	Drill Date	Approximate Distance from Subject Property
B(2-1)2BBB	Suncor Development	WR 611735	866	20	W	1982	½ mile north
B(2-1)2BBC	Goodyear Tire	WR 527984	71	20	U	1990	⅜ mile north
B(2-1)2BBC	Suncor Development	WR 611734	772	20	W	1982	⅜ mile north
B(2-1)2BBD	Southwest Salt Co.	WR 528966	625	20	U	1990	⅜ mile north
B(2-1)2BCB	Cal Gas Corp	WR 518405	400	8	O	1987	¼ mile north
B(2-1)2BCB	Cal Gas Corp	WR 518406	401	8	O	1987	¼ mile north
B(2-1)2BCB	Cal Gas Corp	WR 518407	401	8	O	1987	¼ mile north
B(2-1)2BCB	Roach & Baker Ranch	WR 606564	817	4	W	1982	¼ mile north
B(2-1)2BDA	Goodyear Tire	WR 527896	170	20	U	1990	¼ mile north
B(2-1)2CBB	Morton Salt	WR 519675	824	12	W	1987	⅛ mile south
B(2-1)2CBB	Roach & Baker Ranch	WR 618180	650	20	W	1982	⅛ mile south
B(2-1)2CD	Roosevelt Irr. Distr.	WR 607240	750	24	W	1982	unknown
B(2-1)3AAD	First Am Title Ins.	WR 606565	8521	68	W	1982	⅜ mile north
B(2-1)3ABB	Indian School	WR 606566	920	20	W	1982	½ mile north
B(2-1)3ABB	Roach & Baker Ranch	WR 606567	500	8	W	1982	½ mile north
B(2-1)3BA	First State Service	WR 601890	1060	20	W	1982	unknown
B(2-1)3DDD	Northern Water Co.	WR 606568	600	8	W	1982	½ mile south
B(2-1)4	U.S. Air Force	WR 515789	101	7	U	1986	unknown
B(2-1)4ADA	U.S. Air Force	WR 530122	140	NL	G	1990	subject property?
B(2-1)4B	U. S. Air Force	WR 524896	150	NL	G	1989	unknown
B(2-1)4BCB	U.S. Air Force	WR 507977	910	16	W	1984	⅜ mile south
B(2-1)4DAA	U.S. Air Force	WR 609882	460	16	W	1982	⅛ mile south
B(2-1)4DCB	U.S. Air Force	WR 507978	1050	16	W	1984	½ mile southwest
B(2-1)4DDA	Dept. of Air Force	WR 523309	150	16	G	1989	⅜ mile southwest
B(2-1)5	U.S. Air Force	WR 515790	101	7	U	1986	subject property ?
B(2-1)5A	U.S. Air Force	WR 515895	470	6	O	1986	subject property ?
B(2-1)5A	U. S. Air Force	WR 515896	430	6	O	1986	subject property ?
B(2-1)5A	U.S. Air Force	WR 515897	430	6	O	1986	subject property ?
B(2-1)5AAB	U. S. Air Force	WR 609886	1002	18	W	1982	⅛ mile south
B(2-1)5ABC	U.S. Air Force	WR 609888	1023	18	W	1982	¼ mile south

Location	Owner	Registration Number	Depth (ft)	Diameter (in)	Well Use	Drill Date	Approximate Distance from Subject Property
B(2-1)5BBB	J.D. Bickman	WR 504271	800	8	W	1982	⅛ mile south
B(2-1)5BBB	J.D. Bickman	WR 618171	949	20	W	1982	⅛ mile south
B(2-1)5BBB	J.D. Bickman	WR618174	600	6	W	1982	⅛ mile south
B(2-1)5BCC	U.S. Air Force	WR 609885	1002	18	W	1982	½ mile south
B(3-1)32AAA	L. Woolf	WR 610105	1320	16	W	1982	½ mile northeast
B(3-2)32BAD	L. Woolf	WR 608545	1210	6	W	1982	⅜ mile north
B(3-1)32BAD	L. Woolf	WR 610106	1400	16	W	1982	⅜ mile north
B(3-1)32BBA	L. Woolf	WR 608546	1050	18	W	1982	½ mile north
B(3-1)32BBA	L. Woolf	WR 608546	1050	18	W	1982	½ mile north
B(3-1)32BBB	L. Woolf	WR 610107	1200	20	W	1982	½ mile north
B(3-1)32CBA	Agri-Empire	WR 601889	1100	18	W	1982	subject property?
B(3-1)33DBB	Olive Ave. Homeowners	WR 618162	596	8	W	1982	½ mile north
B(3-1)32CBB	S.L. Libby	NL	700	20	W	1951	subject property?
B(3-1)32CBB	Greer-Minor Farms	NL	1100	18	W	1977	subject property?

NL	=	Not Listed	A	=	Agriculture
B	=	Utility	D	=	Domestic
E	=	Municipal	U	=	Industrial
I	=	Irrigation	W	=	Water Production

Two wells were observed on the subject property. One of the listed wells for Luke AFB is monitor well # 111, which is located immediately adjacent to the Dysart Drain Channel. In addition, one unused water well was observed near the homestead on the subject property. This well was capped at the surface with a steel plate.

Several other wells appear to be registered on the subject property, although some of the registrations may represent duplicate registrations of the same well. No other wells were observed during the site inspection.

5.4 MARICOPA COUNTY RECORDS

Illegal Dumping Sites - CEC/WRA personnel contacted Mr. Marion Sams of the Maricopa County Department of Environmental Health to obtain any information regarding illegal dumping on the subject property. Mr. Sams stated that some areas near the subject property, particularly the bed of the Agua Fria River, have historically been utilized for wildcat dumping. Mr. Sams also stated that some incidents of waste oil dumping had occurred in the vicinity of Reems Road and Northern Avenue. However, Mr. Sams stated that he had no specific knowledge about illegal dumping on the subject property.

Registered Septic Tanks - Due to the shape, size, and nature of the subject site, and the fact that it has no street address, a review of Maricopa County septic tank registration data for most of the channel was not practical. No septic tanks were registered at the homestead located at the northwest corner of the 160-are parcel.

6.0 REVIEW OF LUKE AFB SUPERFUND DOCUMENTS

CEC/WRA personnel reviewed extensive documentation regarding the NPL investigation at Luke AFB. To date, 42 specific sites have been identified for investigation. These sites are identified on the map included as Appendix B. This map is an excerpt of the LAFB Management Action Plan (Radian Corp., 1993).

Nine of the sites are located near enough to the subject property to have a potential impact. These include:

OT-01 Old Incinerator Site
FT-07 North Fire Training Area
OT-10 Concrete Rubble Burial Site
DP-13 Drainage Ditch Disposal Area
LF-14 Old Salvage Yard Burial Site
SS-16 Facility 321 UST Storage
SS-17 Former DPDO Yard
LF-37 Northeast Landfill
SS-42 Bulk Fuels Storage

According to the Draft Interim Remedial Investigation Report, Phase I, Operable Unit 1 (Geraghty and Miller, 1992) three of the sites (OT-01, OT-10, and SS-16) were dropped from the program after an initial investigation.

Site SS-42, the Bulk Fuels Storage area, was recently included in the Superfund program after a major petroleum release was confirmed. This site, also known as facility 351, was discussed in Section 5.2 of this report.

North Fire Training Area

One nearby site (FT-07) has been remediated. This area was for many years the site of training operations in which jet fuel was poured onto the ground and ignited to provide live-fire training for firefighters. According to a Pre-Design Report, North Fire Training Area (EA, 1989) the vertical and horizontal extent of soil contamination resulting from these activities was well-defined, and the contamination did not impact groundwater. According to Mr. Jeff Rothrock, the volatile components have since been removed by soil-vapor extraction, and a risk assessment is being developed to address the heavier hydrocarbons which remain in the soil. This site does not appear to have impacted the subject property.

Drainage Ditch Disposal Area

This site, DP-13, appears to potentially have a direct impact on the subject property. According to the Management Action Plan (Radian, 1993), this site was a former drainage ditch which was used for landfilling general refuse during the 1940's. Buried materials reportedly included concrete rubble, wire, fencing, and waste lumber.

During the Remedial Investigation, Phase I (Geraghty and Miller, 1992), 15 test pits were excavated in DP-13 to visually assess the buried materials. Samples were collected and analyzed from each test pit. The site also was evaluated by means of a geophysical survey and was screened for volatile contaminants by soil-gas techniques.

Relevant excerpts of the Geraghty & Miller report are included as Appendix E. The most significant finding was the detection of isolated areas of hydrocarbon contamination in the shallow sub-surface. According to the Management Action Plan (Radian 1993), seven 20-foot borings are planned for the Phase II investigation to confirm the extent of hydrocarbon contamination. Although VOCs were detected at very low levels in soil gas, none were detected in soil samples collected from the test pits, and further investigation for VOCs in this area is not planned.

It should be noted that trinitrotoluene (TNT) was detected at very low levels in three of the test pits in this area, suggesting that munitions residues may have been buried.

Sites LF-14, SS-17, and LF-37

These three sites are grouped together in the extreme northwest corner of the base. The Old Salvage Yard Disposal Site (LF-14) was reportedly used for the burial of tools and aircraft parts, and may have been used for dumping of transformer fluids. According to the Management Action Plan (Radian, 1993), PCBs have been detected at low levels in sub-surface soils approximately 15 to 25 feet below ground surface (bgs). Further investigation of this area is planned as part of the Phase II investigation.

The Radian report states that the Former Defense Property Disposal Office (DPDO) Yard, site SS-17, was used for the storage of hazardous wastes, munitions, and transformers, among other materials. During these Phase I investigation, hydrocarbons were detected at low levels in shallow sub-surface soils in this area. VOCs were not detected. The Radian report states that the extent of hydrocarbon contamination appears to have been defined, and further investigation of this site is not planned.

The Northeast Landfill, site LF-37, was used for general landfill operations. During the Phase I investigation, hydrocarbons were detected at low levels in shallow sub-surface soils in the area. The Radian report states that the extent of the hydrocarbons appears to have been defined, and further investigation of this site is not planned.

Based on this information, the only likely route for contaminant migration to the subject property is by overland runoff. Although significant surface migration is not likely to occur over the 300-400 feet from these sites to the Dysart Drain, the results of sediment sampling described in the following section should provide a basis for assessing the target contaminants associated with these sites.

7.0 SAMPLING AND ANALYSIS

7.1 SCOPE OF WORK

Because the 160-acre parcel has historically been used for the production of row crops, CEC/WRA recommended that surface soils be screened to quantify potential residues of persistent pesticides and herbicides which were commonly used in the 1940's through the 1960's. The limited program of soil sampling included the collection of four composite surface soil samples from the 160-acre parcel. The samples were analyzed for organochlorine pesticides and herbicides, as well as organophosphorus pesticides.

The Phase I ESA confirmed the potential for mobilization of a wide variety of contaminants through surface drainage from the industrial areas of Luke AFB, adjacent to the Dysart Drain. Potential contaminants included hydrocarbons, solvents, polychlorinated biphenyls (PCBs), toxic metals, pesticides, and herbicides.

To investigate these concerns, two surface sediment samples were collected from the drain, one from an unlined portion immediately upstream from the point where the drain goes underground, and another from the a lined area immediately upstream of the drain's exit from the base at Litchfield Road.

7.2 FIELD OPERATIONS

Surface soil samples were collected from the 160-acre parcel on October 26, 1993. Sample locations are illustrated in Figures 3 and 4. Twelve discrete samples were each collected for samples DD-SEQ and DD-NWG. Six discrete samples were each collected for samples DD-SWQ and DD-NEQ. Samples were collected by hand trowel and were field-composited in a stainless steel bowl. Duplicate glass containers were filled for each individual sample. The second container of each sample was used for laboratory compositing into sample DD-Comp.

Discrete sediment samples (DD-Upstream and DD-Downstream) were collected by hand trowel on November 9, 1993.

Samples were placed in glass jars, and were sealed, labeled, and immediately placed on ice for transportation to the analytical laboratory using chain-of-custody procedures. All sampling equipment was decontaminated prior to each use by washing in a solution of tap water and laboratory detergent, followed by a triple rinse in distilled water.

7.3 ANALYTICAL PROCEDURES

Surface soil samples were analyzed for organochlorine pesticides (EPA Method 8080), organochlorine herbicides (EPA Method 8140) and organophosphorus pesticides (EPA Method 8150).

In addition to the procedures described above, sediment samples were analyzed for the 8 TCLP metals, for volatile organic compounds (VOCs) by EPA methods 8010/8020, for total petroleum hydrocarbons by Method BLS-181, and for PCBs by EPA Method 8080.

7.4 LABORATORY RESULTS

Preliminary laboratory reports and chain-of-custody forms are provided as Appendix D.

Surface Soil Sampling - Only one of the target compounds was detected. The compound 4,4'-DDE, an aerobic degradative product of the pesticide DDT, was detected in each of the composite samples at levels ranging from 34 to 170 micrograms per kilogram (ug/kg). Similar background levels of DDT and its breakdown products are commonly seen in areas of the Salt River Valley where cotton or other crops were grown from the 1940s through the 1960s. The observed concentrations compared favorably with the Arizona Department of Environmental Quality (ADEQ) Health-Based Guidance Level (HBGL) of 4,000 ug/kg of total DDT (together with its breakdown products) in soil.

Sediment Sampling - Analysis of these screening samples did not reveal significant concentrations of the target contaminants. Total petroleum hydrocarbons were detected, as expected, but at levels well below 100 milligrams per kilogram (mg/kg). No halogenated or aromatic solvents were detected. Metals were detected only at insignificant levels, and no significant pesticides or herbicides were detected. The compound 4,4'-DDE was detected at a level very similar to that observed in the fields upstream.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of our records search and site observations, CEC/WRA has reached the following conclusions regarding the subject property.

8.1 SUPERFUND SITES

CEC/WRA personnel reviewed extensive documentation regarding the NPL investigation at Luke AFB. To date, 42 specific sites have been identified for investigation. Nine of these sites are located near the subject property. Three have been dropped from further investigation, one has been remediated and five remain open for investigation. One of the open sites is the bulk fuel storage area (facility 351) which is discussed below. Three other sites are grouped together in the extreme northwest corner of the base, and based on the results of the NPL investigation so far, do not appear likely to impact the subject property.

One site, the Drainage Ditch Disposal Area (DP-13), appears to potentially have a direct impact on the subject property. This site was a former drainage ditch which was used for landfilling general refuse during the 1940's. Buried materials reportedly included concrete rubble, wire, fencing, and waste lumber. Isolated areas of sub-surface hydrocarbon contamination have been detected in this area. In addition, the detection of trinitrotoluene (TNT) at very low levels in isolated spots suggests that munitions residues may have been buried in this area.

Although the landfill does not appear to extend onto the subject property, CEC/WRA recommends that care be exercised when excavating in the area where the drain passes under Northern Avenue. If evidence of hazardous materials is observed, the base environmental staff should be contacted immediately. The District may also wish to request that an explosives expert be available to identify any suspicious items which may be encountered.

8.2 ADJACENT PETROLEUM RELEASES

Review of Luke AFB records indicates that two sub-surface petroleum releases have occurred near the subject property. One is associated with building 353, a facility which was used for the maintenance of large fuel-tanker trucks for many years. The second is a recently discovered release from a large above-ground jet fuel storage tank known as facility 351.

The lateral and vertical extent of soil contamination resulting from the release at building 353 has been determined, and the contamination does not appear to have extended onto the subject property. Remediation of the site by soil vapor extraction is on-going. However, because the point of release was located less than 75 feet away from the Dysart Drain channel, care should be taken during any excavation in the immediate vicinity of the site. If evidence of hydrocarbon contamination is encountered in shallow surface soils, the work in this area should cease until proper safety precautions have been established and a plan for dealing with the contaminated soils has been coordinated with LAFB authorities. The District should also carefully document any observations of contaminated soils to confirm that they represent existing site conditions, and not conditions which were caused by the District's activities. Sample collection and analysis mat be required for documentation.

The extent of the release from facility 351 has not yet been determined. Soil contamination has been confirmed to a depth of greater than 200 feet. It is not yet known whether groundwater has been impacted by this release, which occurred approximately 400 feet down-gradient from the Dysart Drain

channel. Lateral migration of soil contamination more than 400 feet is not likely, and if lateral migration has occurred it is not likely to be encountered during the shallow excavation required for re-engineering of the channel. However, if evidence of hydrocarbon contamination is observed during excavation, the precautions described above should be followed.

8.3 SURFACE SOIL SAMPLING

Because the 160-acre parcel has historically been used for the production of row crops, CEC/WRA recommended that surface soils be screened to quantify potential residues of persistent pesticides and herbicides which were commonly used in the 1940's through the 1960's. The limited program of soil sampling included the collection of four composite surface soil samples from the 160-acre parcel. The samples were analyzed for organochlorine pesticides and herbicides, as well as organophosphorus pesticides.

Only one of the target compounds was detected. The compound 4,4'-DDE, an aerobic degradative product of the pesticide DDT, was detected in each of the composite samples at levels ranging from 34 to 170 micrograms per kilogram (ug/kg). Similar background levels of DDT and its breakdown products are commonly seen in areas of the Salt River Valley where cotton or other crops were grown from the 1940s through the 1960s. The observed concentrations compared favorably with the Arizona Department of Environmental Quality (ADEQ) Health-Based Guidance Level (HBGL) of 4,000 ug/kg of total DDT (including its breakdown products) in soil.

Based on this data, it is the opinion of CEC/WRA that further investigation of pesticide residues in surface soils on the 160-acre parcel is not warranted.

8.4 SEDIMENT SAMPLING

The Phase I ESA confirmed the potential for mobilization of a wide variety of contaminants through surface drainage from the industrial areas of Luke AFB, adjacent to the Dysart Drain. Potential contaminants included hydrocarbons, solvents, polychlorinated biphenyls (PCBs), toxic metals, pesticides, and herbicides.

To investigate these concerns, two surface sediment samples were collected from the drain, one from an unlined portion immediately upstream from the point where the drain goes underground, and another from the lined area immediately upstream of the drain's exit from the Base at Litchfield Road.

Analysis of these screening samples did not reveal significant concentrations of the target contaminants. Total petroleum hydrocarbons were detected, as expected, but at levels well below 100 milligrams per kilogram (mg/kg). No halogenated or aromatic solvents were detected. Metals were detected only at insignificant levels, and no significant pesticides or herbicides were detected. The compound 4,4'-DDE was detected at a level very similar to that observed in the fields upstream.

The scope of this sampling and analysis does not conclusively address the potential for isolated areas of contamination in the channel, which receives input from several feeder drains. However, the locations of these screening samples were chosen to represent the most likely worst case. The analytical results, when combined with the extensive data obtained through the Luke AFB Superfund investigation, suggest that widespread contamination of the Dysart Drain by surface runoff is not likely. Based on this

information, it is the opinion of CEC/WRA that further investigation of the surface sediment is not warranted for the purposes of re-engineering the channel, and is not suggested at this time.

It should also be noted that this sampling does not address the potential for contaminants which might be introduced downstream from Luke AFB. However, the lined portions of the channel downstream of the base appear to have been effectively scoured during high-flow conditions, resulting in a channel which was virtually free of sediment, and thus is unlikely to retain contaminants.

8.5 ADJACENT WELLS

Near building 1365 on Luke AFB, a monitor well is present within approximately ten feet of the south bank of the Dysart Drain channel. Care should be taken during any excavation of this area to ensure that the integrity of the wellhead is not compromised, or that any annular space surrounding the well casing does not collapse, thus creating an opportunity for infiltration of surface water to the sub-surface.

8.6 WELL ABANDONMENT

One unused water well was observed on the subject property. This well was capped at the surface with a steel plate. CEC/WRA was not able to determine whether the plate was water-tight.

Arizona law requires that all unused wells be capped in accordance with Rule R-12-15-822, or abandoned in accordance with Rule R-12-15-816.

It is important for a property owner to realize that capping a well may not prevent or eliminate all the associated liability, although the requirements of ADWR have been met. Even in the cased portion of a well, there may be a large void area in the annulus outside the casing. If the well provides a means of contaminant migration, the property owner may incur some degree of responsibility, even though the contamination may have been caused by another. The proper abandonment of a well seals the annular space, eliminating the well as a potential means of contaminant migration.

Because the area is to be used as a retention basin, the integrity of the well is very important. CEC/WRA recommends that the well be inspected to determine whether it has been properly abandoned according to ADWR guidelines.

Several other wells appear to be registered on the subject property, although some of the registrations may represent duplicate registrations of the same well. No other wells were observed during the site inspection. If additional wells are encountered during construction of the site, CEC/WRA would recommend that their integrity be evaluated by a qualified hydrogeologist and that they be abandoned if necessary to ensure that they do not provide a conduit for groundwater contamination.

8.7 SEPTIC TANKS

Although no registered septic tanks were found on the property, the homestead located at the extreme northwest corner of the 160-acre parcel probably utilizes septic tanks for the disposal of domestic waste. Because septic tanks provide a continuous access to the sub-surface, they represent an element of risk to environmental conditions on the property through the potential introduction of petroleum or hazardous substances through sinks, toilets, or drains. Based on the domestic nature of the property, the risk of

sub-surface contamination is probably limited. However, this risk may only be conclusively addressed through soil borings, sampling, and analysis in the area of the septic tanks.

Maricopa County health regulations contain specific guidelines for the closure of septic tanks. If the site is to be excavated during construction of the retention basin on the 160-acre parcel, the tanks may require removal and may be evaluated at that time.

8.8 SOIL DARKENING IN IRRIGATION DITCHES

High-water lines in tributary irrigation ditches on the 160-acre parcel displayed soil darkening characteristic of unlined irrigation channels. Similar darkening was observed in unlined portions of the main Dysart Drain channel. Although the nature and source of the darkening is not conclusively known, based on CEC/WRA's observations of other similar parcels, this darkening appears to represent a by-product of nitrogen-based fertilizers which are typically applied to cultivated fields and would be carried off by irrigation overflow.

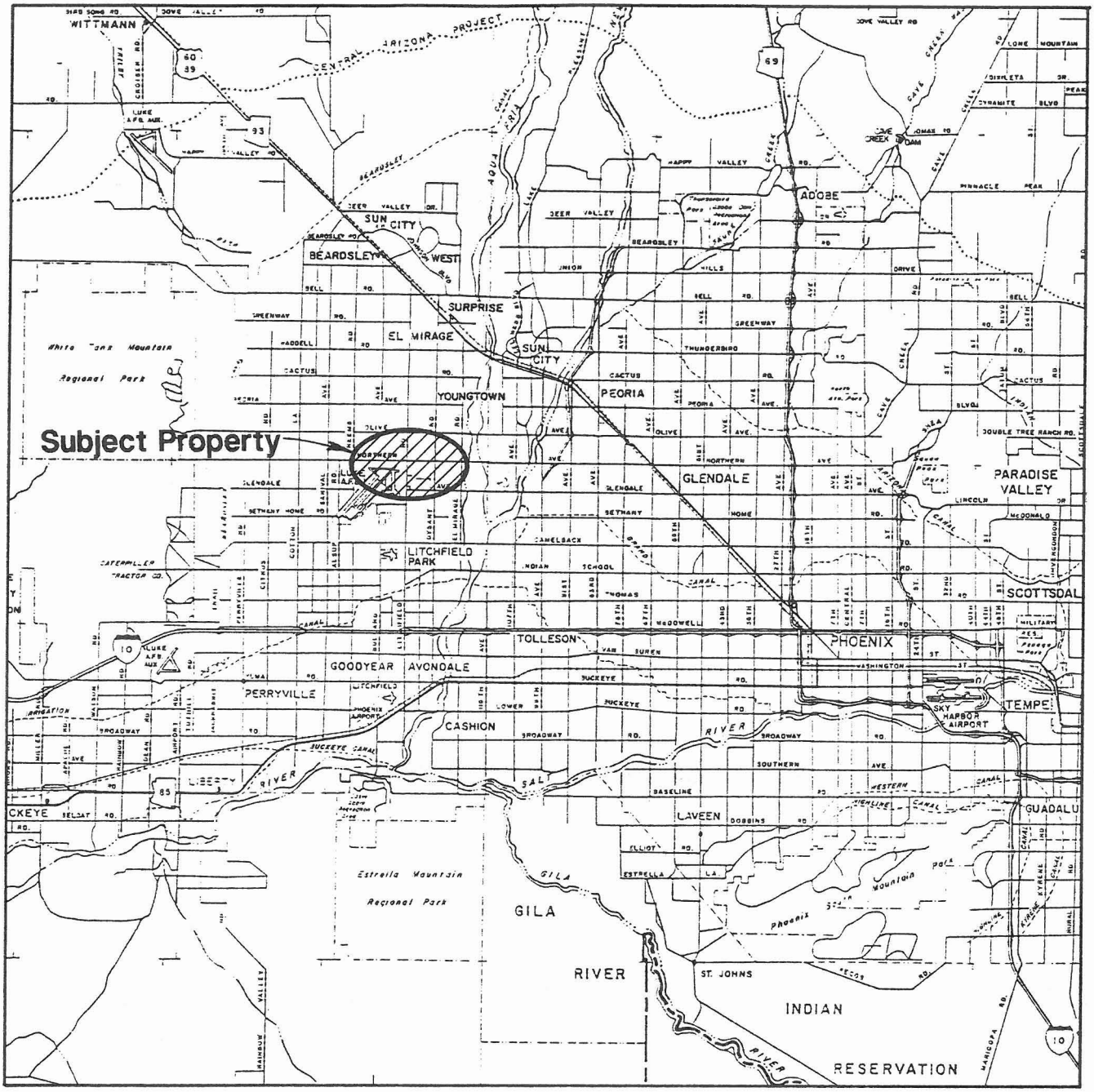
8.9 ADJACENT MORTON SALT AND AMERIGAS FACILITIES

The Morton Salt and Amerigas facilities conduct industrial operations directly adjacent to the channel. Amerigas utilizes hazardous materials in its operations, as evidenced by the drum storage area along the fenceline next to the channel. Although the possibility of contaminant migration from this facility cannot be ruled out without sampling and analysis, the facility appeared to be clean and well-kept, and no significant stains or odors were noted near the property line. Further investigation of the Amerigas facility is not suggested at this time.

The records search did not indicate that the Morton Salt facility utilizes hazardous materials in significant quantities. The facility is not registered as a hazardous waste generator, does not have registered USTs, and is not listed as a SARA Title III facility. Although the character of runoff from this facility may only be conclusively addressed through sampling and analysis, environmental investigation of the Morton Salt facility is not suggested at this time. For design purposes, it should be noted that surface runoff from this facility does contain a very high level of dissolved salt, as evidenced by the white soil staining and corroded concrete structures in the area.

Our site observations and records search did not reveal other significant evidence to suggest the presence of petroleum or hazardous substances on the subject property at this time. No further investigation, other than that discussed above, is recommended.

FIGURES



NORTH

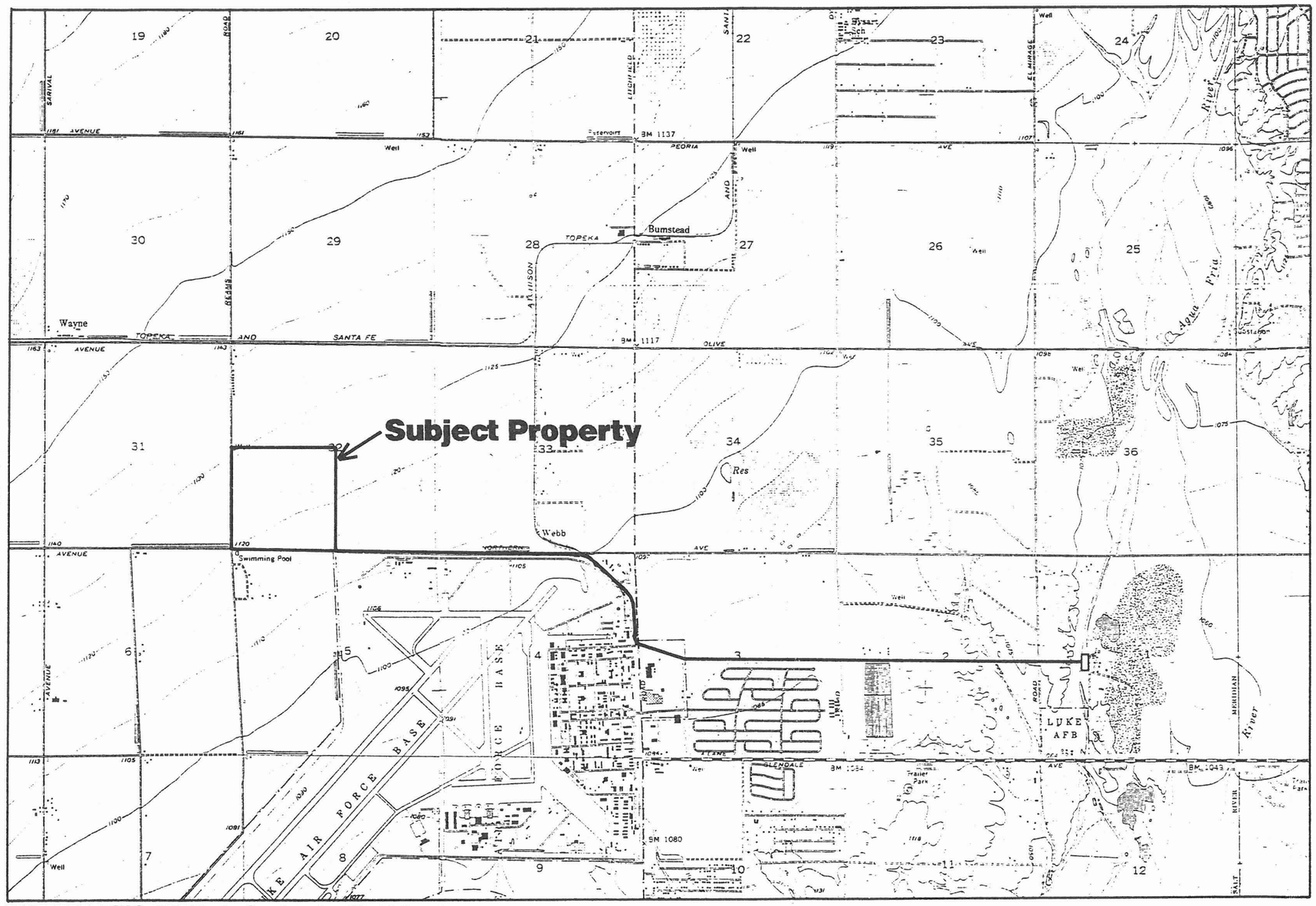
NOT TO SCALE

Water Resources Associates, Inc. A Subsidiary of Yellowstone Environmental Services, Inc.	VICINITY MAP	FIGURE 1
PROJECT NO. AR390-2073 DRAWN BY KMA DATE 11/23/93 CHECKED BY ACT		

R 1 W

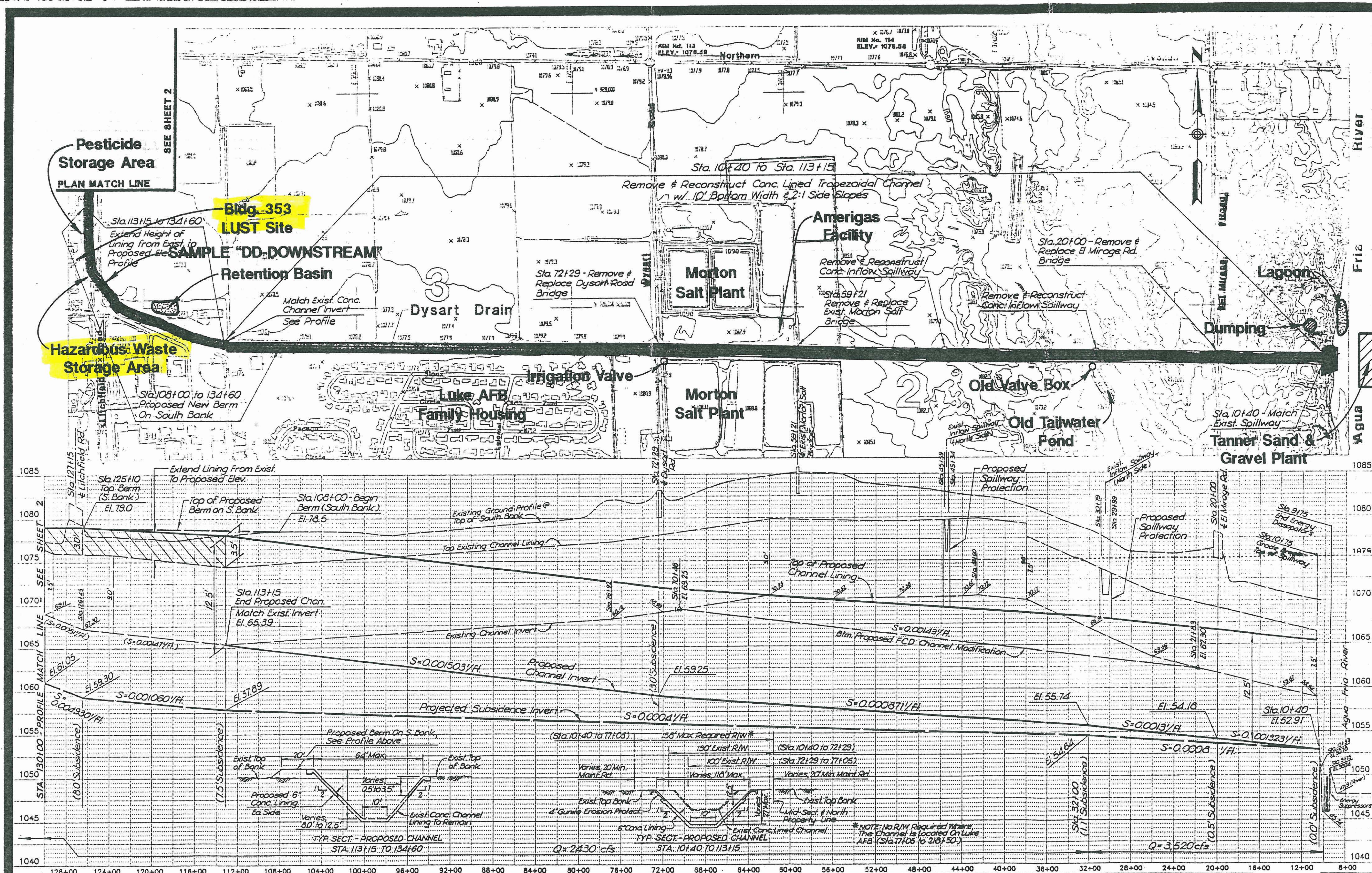
T N 3

T 2 N



BASE MAP: USGS 7.5 Minute Quadrangle - Waddell and El Mirage, AZ. (1974-75)

Water Resources Associates, Inc.		**SITE LOCATION MAP**	**FIGURE 2**
PROJECT NO. AR390-2073	DRAWN BY KMA		
DATE 11/18/93	CHECKED BY ACT		



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
Dysart Drain Improvement Project
Preliminary Design

Project

SELECTED ALTERNATIVE

Sheet Title

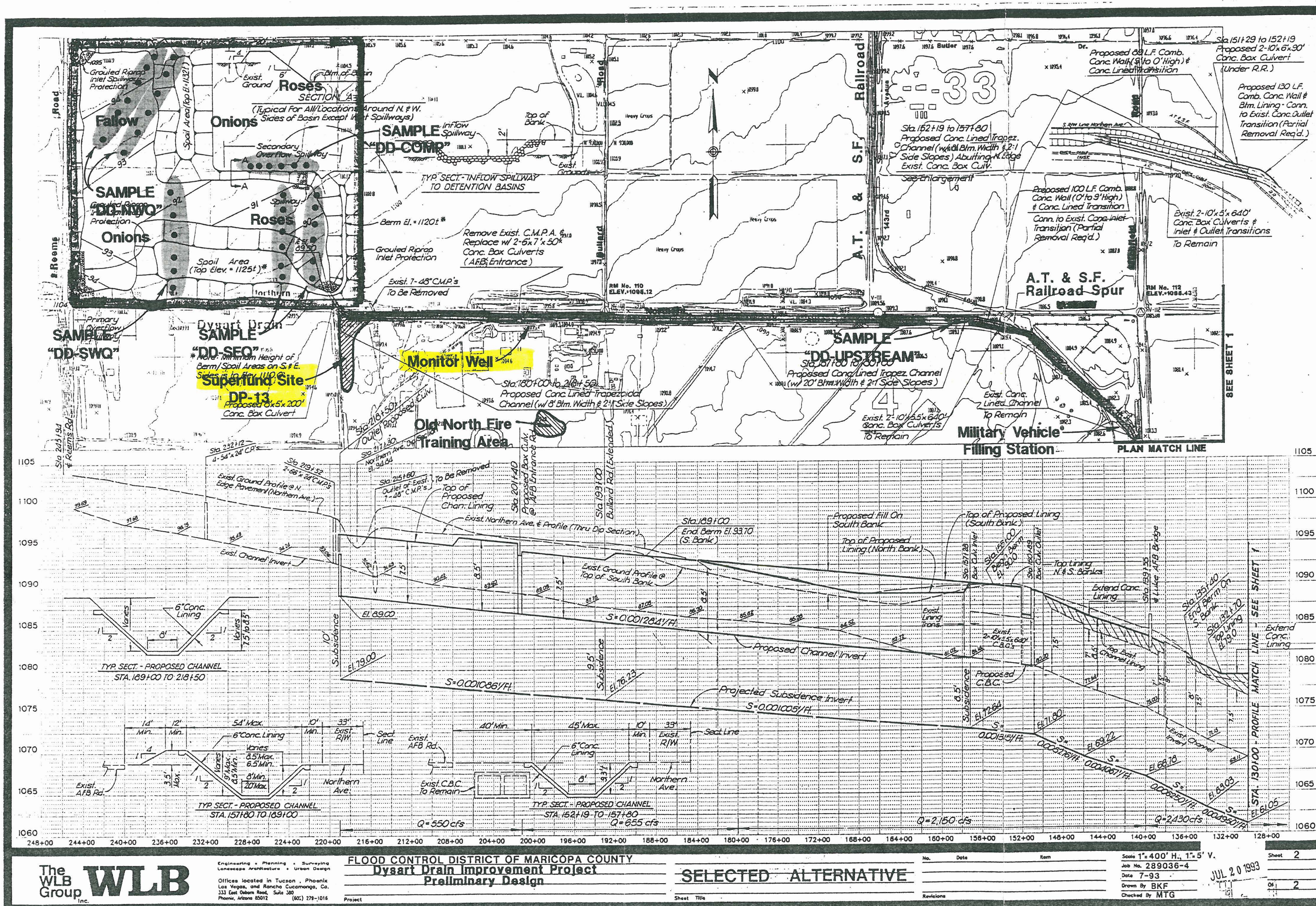
No.	Date	Item

Revisions

Scale 1"=400' H.; 1"=5' V.
Job No. 289036-4
Date 7-93
Drawn By BKF
Checked By MTG
JUL 20 1993
Sheet 1 of 2

DETAILED SITE MAP - FIGURE 3

NOT TO SCALE



DETAILED SITE MAP - FIGURE 4

NOT TO SCALE

APPENDICES

APPENDIX A

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APPENDIX B

Key Map of Luke AFB Superfund Sites

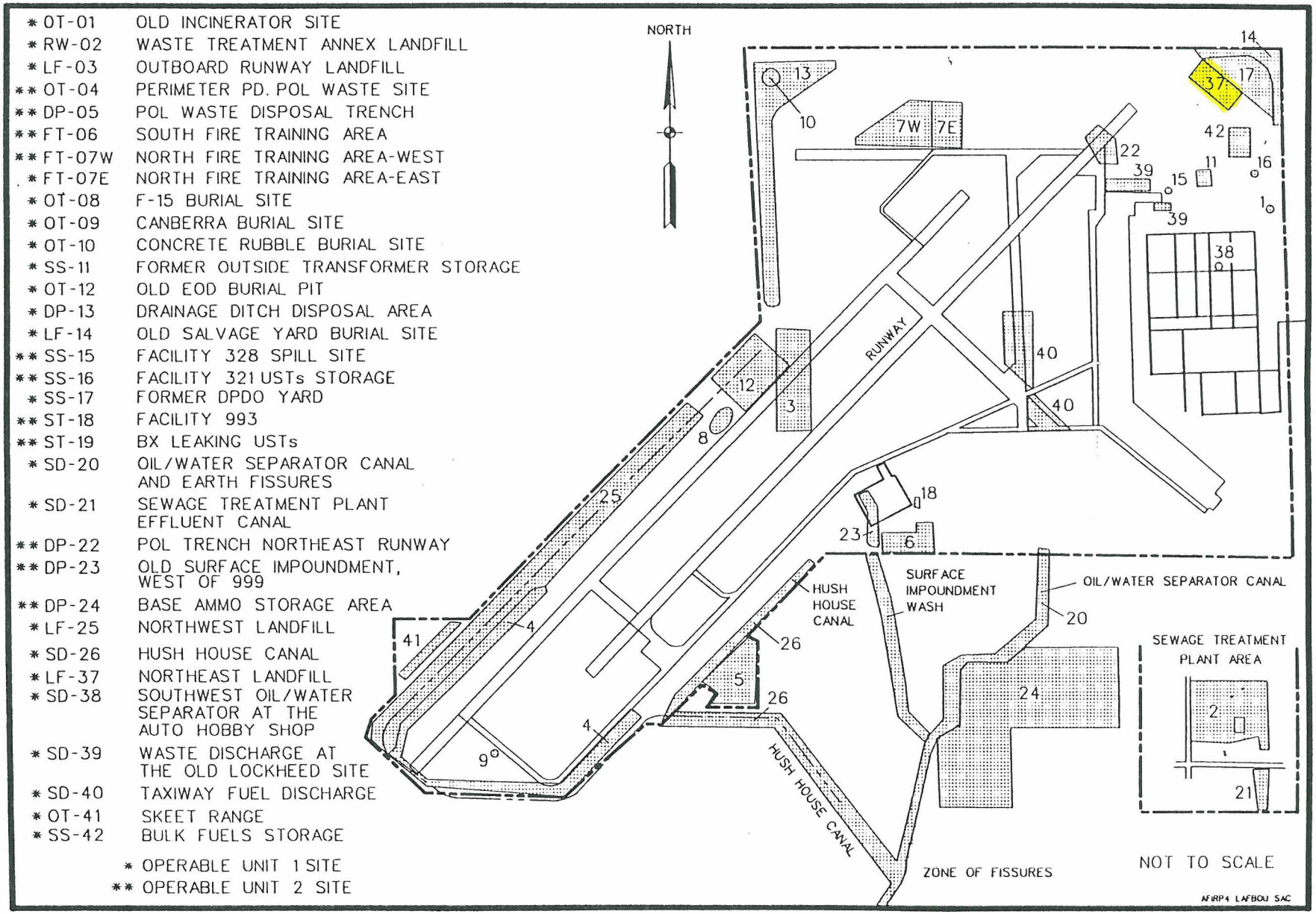


Figure 3-1. Site Locations -- Luke AFB, Arizona

APPENDIX C

Site Photographs

Appendix C
Site Photographs

PHOTOGRAPH NO.	DESCRIPTION
1.	Dysart Drain spillway into Agua Fria River. Tanner sand and gravel plant in background.
2.	Concrete rubble at spillway.
3.	Bank of Agua Fria River looking north toward spillway.
4.	Small lagoon in Agua Fria River bed north of spillway.
5.	Wildcat dumping north of spillway.
6.	Dysart Drain, looking west. Bridge at El Mirage Road.
7.	Typical roadside drainpipe.
8.	Inlet structure from natural channel to Dysart Drain.
9.	Valve box for inactive irrigation system, south of Dysart Drain.
10.	Pumping operation to drain the channel for saw-cutting concrete liner.
11.	Water being pumped onto adjacent property to the south.
12.	Adjacent evaporation ponds at Morton Salt plant.
13.	Corroded reinforced-concrete bridge over Dysart Drain at Morton Salt plant.
14.	Drum storage area at Amerigas facility, adjacent to the north.
15.	Above-ground tanks at Amerigas facility.
16.	Excavated irrigation-system valve near Dysart Road.
17.	Concrete-lined Dysart Drain channel, looking west from Dysart Road.
18.	Typical abandoned irrigation channel, with outfall to Dysart Drain.
19.	Looking east along south bank of Dysart Drain channel, adjacent to Luke AFB family housing area. Note recent earthwork to elevate south bank.
20.	Pipelines crossing channel near Litchfield Road.
21.	Typical outfall from adjacent fields.
22.	Retention basin near LAFB dog-training area, north of channel.

23. Lined channel entering Luke AFB (looking south). Note four-inch pipe discharging from south side.

24. Hazardous waste storage facility adjacent to south of channel.

25. Soil vapor extraction system associated with Building 353 LUST site. Dysart drain channel in background. Looking east.

26. Pesticide storage facility adjacent to channel.

27. USTs at military vehicle filling station, adjacent to channel.

28. Unlined drainage area near northeast corner of Luke AFB.

29. Soil vapor extraction system at old North Fire Training Area.

30. Typical agricultural drainage outfall into unlined portion of channel.

31. Typical stretch of unlined channel. Monitoring well visible adjacent to channel.

32. Entrance of channel onto Luke AFB from adjacent property. Northern Avenue in background.

33. Low-lying area near northwest corner of Luke AFB. NPL site # LF-13.

34. Typical staining along unlined portions of the channel.

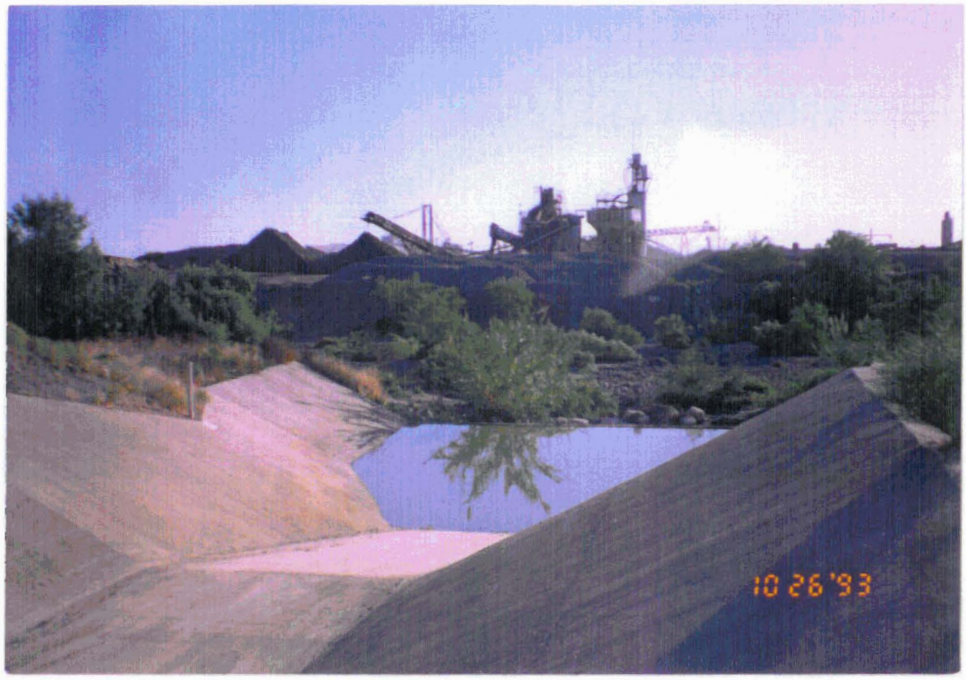
35. Onion crop and unlined irrigation ditch on 160-acre parcel.

36. Rose crop on 160-acre parcel.

37. Typical staining in unlined irrigation ditches on 160-acre parcel.

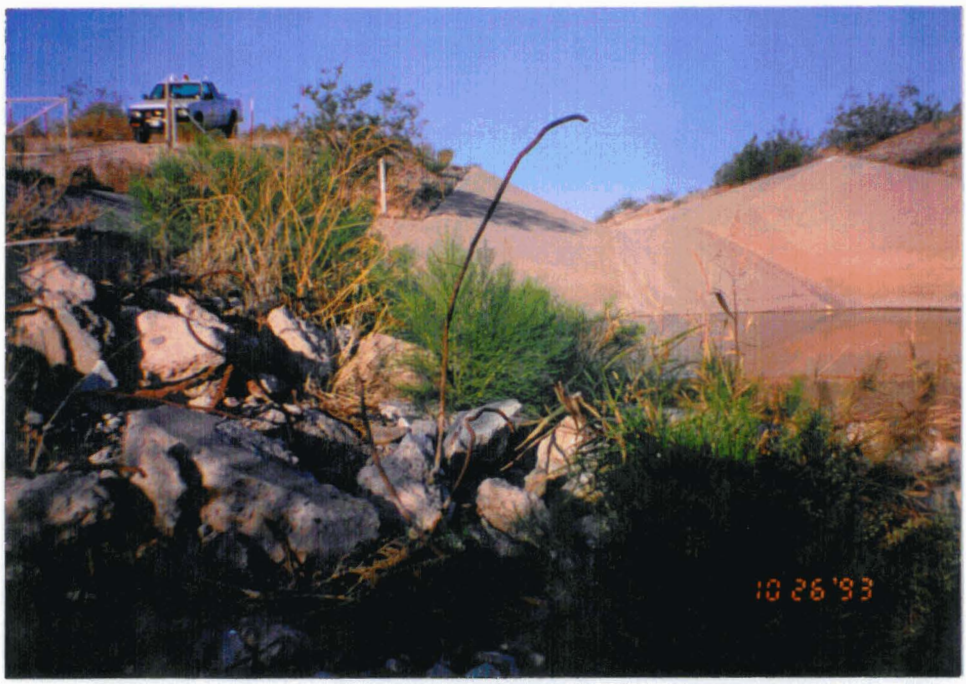
38. Grouted rip-rap in channel at northeast corner of Reems Road and Northern Avenue, looking east.

39. Water tank and old well near homestead at northwest corner of 160-acre parcel.



Photograph No. 1

Dysart Drain spillway into Agua Fria River. Tanner sand and gravel plant in background.



Photograph No. 2

Concrete rubble at spillway.

Photograph No. 3

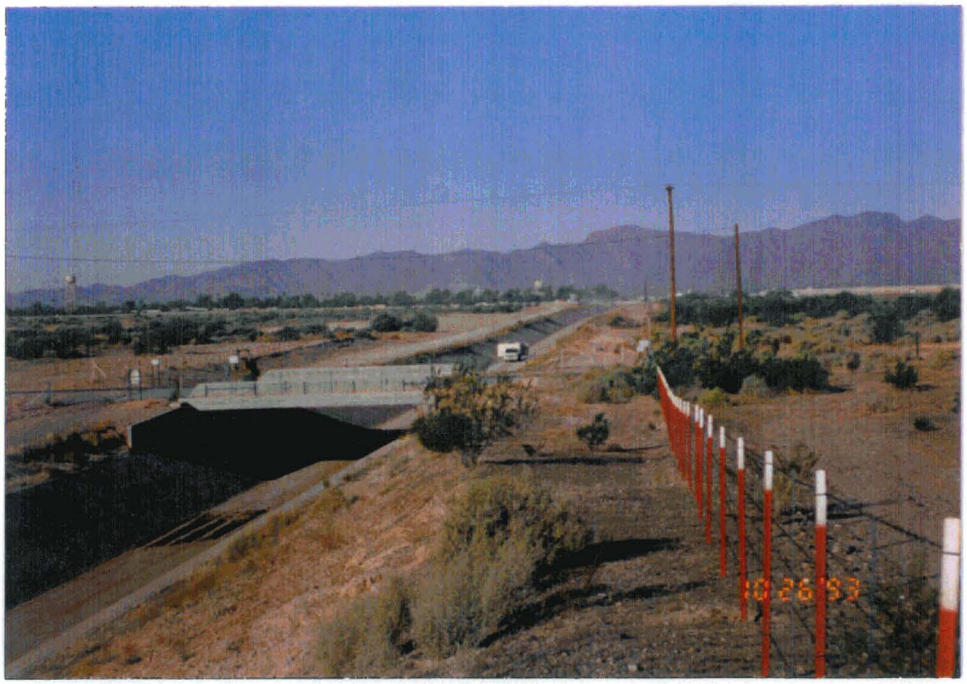
Bank of Agua Fria River looking north toward spillway.

Photograph No. 4

Small lagoon in Agua Fria River bed north of spillway.

Photograph No. 5

Wildcat dumping north of spillway.



Photograph No. 6

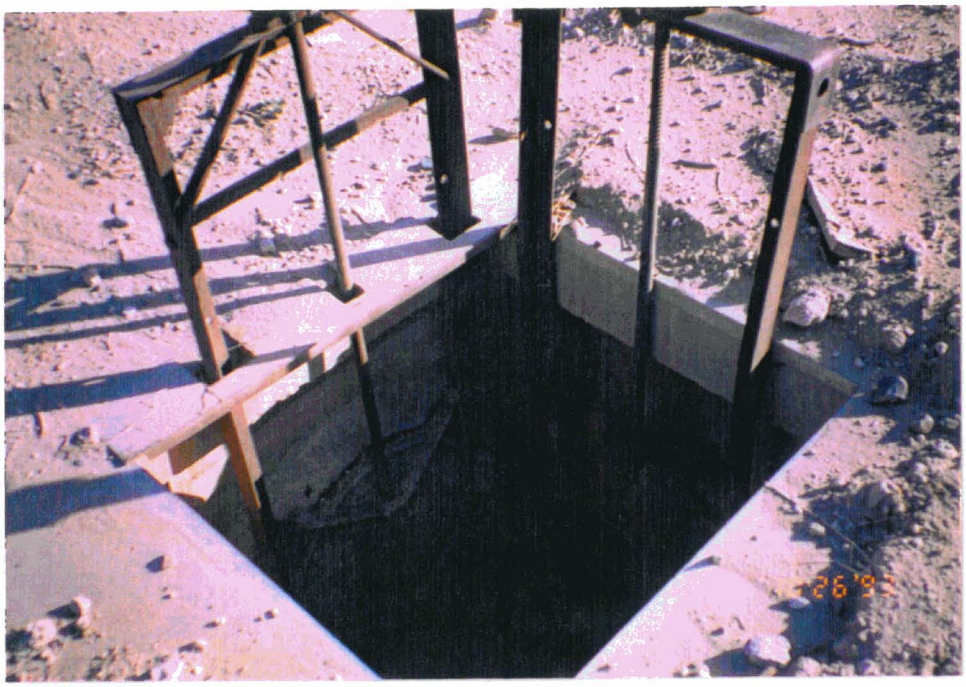
Dysart Drain, looking west. Bridge at El Mirage Road.

Photograph No. 7

Typical roadside drainpipe.

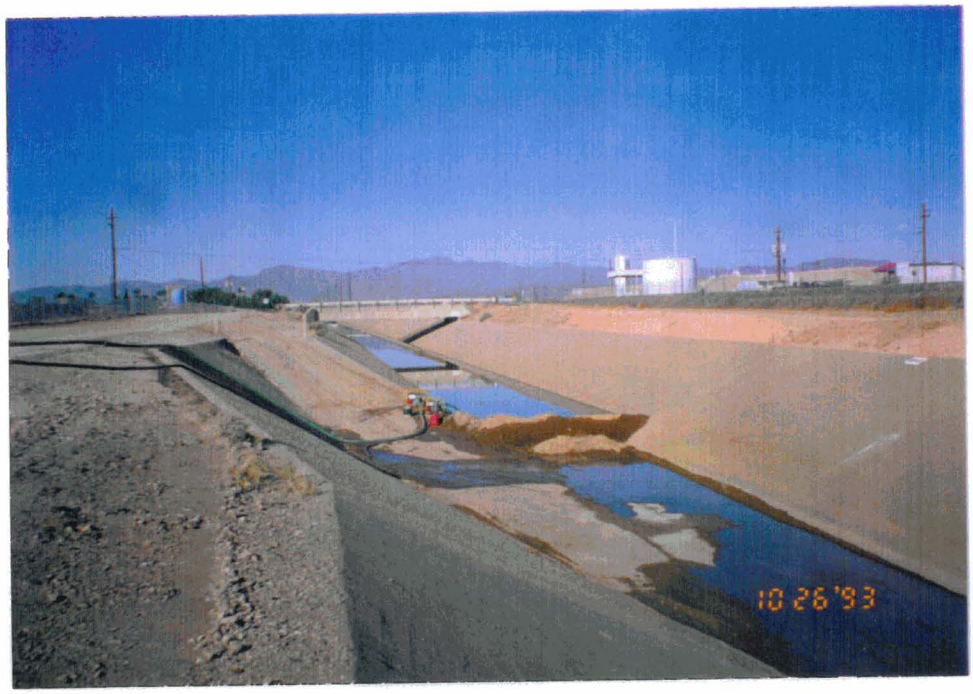
Photograph No. 8

Inlet structure from natural channel to Dysart Drain.



Photograph No. 9

Valve box for inactive irrigation system, south of Dysart Drain.

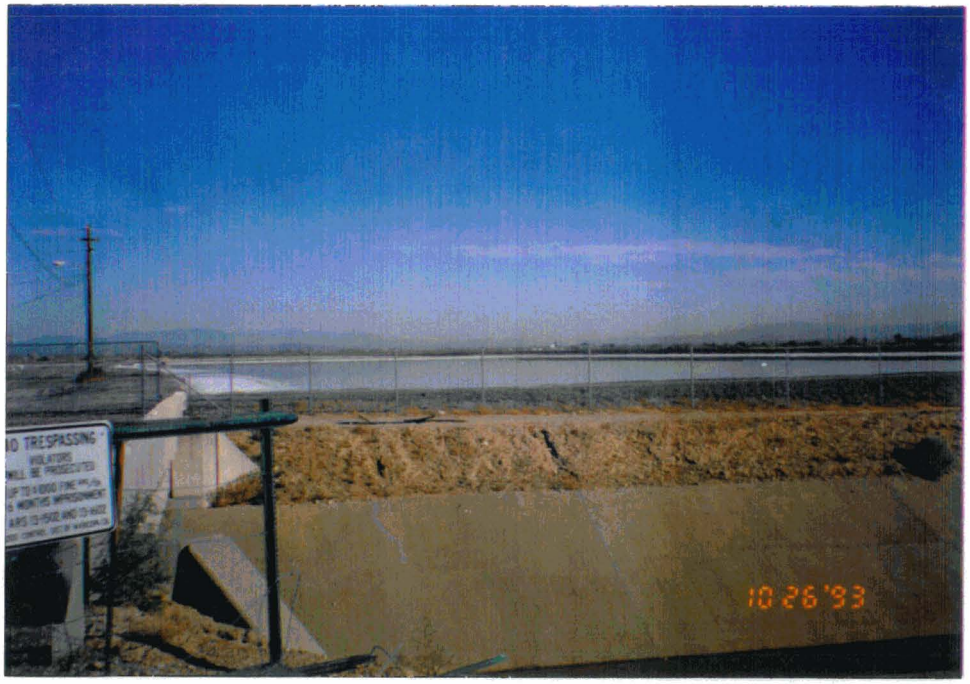


Photograph No. 10

Pumping operation to drain the channel for saw-cutting concrete liner.

Photograph No. 11

Water being pumped onto adjacent property to the south.

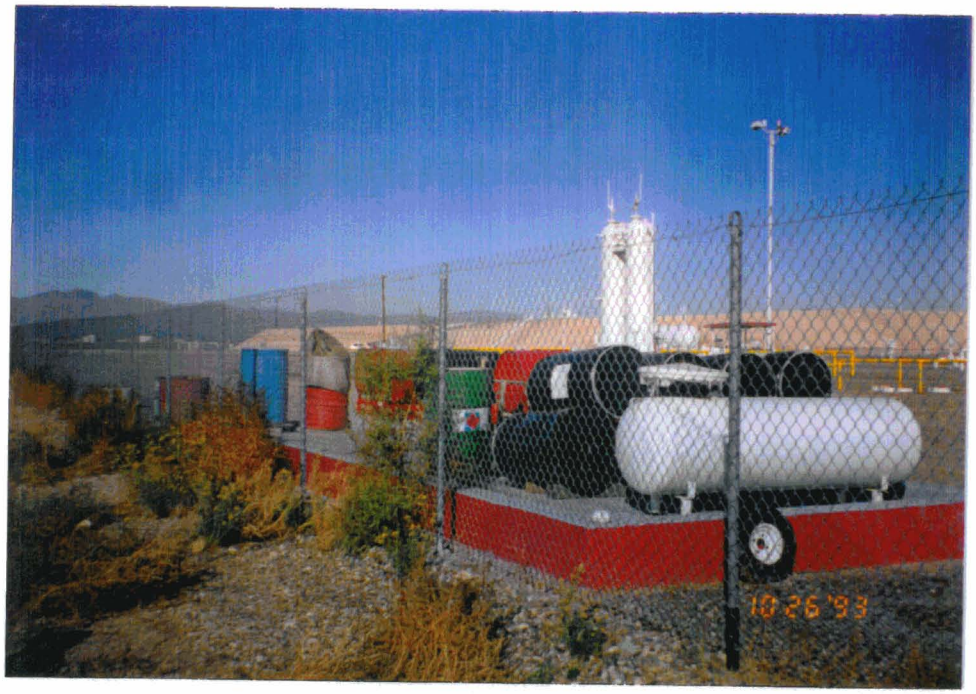


Photograph No. 12

Adjacent evaporation ponds at Morton Salt plant.

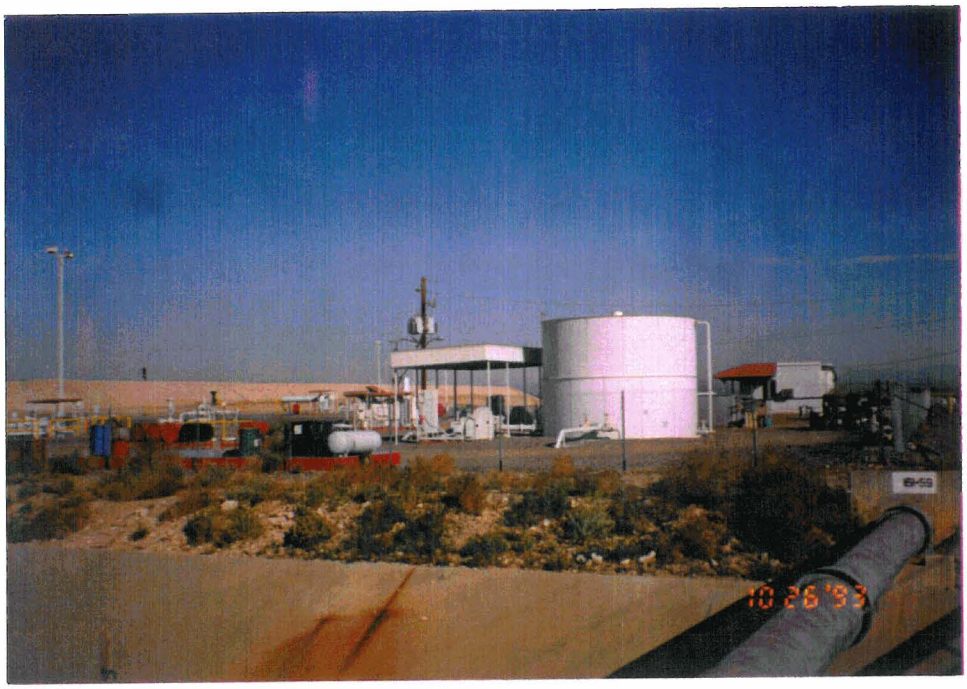
Photograph No. 13

Corroded reinforced-concrete bridge over Dysart Drain at Morton Salt plant.



Photograph No. 14

Drum storage area at Amerigas facility, adjacent to the north.



Photograph No. 15

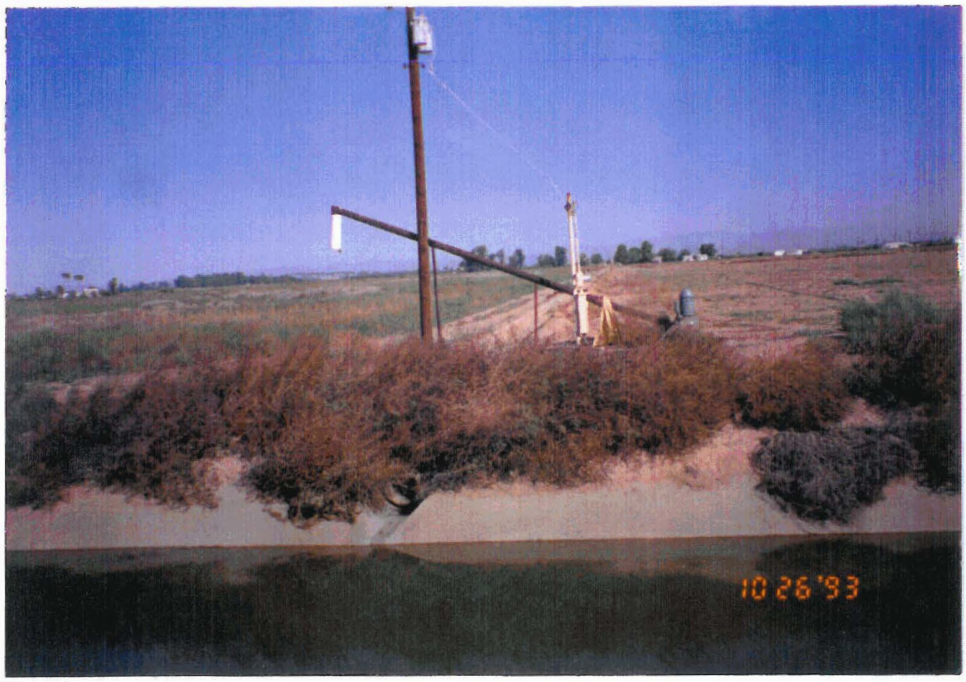
Above-ground tanks at Amerigas facility.

Photograph No. 16

Excavated irrigation-system valve near Dysart Road.

Photograph No. 17

Concrete-lined Dysart Drain channel, looking west from Dysart Road.

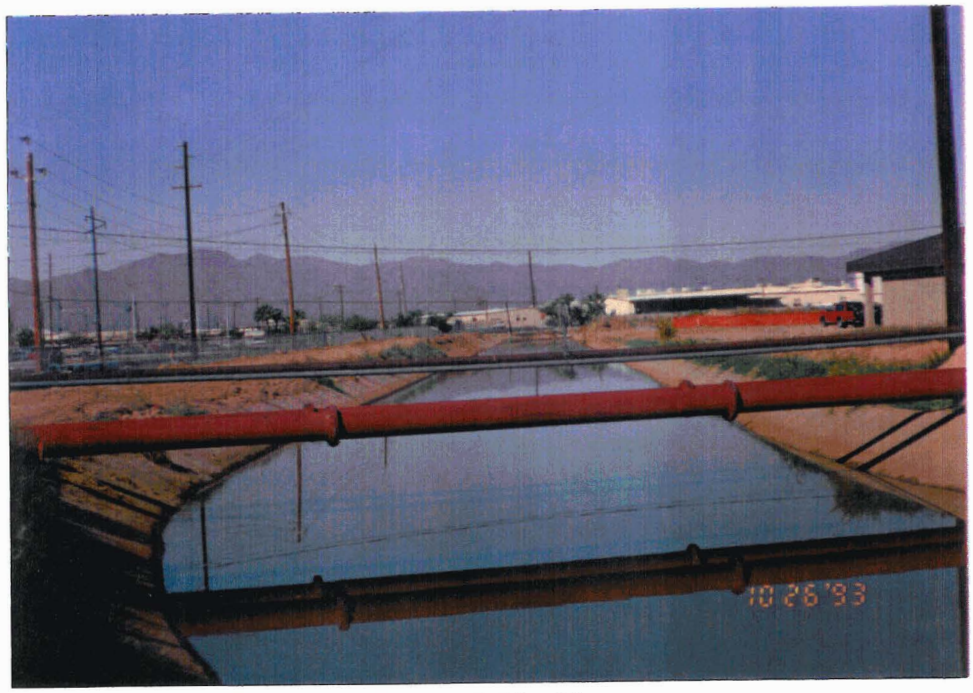


Photograph No. 18

Typical abandoned irrigation channel, with outfall to Dysart Drain.

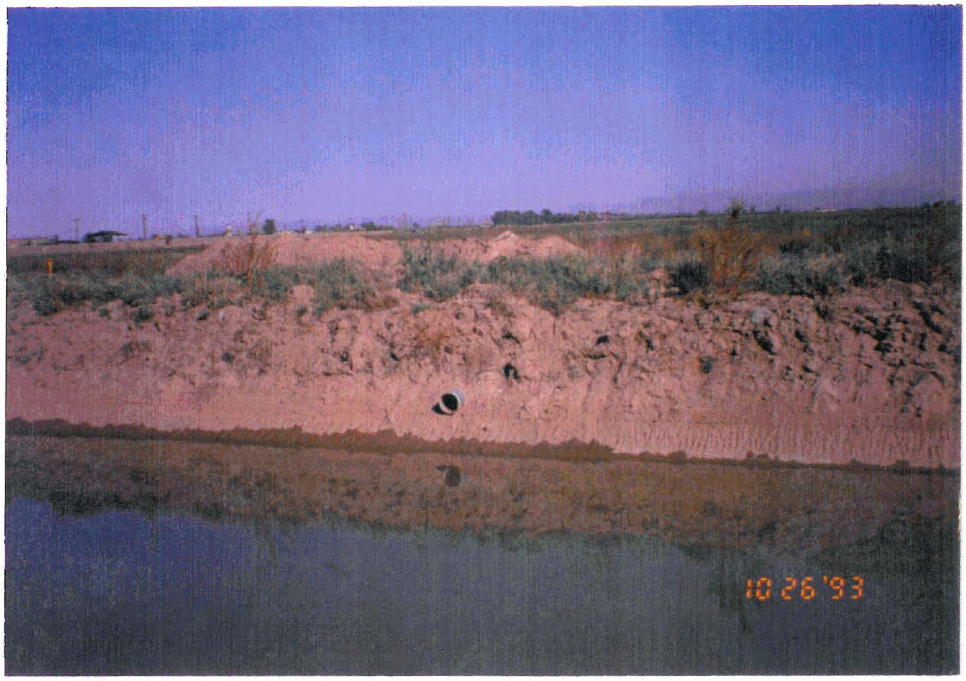
Photograph No. 19

Looking east along sorth bank of Dysart Drain channel, adjacent to Luke AFB family housing area. Note recent earthwork to elevate south bank.



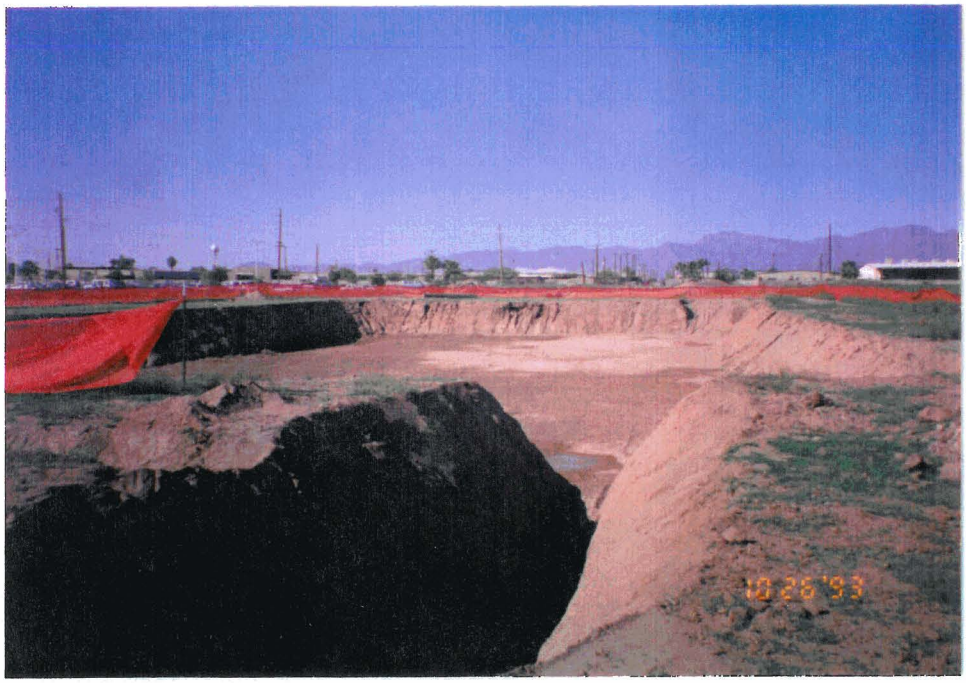
Photograph No. 20

Pipelines crossing channel near Litchfield Road.



Photograph No. 21

Typical outfall from adjacent fields.



Photograph No. 22

Retention basin near LAFB dog-training area, north of channel.

Photograph No. 23

Lined channel entering Luke AFB (looking south). Note four-inch pipe discharging from south side.

Photograph No. 24

Hazardous waste storage facility adjacent to south of channel.

Photograph No. 25

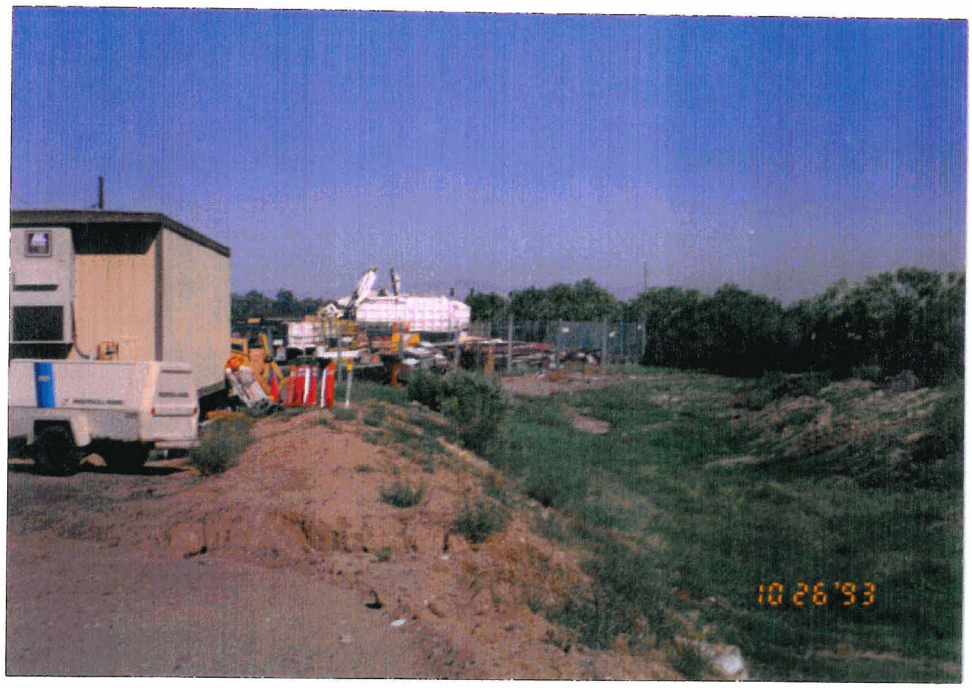
Soil vapor extraction system associated with Building 353 LUST site. Dysart drain channel in background. Looking east.

Photograph No. 26

Pesticide storage facility adjacent to channel.

Photograph No. 27

USTs at military vehicle filling station, adjacent to channel.



Photograph No. 28

Unlined drainage area near northeast corner of Luke AFB.

Photograph No. 29

Soil vapor extraction system at old North Fire Training Area.

Photograph No. 30

Typical agricultural drainage outfall into unlined portion of channel.

Photograph No. 31

Typical stretch of unlined channel. Monitoring well visible adjacent to channel.

Photograph No. 32

Entrance of channel onto Luke AFB from adjacent property. Northern Avenue in background.

Photograph No. 33

Low-lying area near northwest corner of Luke AFB. NPL site # LF-13.

Photograph No. 34

Typical staining along unlined portions of the channel.

Photograph No. 35

Onion crop and unlined irrigation ditch on 160-acre parcel.

Photograph No. 36

Rose crop on 160-acre parcel.

Photograph No. 37

Typical staining in unlined irrigation ditches on 160-acre parcel.

Photograph No. 38

Grouted rip-rap in channel at northeast corner of Reems Road and Northern Avenue, looking east.

Photograph No. 39

Water tank and old well near homestead at northwest corner of 160-acre parcel.

Appendix D

Analytical Results and Chain-of-Custody

Westech Laboratories Inc.
The Quality People
Since 1955

3737 East Broadway Road
Phoenix, Arizona 85040
(602) 437-1080 • fax 437-8706

CLIENT MARICOPA FLOOD CONTROL DISTRICT
ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322259
INVOICE NO.: 22133841
REPORT DATE: 11-19-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-SWQ
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: A. THOMAS
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE COMP.
ANALYST .....: A. ANDREWS

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : PCBR000000230
SAMPLE DATE ...: 10-26-93
SUBMITTAL DATE : 10-28-93
EXTRACTION DATE: 11-12-93
ANALYSIS DATE .: 11-16-93

Method 8080 - Pesticides

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
4,4'-DDD	<2.0	ug/Kg	2.0
4,4'-DDE	170.	ug/Kg	2.0
4,4'-DDT	<8.0	ug/Kg	8.0
Aldrin	<2.5	ug/Kg	2.5
alpha-BHC	<2.0	ug/Kg	2.0
beta-BHC	<4.0	ug/Kg	4.0
delta-BHC	<6.0	ug/Kg	6.0
Chlordane	<9.0	ug/Kg	9.0
Dieldrin	<1.2	ug/Kg	1.2
Endosulfan I	<9.0	ug/Kg	9.0
Endosulfan II	<2.5	ug/Kg	2.5
Endosulfan sulfate	<40.	ug/Kg	40.
Endrin	<4.0	ug/Kg	4.0
Endrin aldehyde	<15.	ug/Kg	15.
Heptachlor	<2.0	ug/Kg	2.0
Heptachlor Epoxide	<55.	ug/Kg	55.
Lindane	<2.5	ug/Kg	2.5
Methoxychlor	<110.	ug/Kg	110.
Toxaphene	<150.	ug/Kg	150.

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Managing Director

Westech Laboratories Inc.
The Quality People
Since 1955

3737 East Broadway Road
Phoenix, Arizona 85040
(602) 437-1080 • fax 437-8706

CLIENT MARICOPA FLOOD CONTROL DISTRICT
ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322258
INVOICE NO.: 22133841
REPORT DATE: 11-19-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-SEQ
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: A. THOMAS
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE COMP.
ANALYST .....: A. ANDREWS

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : PCBR000000230
SAMPLE DATE ...: 10-26-93
SUBMITTAL DATE : 10-28-93
EXTRACTION DATE: 11-12-93
ANALYSIS DATE .: 11-16-93

Method 8080 - Pesticides

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
4,4'-DDD	<2.0	ug/Kg	2.0
4,4'-DDE	54.	ug/Kg	2.0
4,4'-DDT	<8.0	ug/Kg	8.0
Aldrin	<2.5	ug/Kg	2.5
alpha-BHC	<2.0	ug/Kg	2.0
beta-BHC	<4.0	ug/Kg	4.0
delta-BHC	<6.0	ug/Kg	6.0
Chlordane	<9.0	ug/Kg	9.0
Dieldrin	<1.2	ug/Kg	1.2
Endosulfan I	<9.0	ug/Kg	9.0
Endosulfan II	<2.5	ug/Kg	2.5
Endosulfan sulfate	<40.	ug/Kg	40.
Endrin	<4.0	ug/Kg	4.0
Endrin aldehyde	<15.	ug/Kg	15.
Heptachlor	<2.0	ug/Kg	2.0
Heptachlor Epoxide	<55.	ug/Kg	55.
Lindane	<2.5	ug/Kg	2.5
Methoxychlor	<110.	ug/Kg	110.
Toxaphene	<150.	ug/Kg	150.

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(602) 437-1080 • fax 437-8706

CLIENT MARICOPA FLOOD CONTROL DISTRICT
ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322260
INVOICE NO.: 22133841
REPORT DATE: 11-19-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-NEQ
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: A. THOMAS
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: IRRIG. DITCH COMP.
ANALYST .....: A. ANDREWS

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : PCBR000000230
SAMPLE DATE ...: 10-26-93
SUBMITTAL DATE : 10-28-93
EXTRACTION DATE: 11-12-93
ANALYSIS DATE .: 11-16-93

Method 8080 - Pesticides

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
4,4'-DDD	<2.0	ug/Kg	2.0
4,4'-DDE	34.	ug/Kg	2.0
4,4'-DDT	<8.0	ug/Kg	8.0
Aldrin	<2.5	ug/Kg	2.5
alpha-BHC	<2.0	ug/Kg	2.0
beta-BHC	<4.0	ug/Kg	4.0
delta-BHC	<6.0	ug/Kg	6.0
Chlordane	<9.0	ug/Kg	9.0
Dieldrin	<1.2	ug/Kg	1.2
Endosulfan I	<9.0	ug/Kg	9.0
Endosulfan II	<2.5	ug/Kg	2.5
Endosulfan sulfate	<40.	ug/Kg	40.
Endrin	<4.0	ug/Kg	4.0
Endrin aldehyde	<15.	ug/Kg	15.
Heptachlor	<2.0	ug/Kg	2.0
Heptachlor Epoxide	<55.	ug/Kg	55.
Lindane	<2.5	ug/Kg	2.5
Methoxychlor	<110.	ug/Kg	110.
Toxaphene	<150.	ug/Kg	150.

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3737 East Broadway Road
Phoenix, Arizona 85040
(602) 437-1080 • fax 437-8706

CLIENT MARICOPA FLOOD CONTROL DISTRICT
ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322261
INVOICE NO.: 22133841
REPORT DATE: 11-19-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-NWQ
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: A. THOMAS
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE COMP.
ANALYST .....: A. ANDREWS

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : PCBR000000230
SAMPLE DATE ...: 10-26-93
SUBMITTAL DATE : 10-28-93
EXTRACTION DATE: 11-12-93
ANALYSIS DATE .: 11-16-93

Method 8080 - Pesticides

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
4,4'-DDD	<2.0	ug/Kg	2.0
4,4'-DDE	91.	ug/Kg	2.0
4,4'-DDT	<8.0	ug/Kg	8.0
Aldrin	<2.5	ug/Kg	2.5
alpha-BHC	<2.0	ug/Kg	2.0
beta-BHC	<4.0	ug/Kg	4.0
delta-BHC	<6.0	ug/Kg	6.0
Chlordane	<9.0	ug/Kg	9.0
Dieldrin	24.	ug/Kg	1.2
Endosulfan I	<9.0	ug/Kg	9.0
Endosulfan II	<2.5	ug/Kg	2.5
Endosulfan sulfate	<40.	ug/Kg	40.
Endrin	<4.0	ug/Kg	4.0
Endrin aldehyde	<15.	ug/Kg	15.
Heptachlor	<2.0	ug/Kg	2.0
Heptachlor Epoxide	<55.	ug/Kg	55.
Lindane	<2.5	ug/Kg	2.5
Methoxychlor	<110.	ug/Kg	110.
Toxaphene	<150.	ug/Kg	150.

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ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322262
INVOICE NO.: 22133841
REPORT DATE: 11-19-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-COMP
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: A. THOMAS
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE,IRRIG. DITCH COMP
ANALYST .....: W. MCCANN

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : PCBR000000230
SAMPLE DATE ...: 10-26-93
SUBMITTAL DATE : 10-28-93
EXTRACTION DATE: 11-08-93
ANALYSIS DATE .: 11-17-93

Method 8140 - Organophosphorus Pesticides

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
Bolstar (Sulprofos)	<200.	ug/Kg	200.
Azinphos-Methyl (Guthion)	<2200.	ug/Kg	2200.
Coumaphos (Resitox)	<1200.	ug/Kg	1200.
Demeton-o	<200.	ug/Kg	200.
Demeton-s	<200.	ug/Kg	200.
Diazinon	<200.	ug/Kg	200.
Disulfoton (Di-Syston)	<200.	ug/Kg	200.
EPN	<200.	ug/Kg	200.
Ethoprop (Prophos)	<400.	ug/Kg	400.
Malathion	<200.	ug/Kg	200.
Merphos (Folex)	<200.	ug/Kg	200.
Methyl Parathion	<200.	ug/Kg	200.
Mevinphos (Phosdrin)	<200.	ug/Kg	200.
Naled (Dibrom)	<400.	ug/Kg	400.
Ethyl Parathion	<200.	ug/Kg	200.
Phorate (Thimet)	<200.	ug/Kg	200.
Tetrachlorvinphos (Stirifos)	<400.	ug/Kg	400.
Chlorpyrifos (Dursban)	<200.	ug/Kg	200.
Fensulfothion	<200.	ug/Kg	200.
Ronnel (Fenchlorphos)	<400.	ug/Kg	400.
Sulfotep	<200.	ug/Kg	200.

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2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322262
INVOICE NO.: 22133841
REPORT DATE: 11-19-93
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PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-COMP
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: A. THOMAS
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE,IRRIG. DITCH COMP
ANALYST .....: A. ANDREWS

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : PCBR000000230
SAMPLE DATE ...: 10-26-93
SUBMITTAL DATE : 10-28-93
EXTRACTION DATE: 11-08-93
ANALYSIS DATE .: 11-08-93

Method 8150 - Chlorinated Herbicides

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
2,4,5-T	<40.	ug/Kg	40.
2,4,5-TP (Silvex)	<40.	ug/Kg	40.
2,4-D	<200.	ug/Kg	200.
2,4-DB	<200.	ug/Kg	200.
Dalapon	<3300.	ug/Kg	3300.
Dicamba	<400.	ug/Kg	400.
Dichlorprop	<400.	ug/Kg	400.
Dinoseb	<400.	ug/Kg	400.
MCPA	<4000.	ug/Kg	4000.
MCPP	<5000.	ug/Kg	5000.

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3737 East Broadway Road
Phoenix, Arizona 85040
(602) 437-1080 • fax 437-8706

CLIENT MARICOPA FLOOD CONTROL DISTRICT
ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322988
INVOICE NO.: 22133999
REPORT DATE: 11-23-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-UPSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: --

TCLP Metals Analysis

D A T A T A B L E

Parameter	Result	Unit	Detection Limit	Analysis Date
Arsenic (TCLP)	<0.05	mg/L	0.05	11-15-93
Barium (TCLP)	1.0	mg/L	0.05	11-15-93
Cadmium (TCLP)	<0.05	mg/L	0.05	11-15-93
Chromium (TCLP)	<0.05	mg/L	0.05	11-15-93
Lead (TCLP)	<0.05	mg/L	0.05	11-15-93
Mercury (TCLP)	<0.01	mg/L	0.01	11-15-93
Selenium (TCLP)	<0.05	mg/L	0.05	11-15-93
Silver (TCLP)	<0.05	mg/L	0.05	11-15-93

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Phoenix, Arizona 85040
(602) 437-1080 • fax 437-8706

CLIENT MARICOPA FLOOD CONTROL DISTRICT
ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322988
INVOICE NO.: 22133999
REPORT DATE: 11-23-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-UPSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: D. HENZLER

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-17-93
ANALYSIS DATE .: 11-22-93

BLS 181/Modified 418.1 - Total Petroleum Fuel Hydrocarbons

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
Total Petroleum Hydrocarbons .....:	23.	mg/Kg	10.

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PT Managing Director

Westech Laboratories Inc.
The Quality People
Since 1955

3737 East Broadway Road
Phoenix, Arizona 85040
(602) 437-1080 • fax 437-8706

CLIENT MARICOPA FLOOD CONTROL DISTRICT
ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322988
INVOICE NO.: 22133999
REPORT DATE: 11-23-93
REVIEWED BY:
PAGE : 1 OF 2

CLIENT SAMPLE ID : DD-UPSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: L. ANTONY

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-16-93
ANALYSIS DATE .: 11-17-93

REMARKS -

Sample run on GC/MS.

Method 8010 - Halogenated Volatile Organics

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
Bromochloromethane	<50.	ug/Kg	50.
Bromodichloromethane	<50.	ug/Kg	50.
Bromoform	<50.	ug/Kg	50.
Bromomethane	<50.	ug/Kg	50.
Carbon tetrachloride	<25.	ug/Kg	25.
Chlorobenzene	<10.	ug/Kg	10.
Chloroethene	<50.	ug/Kg	50.
Chloroform	<25.	ug/Kg	25.
Chloromethane	<50.	ug/Kg	50.
Dibromochloromethane	<50.	ug/Kg	50.
1,2-Dichlorobenzene	<10.	ug/Kg	10.
1,3-Dichlorobenzene	<10.	ug/Kg	10.
1,4-Dichlorobenzene	<10.	ug/Kg	10.
Dichlorodifluoromethane	<50.	ug/Kg	50.
1,1-Dichloroethane	<25.	ug/Kg	25.
1,2-Dichloroethane	<25.	ug/Kg	25.
1,1-Dichloroethene	<25.	ug/Kg	25.
cis 1,2-Dichloroethene	<25.	ug/Kg	25.
trans 1,2-Dichloroethene	<50.	ug/Kg	50.
1,2-Dichloropropane	<25.	ug/Kg	25.
trans 1,3-Dichloropropene	<25.	ug/Kg	25.
cis 1,2-Dichloropropene	<25.	ug/Kg	25.
Dichloromethane	<250.	ug/Kg	250.
1,1,2,2-Tetrachloroethane	<25.	ug/Kg	25.
1,1,2,2-Tetrachloroethene	<25.	ug/Kg	25.
1,1,1-Trichloroethane	<25.	ug/Kg	25.

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ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322988
INVOICE NO.: 22133999
REPORT DATE: 11-23-93
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PAGE : 2 OF 2

DATA TABLE (Cont.)

Parameter	Result	Unit	Detection Limit
1,1,2-Trichloroethane .....:	<25.	ug/Kg	25.
Trichloroethene .....:	<25.	ug/Kg	25.
Trichlorofluoromethane .....:	<50.	ug/Kg	50.
Vinyl chloride .....:	<50.	ug/Kg	50.
2-Chloroethylvinyl Ether .....:	<50.	ug/Kg	50.

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INVOICE NO.: 22133999
REPORT DATE: 11-23-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-UPSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: L. ANTONY

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-16-93
ANALYSIS DATE .: 11-17-93

REMARKS -

Sample run on GC/MS.

Method 8020 - Aromatic Volatiles

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
Chlorobenzene	<10.	ug/Kg	10.
1,2-Dichlorobenzene	<10.	ug/Kg	10.
1,3-Dichlorobenzene	<10.	ug/Kg	10.
1,4-Dichlorobenzene	<10.	ug/Kg	10.
Ethylbenzene	<10.	ug/Kg	10.
Toluene	<10.	ug/Kg	10.
Total Xylenes	<5.0	ug/Kg	5.0
Benzene	<10.	ug/Kg	10.

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SAMPLE NO. : 9322988
INVOICE NO.: 22133999
REPORT DATE: 11-23-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-UPSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: A. ANDREWS

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-12-93
ANALYSIS DATE .: 11-16-93

Method 8080 - Pesticides & PCB'S

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
4,4'-DDD	<2.0	ug/Kg	2.0
4,4'-DDE	31.0	ug/Kg	2.0
4,4'-DDT	<8.0	ug/Kg	8.0
Aldrin	<2.5	ug/Kg	2.5
alpha-BHC	<2.0	ug/Kg	2.0
beta-BHC	<4.0	ug/Kg	4.0
delta-BHC	<6.0	ug/Kg	6.0
Chlordane	<9.0	ug/Kg	9.0
Dieldrin	<1.2	ug/Kg	1.2
Endosulfan I	<9.0	ug/Kg	9.0
Endosulfan II	<2.5	ug/Kg	2.5
Endosulfan sulfate	<40.	ug/Kg	40.
Endrin	<4.0	ug/Kg	4.0
Endrin aldehyde	<15.	ug/Kg	15.
Heptachlor	<2.0	ug/Kg	2.0
Heptachlor Epoxide	<55.	ug/Kg	55.
Lindane	<2.5	ug/Kg	2.5
Methoxychlor	<110.	ug/Kg	110.
Toxaphene	<150.	ug/Kg	150.
PCB 1016	<100.	ug/Kg	100.
PCB 1221	<1000.	ug/Kg	1000.
PCB 1232	<250.	ug/Kg	250.
PCB 1242	<250.	ug/Kg	250.
PCB 1248	<200.	ug/Kg	200.
PCB 1254	<200.	ug/Kg	200.
PCB 1260	<200.	ug/Kg	200.

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PHOENIX, AZ 85009

SAMPLE NO. : 9322988
INVOICE NO.: 22133999
REPORT DATE: 11-23-93
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PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-UPSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: W. MCCANN

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-14-93
ANALYSIS DATE .: 11-17-93

Method 8140 - Organophosphorus Pesticides

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
Bolstar (Sulprofos)	<200.	ug/Kg	200.
Azinphos-Methyl (Guthion)	<2200.	ug/Kg	2200.
Coumaphos (Resitox)	<1200.	ug/Kg	1200.
Demeton-o	<200.	ug/Kg	200.
Demeton-s	<200.	ug/Kg	200.
Diazinon	<200.	ug/Kg	200.
Disulfoton (Di-Syston)	<200.	ug/Kg	200.
EPN	<200.	ug/Kg	200.
Ethoprop (Prophos)	<400.	ug/Kg	400.
Malathion	<200.	ug/Kg	200.
Merphos (Folex)	<200.	ug/Kg	200.
Methyl Parathion	<200.	ug/Kg	200.
Mevinphos (Phosdrin)	<200.	ug/Kg	200.
Naled (Dibrom)	<400.	ug/Kg	400.
Ethyl Parathion	<200.	ug/Kg	200.
Phorate (Thimet)	<200.	ug/Kg	200.
Tetrachlorvinphos (Stirifos)	<400.	ug/Kg	400.
Chlorpyrifos (Dursban)	<200.	ug/Kg	200.
Fensulfothion	<200.	ug/Kg	200.
Ronnel (Fenchlorphos)	<400.	ug/Kg	400.
Sulfotep	<200.	ug/Kg	200.

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2801 WEST DURANGO STREET
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INVOICE NO.: 22133999
REPORT DATE: 11-23-93
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PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-UPSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: A. ANDREWS

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-13-93
ANALYSIS DATE .: 11-17-93

Method 8150 - Chlorinated Herbicides

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
2,4,5-T	<40.	ug/Kg	40.
2,4,5-TP (Silvex)	<40.	ug/Kg	40.
2,4-D	<200.	ug/Kg	200.
2,4-DB	<200.	ug/Kg	200.
Dalapon	<3300.	ug/Kg	3300.
Dicamba	<400.	ug/Kg	400.
Dichlorprop	<400.	ug/Kg	400.
Dinoseb	<400.	ug/Kg	400.
MCPA	<4000.	ug/Kg	4000.
MCPP	<5000.	ug/Kg	5000.

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PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322989
INVOICE NO.: 22133999
REPORT DATE: 11-23-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-DOWNSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: --

TCLP Metals Analysis

D A T A T A B L E

Parameter	Result	Unit	Detection Limit	Analysis Date
Arsenic (TCLP)	<0.05	mg/L	0.05	11-15-93
Barium (TCLP)	0.95	mg/L	0.05	11-15-93
Cadmium (TCLP)	<0.05	mg/L	0.05	11-15-93
Chromium (TCLP)	<0.05	mg/L	0.05	11-15-93
Lead (TCLP)	<0.05	mg/L	0.05	11-15-93
Mercury (TCLP)	<0.01	mg/L	0.01	11-15-93
Selenium (TCLP)	<0.05	mg/L	0.05	11-15-93
Silver (TCLP)	<0.05	mg/L	0.05	11-15-93

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PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322989
INVOICE NO.: 22133999
REPORT DATE: 11-23-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-DOWNSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: D. HENZLER

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-17-93
ANALYSIS DATE .: 11-22-93

BLS 181/Modified 418.1 - Total Petroleum Fuel Hydrocarbons

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
Total Petroleum Hydrocarbons .....:	35.	mg/Kg	10.

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PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322989
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SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: L. ANTONY

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-16-93
ANALYSIS DATE .: 11-17-93

REMARKS -

Sample run on GC/MS.

Method 8010 - Halogenated Volatile Organics

DATA TABLE

Parameter	Result	Unit	Detection Limit
Bromochloromethane	<50.	ug/Kg	50.
Bromodichloromethane	<50.	ug/Kg	50.
Bromoform	<50.	ug/Kg	50.
Bromomethane	<50.	ug/Kg	50.
Carbon tetrachloride	<25.	ug/Kg	25.
Chlorobenzene	<10.	ug/Kg	10.
Chloroethene	<50.	ug/Kg	50.
Chloroform	<25.	ug/Kg	25.
Chloromethane	<50.	ug/Kg	50.
Dibromochloromethane	<50.	ug/Kg	50.
1,2-Dichlorobenzene	<10.	ug/Kg	10.
1,3-Dichlorobenzene	<10.	ug/Kg	10.
1,4-Dichlorobenzene	<10.	ug/Kg	10.
Dichlorodifluoromethane	<50.	ug/Kg	50.
1,1-Dichloroethane	<25.	ug/Kg	25.
1,2-Dichloroethane	<25.	ug/Kg	25.
1,1-Dichloroethene	<25.	ug/Kg	25.
cis 1,2-Dichloroethene	<25.	ug/Kg	25.
trans 1,2-Dichloroethene	<50.	ug/Kg	50.
1,2-Dichloropropane	<25.	ug/Kg	25.
trans 1,3-Dichloropropene	<25.	ug/Kg	25.
cis 1,2-Dichloropropene	<25.	ug/Kg	25.
Dichloromethane	<250.	ug/Kg	250.
1,1,2,2-Tetrachloroethane	<25.	ug/Kg	25.
1,1,2,2-Tetrachloroethene	<25.	ug/Kg	25.
1,1,1-Trichloroethane	<25.	ug/Kg	25.

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D A T A T A B L E (Cont.)

Parameter	Result	Unit	Detection Limit
1,1,2-Trichloroethane .....:	<25.	ug/Kg	25.
Trichloroethene .....:	<25.	ug/Kg	25.
Trichlorofluoromethane .....:	<50.	ug/Kg	50.
Vinyl chloride .....:	<50.	ug/Kg	50.
2-Chloroethylvinyl Ether .....:	<50.	ug/Kg	50.

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ANALYST .....: L. ANTONY

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-16-93
ANALYSIS DATE .: 11-17-93

REMARKS -

Sample run on GC/MS.

Method 8020 - Aromatic Volatiles

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
Chlorobenzene	<10.	ug/Kg	10.
1,2-Dichlorobenzene	<10.	ug/Kg	10.
1,3-Dichlorobenzene	<10.	ug/Kg	10.
1,4-Dichlorobenzene	<10.	ug/Kg	10.
Ethylbenzene	<10.	ug/Kg	10.
Toluene	<10.	ug/Kg	10.
Total Xylenes	<5.0	ug/Kg	5.0
Benzene	<10.	ug/Kg	10.

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SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: A. ANDREWS

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-12-93
ANALYSIS DATE .: 11-16-93

Method 8080 - Pesticides & PCB'S

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
4,4'-DDD	<2.0	ug/Kg	2.0
4,4'-DDE	34.0	ug/Kg	2.0
4,4'-DDT	<8.0	ug/Kg	8.0
Aldrin	<2.5	ug/Kg	2.5
alpha-BHC	<2.0	ug/Kg	2.0
beta-BHC	<4.0	ug/Kg	4.0
delta-BHC	<6.0	ug/Kg	6.0
Chlordane	<9.0	ug/Kg	9.0
Dieldrin	<1.2	ug/Kg	1.2
Endosulfan I	<9.0	ug/Kg	9.0
Endosulfan II	<2.5	ug/Kg	2.5
Endosulfan sulfate	<40.	ug/Kg	40.
Endrin	<4.0	ug/Kg	4.0
Endrin aldehyde	<15.	ug/Kg	15.
Heptachlor	<2.0	ug/Kg	2.0
Heptachlor Epoxide	<55.	ug/Kg	55.
Lindane	<2.5	ug/Kg	2.5
Methoxychlor	<110.	ug/Kg	110.
Toxaphene	<150.	ug/Kg	150.
PCB 1016	<100.	ug/Kg	100.
PCB 1221	<1000.	ug/Kg	1000.
PCB 1232	<250.	ug/Kg	250.
PCB 1242	<250.	ug/Kg	250.
PCB 1248	<200.	ug/Kg	200.
PCB 1254	<200.	ug/Kg	200.
PCB 1260	<200.	ug/Kg	200.

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PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-DOWNSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: A. ANDREWS

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-12-93
ANALYSIS DATE .: 11-16-93

Method 8080 - Pesticides & PCB'S

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
4,4'-DDD	<2.0	ug/Kg	2.0
4,4'-DDE	34.0	ug/Kg	2.0
4,4'-DDT	<8.0	ug/Kg	8.0
Aldrin	<2.5	ug/Kg	2.5
alpha-BHC	<2.0	ug/Kg	2.0
beta-BHC	<4.0	ug/Kg	4.0
delta-BHC	<6.0	ug/Kg	6.0
Chlordane	<9.0	ug/Kg	9.0
Dieldrin	<1.2	ug/Kg	1.2
Endosulfan I	<9.0	ug/Kg	9.0
Endosulfan II	<2.5	ug/Kg	2.5
Endosulfan sulfate	<40.	ug/Kg	40.
Endrin	<4.0	ug/Kg	4.0
Endrin aldehyde	<15.	ug/Kg	15.
Heptachlor	<2.0	ug/Kg	2.0
Heptachlor Epoxide	<55.	ug/Kg	55.
Lindane	<2.5	ug/Kg	2.5
Methoxychlor	<110.	ug/Kg	110.
Toxaphene	<150.	ug/Kg	150.
PCB 1016	<100.	ug/Kg	100.
PCB 1221	<1000.	ug/Kg	1000.
PCB 1232	<250.	ug/Kg	250.
PCB 1242	<250.	ug/Kg	250.
PCB 1248	<200.	ug/Kg	200.
PCB 1254	<200.	ug/Kg	200.
PCB 1260	<200.	ug/Kg	200.

(1) Copy to Client

PENDING QA/QC REVIEW

Managing Director

Westech Laboratories Inc.
The Quality People
Since 1955

3737 East Broadway Road
Phoenix, Arizona 85040
(602) 437-1080 • fax 437-8706

CLIENT MARICOPA FLOOD CONTROL DISTRICT
ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322989
INVOICE NO.: 22133999
REPORT DATE: 11-23-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-DOWNSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: W. MCCANN

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-14-93
ANALYSIS DATE .: 11-17-93

Method 8140 - Organophosphorus Pesticides

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
Bolstar (Sulprofos)	<200.	ug/Kg	200.
Azinphos-Methyl (Guthion)	<2200.	ug/Kg	2200.
Coumaphos (Resitox)	<1200.	ug/Kg	1200.
Demeton-o	<200.	ug/Kg	200.
Demeton-s	<200.	ug/Kg	200.
Diazinon	<200.	ug/Kg	200.
Disulfoton (Di-Syston)	<200.	ug/Kg	200.
EPN	<200.	ug/Kg	200.
Ethoprop (Prophos)	<400.	ug/Kg	400.
Malathion	<200.	ug/Kg	200.
Merphos (Folex)	<200.	ug/Kg	200.
Methyl Parathion	<200.	ug/Kg	200.
Mevinphos (Phosdrin)	<200.	ug/Kg	200.
Naled (Dibrom)	<400.	ug/Kg	400.
Ethyl Parathion	<200.	ug/Kg	200.
Phorate (Thimet)	<200.	ug/Kg	200.
Tetrachlorvinphos (Stirifos)	<400.	ug/Kg	400.
Chlorpyrifos (Dursban)	<200.	ug/Kg	200.
Fensulfothion	<200.	ug/Kg	200.
Ronnel (Fenchlorphos)	<400.	ug/Kg	400.
Sulfotep	<200.	ug/Kg	200.

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Managing Director

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The Quality People
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Phoenix, Arizona 85040
(602) 437-1080 • fax 437-8706

CLIENT MARICOPA FLOOD CONTROL DISTRICT
ATTN: DAVE GARDNER
PROJECT: DYSART DRAIN
2801 WEST DURANGO STREET
PHOENIX, AZ 85009

SAMPLE NO. : 9322989
INVOICE NO.: 22133999
REPORT DATE: 11-23-93
REVIEWED BY:
PAGE : 1 OF 1

CLIENT SAMPLE ID : DD-DOWNSTREAM
SAMPLE TYPE .....: SOIL
SAMPLED BY .....: C. ROWLEY
SUBMITTED BY ....: A. THOMAS
SAMPLE SOURCE ...: SURFACE SEDIMENT
ANALYST .....: A. ANDREWS

AUTHORIZED BY : D. GARDNER
CLIENT P.O. : AR390-2073
SAMPLE DATE ...: 11-09-93
SUBMITTAL DATE : 11-10-93
EXTRACTION DATE: 11-13-93
ANALYSIS DATE .: 11-17-93

Method 8150 - Chlorinated Herbicides

D A T A T A B L E

Parameter	Result	Unit	Detection Limit
2,4,5-T	<40.	ug/Kg	40.
2,4,5-TP (Silvex)	<40.	ug/Kg	40.
2,4-D	<200.	ug/Kg	200.
2,4-DB	<200.	ug/Kg	200.
Dalapon	<3300.	ug/Kg	3300.
Dicamba	<400.	ug/Kg	400.
Dichlorprop	<400.	ug/Kg	400.
Dinoseb	<400.	ug/Kg	400.
MCPA	<4000.	ug/Kg	4000.
MCPP	<5000.	ug/Kg	5000.

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Managing Director

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Flagstaff • 2400 E. Huntington Dr. • AZ 86004 • (602) 774-8708 • fax 774-6469
El Paso • 10737 Gateway West #100 • TX 79935 • (915) 592-3591 • fax 592-3594

CHAIN OF CUSTODY RECORD

WATER RESOURCES ASSOCIATES

CLIENT	ADDRESS	
MARICOPA COUNTY FLOOD CONTROL DIST. c/o CEC/WRA	4041 N. CENTRAL AVE, #1050 PHOENIX AZ 85012	
TELEPHONE: 248-8808	PROJECT: DYSART DRAIN	JOB / P.O. NO.: AR 390-2073

• REFER TO FEE SCHEDULE FOR ANALYSES SELECTION •

SAMPLER (SIGNATURE): [signature]

SAMPLER (PLEASE PRINT): ALAN C. THOMAS

SAMPLE TYPE CODES
S – Soil; G – Sludge; X – Other; W – Water; T – Travel Blank; O – Oil; F – Field Blank

CLIENT SAMPLE IDENTIFICATION NUMBER	DATE	TIME	SAMPLE LOCATION	HOLD	COMPOSITE	GRAB	SAMPLE TYPE	NUMBER OF CONTAINERS	REQUESTED ANALYSES: EPA 3080 (W/O PCB's)	EPA 8140	EPA 3150	COMMENTS	LABORATORY SAMPLE IDENTIFICATION NUMBER
DD-SEQ	10/24/93	1305	SURFACE COMP.		X		S	2	X	X	X		
DD-SWQ	10/24/93	1335	SURFACE COMP.		X		S	2	X	X	X		
DD-NEQ	10/24/93	1405	IRRIG DITCH COMP.		X		S	2	X	X	X		
DD-NWQ	10/24/93	1435	SURFACE COMP.		X		S	2	X	X	X		

PLEASE LAB-COMPOSITE 2ND CONTAINER; OF ALL 4 SAMPLES TO RUN ONE 8140/3150 ANALYSIS, REPORT E SAMPLE "DD-COMP"

NOTE: PLEASE DIRECT BILL TO MARICOPA COUNTY FLOOD CONTROL DISTRICT PER AUTHORIZATION OF DAVE GARDNER (506-8401)

THANKS

RELINQUISHED BY (SIGNATURE)	RECEIVED BY (SIGNATURE)	DATE	TIME	REMARKS
[signature]	[signature]	10/26	3:15	
RELINQUISHED BY (SIGNATURE)	RECEIVED BY (SIGNATURE)	DATE	TIME	
RELINQUISHED BY (SIGNATURE)	RECEIVED BY (SIGNATURE)	DATE	TIME	
RELINQUISHED BY (SIGNATURE)	RECEIVED BY (SIGNATURE)	DATE	TIME	

623 White - Testing Laboratory; Yellow - Department Job File; Pink - Client

Westech Laboratories Inc.

Phoenix • 3737 E. Broadway Rd. • AZ 85040 • (602) 437-1080 • fax 437-8706
Flagstaff • 2400 E. Huntington Dr. • AZ 86004 • (602) 774-8708 • fax 774-6469
El Paso • 10737 Gateway West #100 • TX 79935 • (915) 592-3591 • fax 592-3594

CHAIN OF CUSTODY RECORD

CLIENT: MARICOPA COUNTY FLOOD CONTROL DIST. c/o CEC/WRA	ADDRESS: 4041 N. CENTRAL AVE #1050 PHOENIX, AZ 85012
TELEPHONE: 248-8808	PROJECT: DYSART DRAIN — JOB/P.O. NO.: AR 390-2073

• REFER TO FEE SCHEDULE FOR ANALYSES SELECTION •

SAMPLER (SIGNATURE): [signature]
SAMPLER (PLEASE PRINT): Corey S. Rowby

SAMPLE TYPE CODES: S – SOIL, G – SLUDGE, X – OTHER, W – WATER, T – TRAVEL BLANK, O – OIL, F – FIELD BLANK

REQUESTED ANALYSES: 8010/8020, 8080, ~~8140~~/8140/8150, ~~8015 mod~~ ~~(Gas)~~, ~~Hc~~, 815.1 (18.1), TCLP METALS

CLIENT SAMPLE IDENTIFICATION NUMBER	DATE	TIME	SAMPLE LOCATION	HOLD	COMPOSITE	GRAB	SAMPLE TYPE	NUMBER OF CONTAINERS	8010/8020	8080	8140/8150	8015 mod		18.1	TCLP METALS			COMMENTS	LABORATORY SAMPLE IDENTIFICATION NUMBER
DD-UPSTREAM	11/9/93	1030	SURFACE SEDIMENT			X	S		X	X	X			X	X			PLEASE RUSH PER SANDY'S AUTHORIZATION 11/10/93. THANKS ATT/DMAS	
DD-DOWNSTREAM	11/9/93	1450	SURFACE SEDIMENT			X	S		X	X	X			X	X				

NOTE: 8080 w/PCBs

NOTE: PLEASE DIRECT-BILL BASIC CHARGES TO MARICOPA COUNTY FLOOD CONTROL DISTRICT
BILL RUSH CHARGES TO CEC/WRA
MCFCD AUTHORIZATION: DAVE GARDNER (506-4601)

RELINQUISHED BY (SIGNATURE)	RECEIVED BY (SIGNATURE)	DATE	TIME	REMARKS
[signature]	[signature]	11/9/93	1600	
[signature]	[signature]	[illegible]	[illegible]	

Appendix E

Exceprts from Geraghty & Miller Remedial Investigation: Phase I Report

DRAFT

INTERIM REMEDIAL INVESTIGATION REPORT
PHASE I
OPERABLE UNIT NO. 1
LUKE AIR FORCE BASE, ARIZONA

March 13, 1992

Geraghty & Miller, Inc. is submitting this report to U.S. Army Corps of Engineers for work performed at Luke Air Force Base, Arizona. The report was prepared in conformance with Geraghty & Miller's strict quality assurance/quality control (QA/QC) procedures to ensure that the report meets the highest standards in terms of the methods used and the information presented. If you have any questions or comments concerning this report, please contact one of the individuals listed below.

Respectfully submitted,
GERAGHTY & MILLER, INC.

William W. Huskie
QA/QC Officer

John P. Mihalich
Project Manager

Lorraine C. Council
Principal Scientist
Associate

samples are shown on Figure 19.

4.2.4.3 Test Pit Excavation

A total of 15 test pits were excavated at PSC DP-13. At least two soil/waste samples from each test pit were submitted for laboratory analysis. Test pit samples were collected from depths ranging from 1 to 10 feet bgs. Test Pits TP-1 through TP-15 (excluding Test Pits TP-3 and TP-10) were excavated to investigate the potential source of monopolar and dipolar magnetic anomalies. Waste was not observed in Test Pits TP-1, TP-3, TP-4, TP-7, TP-9, TP-10, TP-13, and TP-15. Eight of the test pits contained waste material including concrete, wood, metal, plastic, asphalt, and wire. Test Pits TP-12 and TP-14 also contained small quantities of unidentified, turquoise-colored crystals. A paint pail and dried paint residue were observed in Test Pit TP-12.

Test Pits TP-11 through TP-15 were excavated at the north end of the PSC to investigate the potential source of several monopolar anomalies observed in data collected from this area. As previously mentioned, waste material was found in each of Test Pits TP-11, TP-12, TP-14, and TP-15. Test Pits TP-12 and TP-13 intercepted an inactive underground utility line. Table 9 summarizes the wastes observed in the test pits.

TRPH were detected in 23 of the 37 samples analyzed from PSC DP-13 at concentrations ranging from 10 to 12,000 mg/kg. The higher concentrations of TRPH were detected in the northern portion of the PSC. Concentrations of TRPH generally decreased with depth in samples collected from the test pits in the northern portion of the PSC. The concentrations of TRPH in Test Pit TP-1 decreased from 530 to 730 mg/kg (in the one foot bgs samples) to 90 mg/kg (in the 10 foot bgs sample). In Test Pit TP-2, concentrations decreased from 240 to less than 10 mg/kg in samples collected from depths of 2 and 5 feet bgs, respectively. In Test Pit TP-5, concentrations decreased from 50 to 20 mg/kg in samples collected from depths of 2 and 10 feet bgs, respectively. In Test Pit TP-11, concentrations of TRPH ranged from 70 to 90 mg/kg in the one foot bgs samples; the concentrations of TRPH in the 10 foot bgs samples were 30 and 440 mg/kg. In Test Pit TP-12, concentrations of TRPH were 20, 12,000, 110, and 380 mg/kg in samples collected from

4.2.4 PSC DP-13

4.2.4.1 Geophysical Survey

The geophysical survey at PSC DP-13 covered an area measuring 3,800 feet by 700 feet and consisted of approximately 6,223 data points. The area is located in the northwest corner of the base. The survey area extends south to within a few hundred feet of the northern limit of PSC OT-12 (Figure 2).

Anomalous conditions that may indicate landfilling are observed throughout the northern part of the survey area and in a narrow (approximately 120 feet wide) strip along the western margin of the PSC (Figure B-4a). The anomalies within this area are not as high in amplitude, nor as continuous as those at PSC LF-03 which suggests that localized disposal PSCs predominate rather than continuous landfilling or landfill trenches. The anomalous area shown in Figure B-4a is bounded to the west and north by the base property boundary. The non-anomalous area is bounded to the south, and to the east in the southern two-thirds of the PSC, by non-anomalous conditions. The non-anomalous conditions observed at the southern end of the PSC also bound the northern extent of the anomalous area identified at PSC OT-12.

4.2.4.2 Soil Gas Sampling

VOCs were not detected at 46 of the 86 sample locations at PSC DP-13. VOCs were detected at the remaining 40 locations at concentrations at or near the detection levels. Benzene was detected at five locations at concentrations ranging from 0.01 to 0.09 ug/L. Toluene was detected at 24 locations at concentrations ranging from 0.01 to 0.17 ug/L. Ethyl benzene was detected at 14 locations at concentrations ranging from 0.01 to 0.10 ug/L. M- and p-xylenes were detected at 40 locations at concentrations ranging from 0.01 to 0.26 ug/L. O-xylene was detected at 37 locations at concentrations ranging from 0.01 to 0.11 ug/L. Chlorinated VOCs (TCE and TCA) were detected at eight sample locations at concentrations ranging from 0.01 to 0.24 ug/L. The concentrations of VOCs in soil gas

depths of 3, 5, 6, and 10 feet bgs, respectively. In Test Pit TP-14, concentrations of TRPH were 560, 480, and 480 mg/kg in samples collected from depths of 4, 6, and 10 feet bgs, respectively. The concentrations of TRPH in test pit soil samples are shown on Figure 20 and listed in Table 16.

Semi-quantitated data indicates that non-listed VOCs, or TICs, were detected in samples from Test Pits TP-11 and TP-12. (The highest TRPH concentration (12,000 mg/kg) was also detected in a sample from Test Pit TP-12.) The concentrations of VOCs are shown on Figure 21 and listed in Table 16. VOC TICs are listed in Table 17.

BNAs were detected in samples from Test Pits TP-12 and TP-14 at individual concentrations ranging from trace amounts to 0.48 mg/kg. TICs were reported in several of the samples analyzed at this PSC, as shown in Table 5. A list of some of the TICs reported includes oxygenated hydrocarbons, total extractable hydrocarbons, aliphatic hydrocarbons, and dicarboxylic acid esters. The correlation between samples with both TICs and quantified TRPH is high. Eighty-seven percent of the samples with reported TICs had quantifiable TRPH. The identification of TICs at this site may be useful to determine the composition of compounds which make up the TRPH. The concentrations of BNAs in test pit soil samples are shown on Figure 22 and listed in Table 16.

The results of the metals analysis for PSC DP-13 (Table 18) were compared with metals results from soil samples collected from background soil borings (Table 7) and with typical background metals concentrations from two technical references, which are shown in Table 8. Arsenic, cadmium, chromium, copper, lead, and antimony were detected at concentrations above background in samples from Test Pit TP-12. Cadmium and copper were detected at concentrations above background in one sample from Test Pit TP-14. Cyanide was detected in two of the 37 samples analyzed at concentrations of 2 and 0.5 mg/kg for samples taken from Test Pit TP-12 and TP-15, respectively, as shown in Table 16.

TNT was detected in one sample from Test Pit TP-11 at a concentration of 0.60 mg/kg, in one sample from Test Pit TP-12 at a concentration of 3.16 mg/kg, and in one sample from Test Pit TP-14 at a concentration of 2.60 mg/kg. No other nitroaromatic explosives were detected in any of the samples from PSC DP-13.

4.2.5 PSCs LF-14

4.2.5.1 Geophysical Survey

The geophysical survey at PSC LF-14 covered an "L" shaped area, along the inside corner of the fence line at the northeast corner of the base. The survey area measured 90 feet by 1,240 feet along the east-west leg and 90 feet by 640 feet along the north-south leg. The survey consisted of approximately 380 data points.

Anomalies occur across the entire LF-14 survey area. However, most of the data collected at LF-14 was considered inconclusive because of interference caused by a variety of metallic debris and other cultural features in the survey area. Three anomalies that may be associated with subsurface material, and at which test pits were excavated, are identified in Figure B-5a.

4.2.5.2 Soil Gas Survey

VOCs were detected at 14 of the 18 soil gas sample locations at PSC LF-14 at concentrations at or near the detection level of 0.01 ug/L. TCA was detected at five of the locations at concentrations ranging from 0.02 to 0.08 ug/L. Benzene was detected at five locations at concentrations ranging from 0.02 to 0.07 ug/L. Toluene was detected at 11 locations at concentrations ranging from 0.01 to 0.23 ug/L. Ethyl benzene was detected at seven locations at concentrations ranging from 0.02 to 0.06 ug/L. M- and p-xylenes were detected at 14 locations at concentrations ranging from 0.01 to 0.21 ug/L. O xylene was detected at 13 locations at concentrations ranging from 0.01 to 0.12 ug/L. The concentrations of VOCs in soil gas samples are shown on Figure 23.

4.2.5.3 Test Excavation

A total of four test pits were excavated at PSC LF-14. Test pit samples were collected at depths ranging from 1 to 10 feet bgs. At least two soil/waste samples from each

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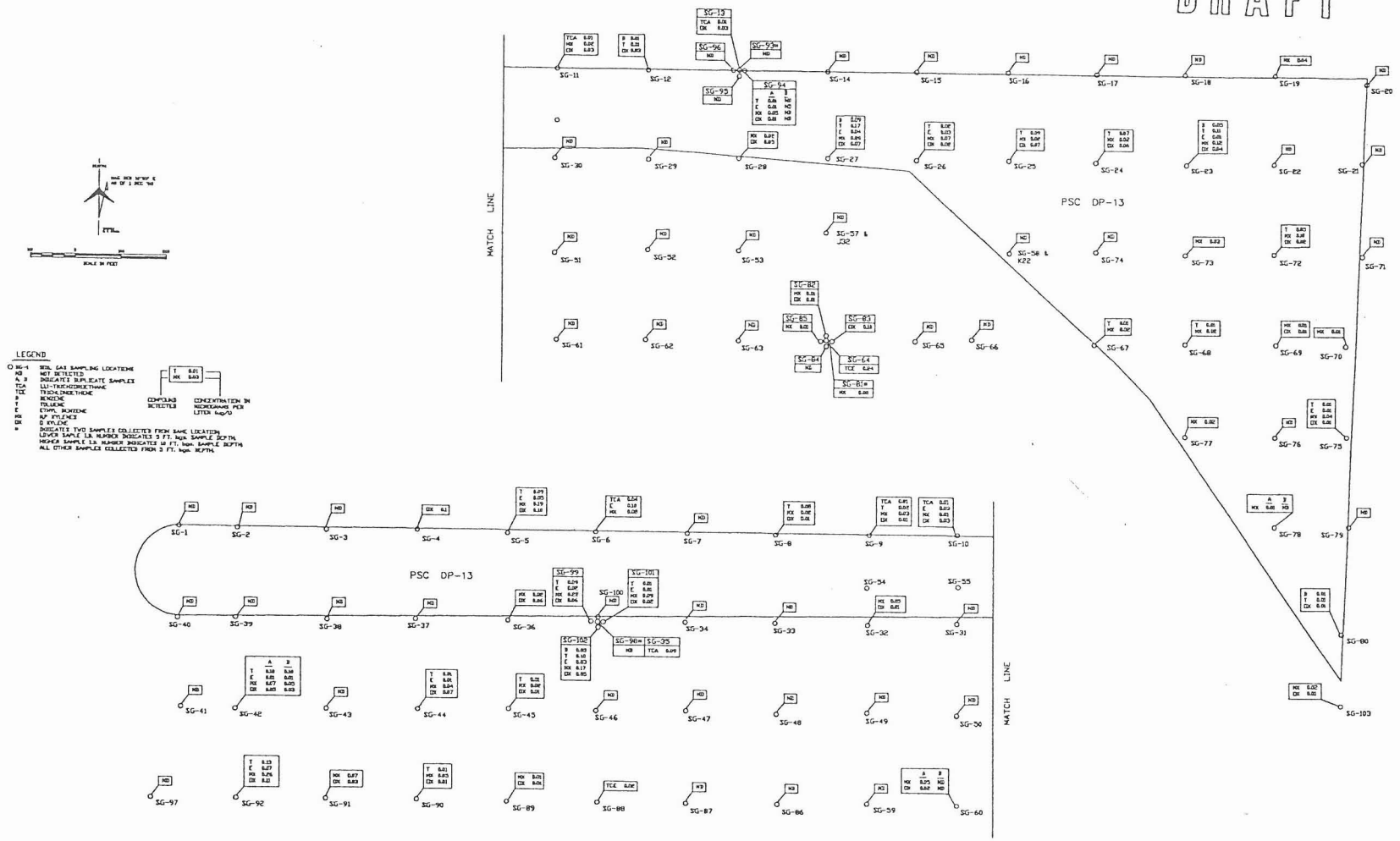


LEGEND

O SG-1	SOIL GAS SAMPLING LOCATIONS
ND	NOT DETECTED
A, B	INDICATES DUPLICATE SAMPLES
TCA	1,1,1-TRICHLOROETHANE
TCE	TRICHLOROETHENE
B	BENZENE
T	TOLUENE
E	ETHYL BENZENE
MX	M,P XYLENES
OX	O XYLENE
*	INDICATES TWO SAMPLES COLLECTED FROM SAME LOCATION; LOWER SAMPLE I.D. NUMBER INDICATES 3 FT. bgs SAMPLE DEPTH. HIGHER SAMPLE I.D. NUMBER INDICATES 10 FT. bgs SAMPLE DEPTH. ALL OTHER SAMPLES COLLECTED FROM 3 FT. bgs DEPTH.

COMPOUND DETECTED — CONCENTRATION IN MICROGRAMS PER LITER (ug/L)

SCALE IN FEET

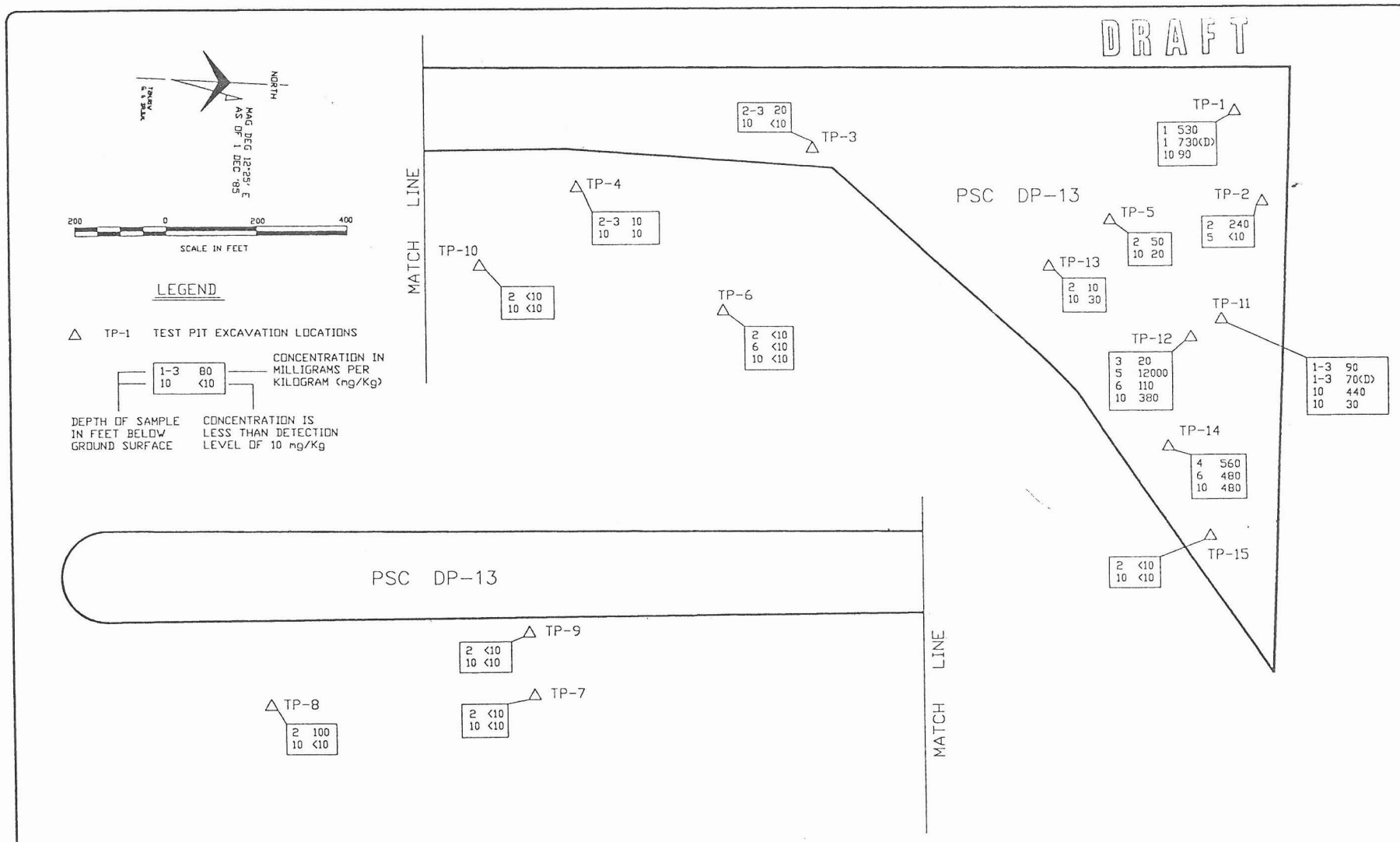
GERAGHTY & MILLER, INC.
Environmental Services

PREPARED BY: LOUIS C. BARKER & COMPANY'S SURVEYOR AUTOCAD FILE: SP2-13.DWG

VOLATILE ORGANIC COMPOUNDS IN SOIL GAS – PSC DP-13
PHASE I REMEDIAL INVESTIGATION, OU-1
LUKE AFB, ARIZONA

FIGURE 19

DRAFT



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DRAWN BY:	JIM C.	DATE:	NOV. 1991
CHECKED BY:	JOHN M.	DATE:	DEC. 1991
APPROVED BY:	L.C.C.	DATE:	DEC. 1991

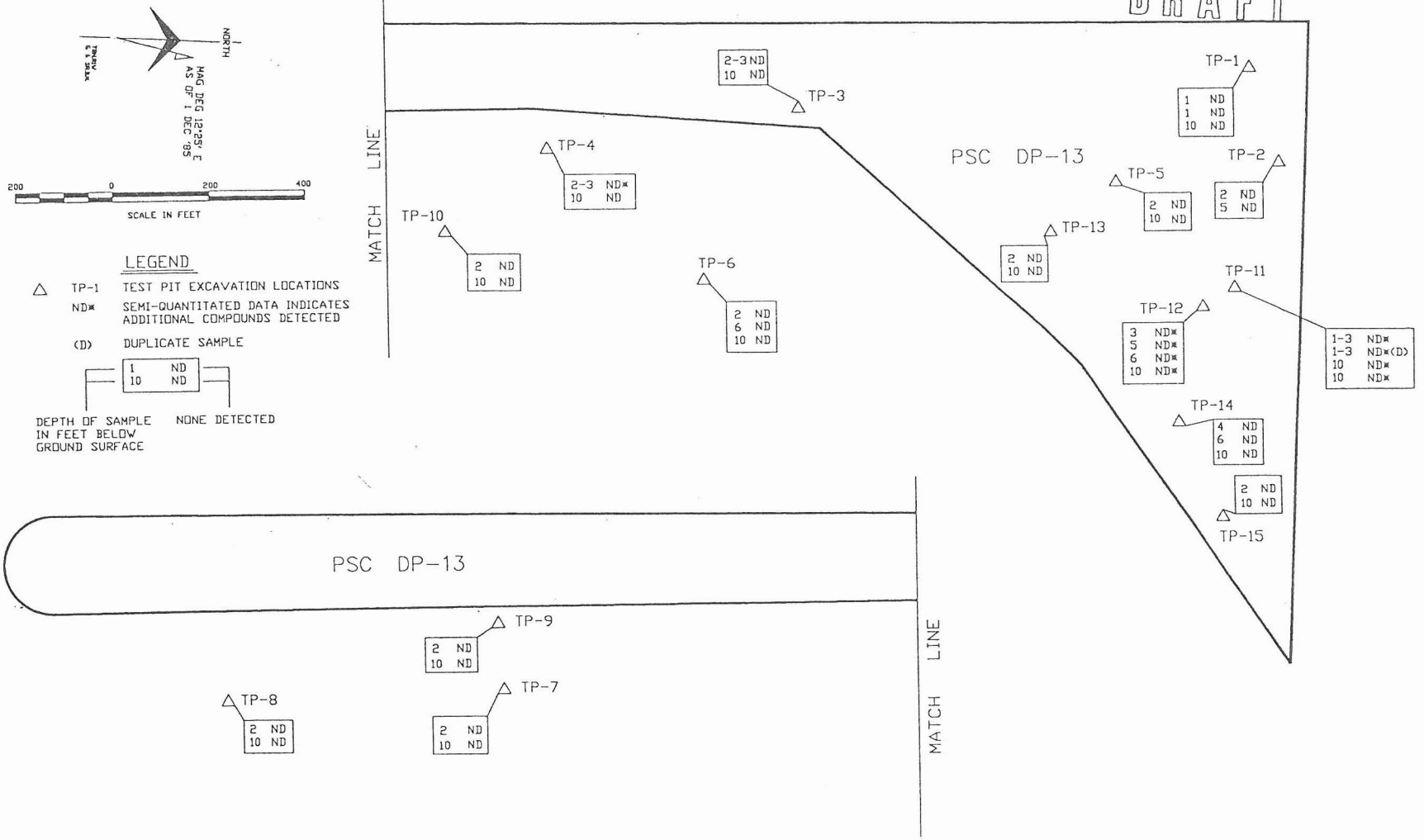
TOTAL RECOVERABLE PETROLEUM HYDROCARBONS IN TEST PIT SOIL SAMPLES – PSC DP-13

PHASE I REMEDIAL INVESTIGATION, OU-1
LUKE AFB, ARIZONA

FIGURE 20

PREPARED BY: LOUIS C. WARNER & COMPANY'S SURVEYORS AUTOCAD FILE: DP2-13

DRAFT



GERAGHTY & MILLER, INC.
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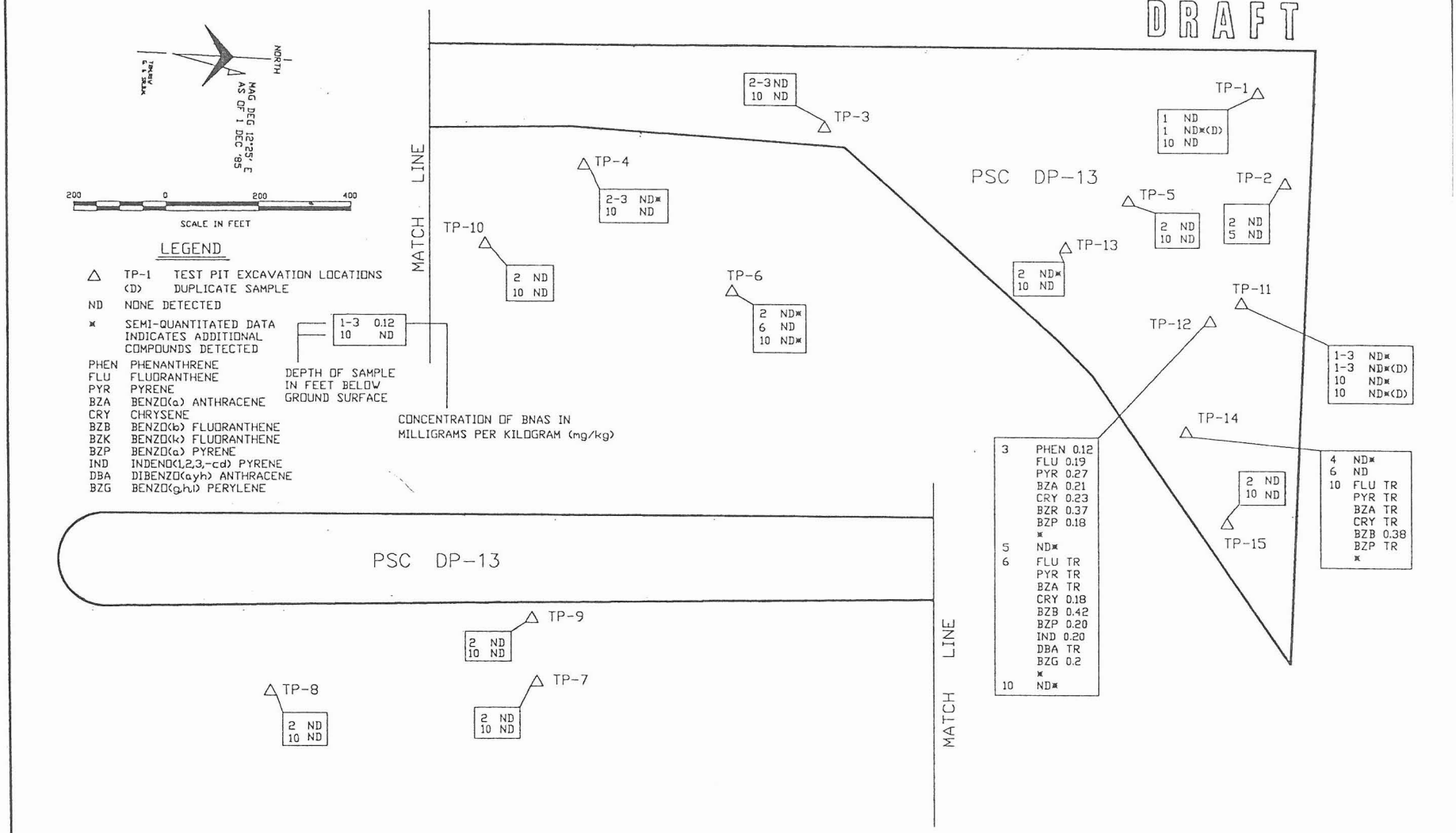
DRAWING NO:			
DRAWN BY:	JIM C.	DATE:	NOV. 1991
CHECKED BY:	JOHN M.	DATE:	DEC. 1991
APPROVED BY:	L.C.C.	DATE:	DEC. 1991

VOLATILE ORGANIC COMPOUNDS IN TEST PIT SOIL SAMPLS – PSC DP-13
PHASE I REMEDIAL INVESTIGATION, OU-1
LUKE AFB, ARIZONA

FIGURE 21

PREPARED BY: LOUIS C. WARNER & COMPANY'S SURVEYORS AUTOCAD FILE: DP2-13

DRAFT



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CHECKED BY:	JOHN M.	DATE:	DEC. 1991
APPROVED BY:	L.C.C.	DATE:	DEC. 1991

BASE/NEUTRAL AND ACID EXTRACTABLE COMPOUNDS IN TEST PIT SOIL SAMPLES – PSC DP-13

PHASE I REMEDIAL INVESTIGATION, OU-1

LUKE AFB, ARIZONA

FIGURE 22

PREPARED BY: LOUIS C. WARNER & COMPANY'S SURVEYORS AUTOCAD FILE: DP2-13

Table 16. Analytical Results, Soil Sampling, PSC DP-13, Phase I Remedial Investigation, Operable Unit No. 1, Luke Air Force Base, Arizona. Page 1 of 3

PSC	Sample I.D.	Sample Location	Depth (ft bgs)	PCBs (mg/kg)	TRPH (mg/kg)	VOCs (mg/kg)	BNAs (mg/kg)	CYANIDE (mg/kg)
DP-13	110591-LUK13-SM00001	TP-1	1	NA	530	ND	ND	<0.5
	110591-LUK13-SM00002D	TP-1	1	NA	730	ND	ND*	<0.5
	110591-LUK13-SM00004	TP-1	10	NA	90	ND	ND	<0.5
	110591-LUK13-SM00005	TP-2	2	NA	240	ND	ND	<0.5
	110591-LUK13-SM00006	TP-2	5	NA	<10	ND	ND	<0.5
	110591-LUK13-SM00007	TP-3	2-3	NA	20	ND	ND	<0.5
	110591-LUK13-SM00008	TP-3	10	NA	<10	ND	ND	<0.5
	110591-LUK13-SM00009	TP-4	2-3	NA	10	ND*	ND*	<0.5
	110591-LUK13-SM00010	TP-4	10	NA	10	ND	ND	<0.5
	110691-LUK13-SM00012	TP-5	2	NA	50	ND	ND	<0.5
	110691-LUK13-SM00013	TP-5	10	NA	20	ND	ND	<0.5
	110691-LUK13-SM00015	TP-6	2	NA	<10	ND	ND*	<0.5(A)
	110691-LUK13-SM00014	TP-6	6	NA	<10	ND	ND	<0.5(A)
	110691-LUK13-SM00016	TP-6	10	NA	<10	ND	ND*	<0.5(A)
	110691-LUK13-SM00017	TP-7	2	NA	<10	ND	ND	<0.5(A)
	110691-LUK13-SM00018	TP-7	10	NA	<10	ND	ND	<0.5
	110691-LUK13-SM00019	TP-8	2	NA	100	ND	ND	<0.5
	110691-LUK13-SM00020	TP-8	10	NA	<10	ND	ND	<0.5
	110691-LUK13-SM00021	TP-9	2	NA	<10	ND	ND	<0.5
	110691-LUK13-SM00022	TP-9	10	NA	<10	ND	ND	<0.5
	110691-LUK13-SM00023	TP-10	2	NA	<10	ND	ND	<0.5
	110691-LUK13-SM00024	TP-10	10	NA	<10	ND	ND	<0.5
	110791-LUK13-SM00026	TP-11	1-3	NA	90	ND*	ND*	<0.5
	110791-LUK13-SM00027D	TP-11	1-3	NA	70	ND*	ND*	<0.5
	110791-LUK13-SM00029	TP-11	10	NA	440	ND*	ND*	<0.5
	110791-LUK13-SM00030	TP-11	10	NA	30	ND*	ND*	<0.5

Table 16. Analytical Results, Soil Sampling, Site DP–13, Phase I Remedial Investigation, Operable Unit No. 1, Luke Air Force Base, Arizona.

Site	Sample I.D.	Sample Location	Depth (ft bgs)	PCBs (mg/kg)	TRPH (mg/kg)	VOCs (mg/kg)	BNAs (mg/kg)	CYANIDE (mg/kg)
DP–13	110791–LUK13–SM00033	TP–12	3	NA	20	ND*	PHEN 0.12 FLU 0.19 PYR 0.27 BZA 0.21 CRY 0.23 BZK 0.37 BZP 0.18 *	<0.5
	110791–LUK13–SM00034	TP–12	5	NA	12,000	ND*	ND*	2.0
	110791–LUK13–SM00031	TP–12	6	NA	110	ND*	FLUTR PYRTR BZATR CRY 0.18 BZB 0.42 BZP 0.20 IND 0.20 DBATR BZG 0.20 *	<0.5
	110791–LUK13–SM00032	TP–12	10	NA	380	ND*	ND*	<0.5
	110891–LUK13–SM00037	TP–13	2	NA	10	ND	ND*	<0.5
	110891–LUK13–SM00038	TP–13	10	NA	30	ND	ND	<0.5

Site	Sample I.D.	Sample Location	Depth (ft bgs)	PCBs (mg/kg)	TRPH (mg/kg)	VOCs (mg/kg)	BNAs (mg/kg)	CYANIDE (mg/kg)
	110891-LUK13-SM00040	TP-14	4	NA	560	ND	ND*	<0.5
	110891-LUK13-SM00039	TP-14	6	NA	480	ND	ND	<0.5
	110891-LUK13-SM00041	TP-14	10	NA	480	ND	FLUTR PYRTR BZATR CRYTR BZB 0.38 BZPTR *	<0.5
	110891-LUK13-SM00042	TP-15	2	NA	<10	ND	ND	<0.5
	110891-LUK13-SM00043	TP-15	10	NA	<10	ND	ND	0.5

15 test pits were excavated; a total of 35 samples plus two QA/QC samples were analyzed.

Table 17. VOC Semi-Quantitated Data for Soil Samples, Phase I Remedial Investigation, Operable Unit No. 1, Luke Air Force Base, Arizona.

Site	Sample I.D.	Parameter/Compound Description	Concentration (mg/kg)
DP-13	SM00009	Unknown Oxygenated Hydrocarbon C3	0.4B
	SM00026	Unknown Oxygenated Hydrocarbon C3	0.4B
	SM00027	Unknown Oxygenated Hydrocarbon C3	0.5B
	SM00029	Unknown Oxygenated Hydrocarbon C3	0.5B
	SM00030	Unknown Oxygenated Hydrocarbon C3	0.4B
	SM00031	Unknown Oxygenated Hydrocarbon C3	0.4B
	SM00032	Unknown Oxygenated Hydrocarbon C3	0.5B
	SM00033	Unknown Oxygenated Hydrocarbon C3	0.5B
	SM00034	Hydrocarbon C6-C10	260
LF-14	SM00002	Aliphatic Hydrocarbon C10+	0.4
		Aliphatic Hydrocarbon C10+	0.4
	SL00022	Aliphatic Hydrocarbon C10	2
		Cyclic Hydrocarbon	0.5
SD-26	SL00035	Decane	60
		Trimethylbenzene Isomer	50
		Undecane	50
		Aromatic Hydrocarbon	40
		Dodecane	40
	SL00036	Decane	50
		Trimethylbenzene Isomer	50
		Undecane	60
		Aromatic Hydrocarbon	40
		Dodecane	50
	SL00038	Decane	10
		Trimethylbenzene Isomer	10
		Undecane	20
		Dodecane	20
		Tridecane	10

B indicates compound also found in laboratory reagent blank.
mg/kg Milligrams per kilogram.

30011T16.wk1

Table 18. Metals Results, PSC DP-13, OU-1, Luke Air Force Base, Arizona.

ATI PROJECT	G&M SAMPLE ID	Sample Location	Depth (ft.bgs)	Ag	As	Ba	Be	Cd	Cr	Cu	Hg	Ni	Pb	Sb	Se	Tl	Zn
111562	110591-LUK13-SM00001	TP-1	1	<1	<5	167.0	<0.5	<0.5	9.7	14.9	<0.25	13	11	<5	<10	<20	39.5
111562	110591-LUK13-SM00002	TP-1	1	<1	<5	120.0	<0.5	<0.5	9.1	16.2	<0.25	12	10	<5	<10	<20	37.1
111562	110591-LUK13-SM00004	TP-1	10	<1	<5	170.0	0.5	<0.5	11.2	16.8	<0.25	14	10	<5	<10	<20	38.5
111562	110591-LUK13-SM00005	TP-2	2	<1	<5	113.0	<0.5	<0.5	9.3	14.7	<0.25	12	9	<5	<10	<20	32.6
111562	110591-LUK13-SM00006	TP-2	5	<1	<5	61.2	<0.5	<0.5	8.4	12.9	<0.25	10	<5	<5	<10	<20	24.1
111562	110591-LUK13-SM00007	TP-3	2-3	<1	<5	112.0	<0.5	<0.5	8.2	12.9	<0.25	10	6	<5	<10	<20	26.3
111562	110591-LUK13-SM00008	TP-3	10	<1	<5	68.6	0.5	<0.5	4.7	11.3	<0.25	7	6	<5	<10	<20	15.2
111604	110791-LUK13-SM00009	TP-4	2-3	<1	<5	94.8	<0.5	<0.5	13.6	14.0	<0.25	11	7	<5	<10	<20	23.7
111562	110591-LUK13-SM00010	TP-4	10	<1	<5	118.0	<0.5	<0.5	9.9	17.8	<0.25	12	9	<5	<10	<20	31.6
111563	110691-LUK13-SM00012	TP-5	2	<1	<5	125.0	<0.5	<0.5	12.4	17.7	<0.25	17	13	<5	<10	<20	35.0
111563	110691-LUK13-SM00013	TP-5	10	<1	<5	127.0	<0.5	<0.5	12.5	18.3	<0.25	15	11	<5	<10	<20	34.1
111563	110691-LUK13-SM00014	TP-6	6	<1	<5	176.0	<0.5	<0.5	15.4	20.4	<0.25	16	13	<5	<10	<20	37.1
111563	110691-LUK13-SM00015	TP-6	2	<1	<5	152.0	0.6	<0.5	13.5	20.3	<0.25	16	11	<5	<10	<20	33.5
111563	110691-LUK13-SM00016	TP-6	10	<1	<5	55.7	<0.5	<0.5	4.4	9.6	<0.25	7	6	<5	<10	<20	13.0
111563	110691-LUK13-SM00017	TP-7	2	<1	9	138.0	<0.5	<0.5	11.7	20.4	<0.25	14	11	<5	<10	<20	33.4
111563	110691-LUK13-SM00018	TP-7	10	<1	<5	154.0	<0.5	<0.5	2.9	6.1	<0.25	4	<5	<5	<10	<20	11.4
111563	110691-LUK13-SM00019	TP-8	2	<1	<5	126.0	<0.5	<0.5	11.4	17.9	<0.25	14	12	<5	<10	<20	33.0
111563	110691-LUK13-SM00020	TP-8	10	<1	<5	34.0	<0.5	<0.5	4.1	7.8	<0.25	6	7	<5	<10	<20	14.0
111563	110691-LUK13-SM00021	TP-9	2	<1	<5	127.0	<0.5	<0.5	10.9	14.5	<0.25	13	9	<5	<10	<20	27.5
111563	110691-LUK13-SM00022	TP-9	10	<1	<5	176.0	<0.5	<0.5	11.9	17.4	<0.25	14	12	<5	<10	<20	35.8
111563	110691-LUK13-SM00023	TP-10	2	<1	<5	98.1	<0.5	<0.5	12.2	24.1	<0.25	15	13	<5	<10	<20	31.0
111563	110691-LUK13-SM00024	TP-10	10	<1	<5	119.0	<0.5	<0.5	10.0	13.0	<0.25	12	8	<5	<10	<20	25.0
111604	110791-LUK13-SM00026	TP-11	1-3	<1	<5	116.0	<0.5	<0.5	10.8	14.4	<0.25	11	9	<5	<10	<20	29.6
111604	110791-LUK13-SM00027	TP-11	1-3	<1	<5	116.0	<0.5	<0.5	10.4	13.4	<0.25	11	10	<5	<10	<20	29.7
111604	110791-LUK13-SM00029	TP-11	10	<1	<5	142.0	<0.5	<0.5	15.3	21.1	<0.25	19	27	<5	<10	<20	57.8
111604	110791-LUK13-SM00030	TP-11	10	<1	<5	137.0	<0.5	<0.5	14.9	21.6	<0.25	18	13	<5	<10	<20	43
111604	110791-LUK13-SM00031	TP-12	6	<1	7	94.7	<0.5	<0.5	23.4	3900	<0.25	16	51	<5	<10	<20	183
111604	110791-LUK13-SM00032	TP-12	10	<1	<5	132.0	<0.5	<0.5	15.2	37.6	<0.25	17	21	<5	<10	<20	48.8
111604	110791-LUK13-SM00033	TP-12	3	<1	<5	129.0	<0.5	<0.5	24.9	22.8	<0.25	14	73	<5	<10	<20	45.7
111604	110791-LUK13-SM00034	TP-12	5	<1	19	78.9	<0.5	2.0	15900	35.6	<0.25	4	36000	7.0	<10	<20	167
111605	110891-LUK13-SM00037	TP-13	2	<1	<5	128.0	<0.5	<0.5	14.4	18.2	<0.25	14	12	<5	<10	<20	33.4
111605	110891-LUK13-SM00038	TP-13	10	<1	<5	101.0	<0.5	<0.5	9.9	13.2	<0.25	10	9	<5	<10	<20	26.7

Table 18. Metals Results, PSC DP-13, OU-1, Luke Air Force Base, Arizona.

ATI PROJECT	G&M SAMPLE ID	Sample Location	Depth (ft.bgs)	Ag	As	Ba	Be	Cd	Cr	Cu	Hg	Ni	Pb	Sb	Se	Tl	Zn
111605	110891-LUK13-SM00039	TP-14	6	<1	<5	132.0	<0.5	28.6	19.5	1340	<0.25	22	42	<5	<10	<20	76.2
111605	110891-LUK13-SM00040	TP-14	4	<1	<5	126.0	<0.5	<0.5	12.6	25.6	<0.25	18	24	<5	<10	<20	56
111605	110891-LUK13-SM00041	TP-14	10	<1	<5	133.0	<0.5	<0.5	13.5	22.7	<0.25	17	26	<5	<10	<20	50.3
111605	110891-LUK13-SM00042	TP-15	2	<1	<5	103.0	<0.5	<0.5	10.4	21.2	<0.25	12	10	<5	<10	<20	28.3
111605	110891-LUK13-SM00043	TP-15	10	<1	<5	164.0	<0.5	<0.5	12.6	19.5	<0.25	14	8	<5	<10	<20	34.5

mg/kg Milligrams per Kilogram

METALS13.WK1

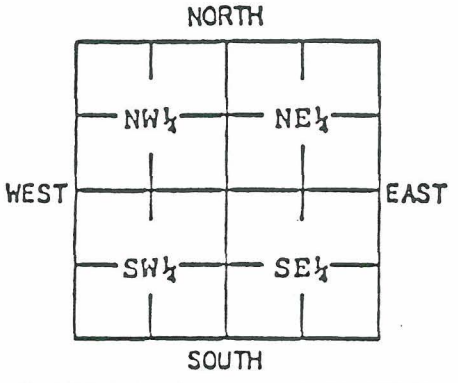
NO FEE REQUIRED

DEPARTMENT OF WATER RESOURCES (DWR)
15 South 15th Avenue
Phoenix, Arizona 85007

NO FEE REQUIRED

NOTICE OF INTENT TO ABANDON A WELL

A.R.S. §45-594, R12-15-816: Well abandonment shall be performed only by a licensed well drilling contractor or single well licensee. The owner of a well shall file a Notice of Intent to Abandon the well prior to abandonment.



INDICATE WELL LOCATION BY X
(Above diagram represents one 640 acre section)

1. Well Location:

Township | Range | Section

¼ (10 Acre) | ¼ (40 Acre) | ¼ (160 Acre)

2. Position location of the well on the land:

Latitude ____ ° ____ ' ____ "

Longitude ____ ° ____ ' ____ "

DO NOT WRITE IN THIS SPACE
OFFICE RECORD

File No. _____
Filed _____ By _____
Input _____ By _____

DUPLICATE
Mailed _____ By _____
Registration _____

3. Well Registration Number:

55- _____

4. Well Owner:

_____
Name

_____
Mailing Address

_____
City State Zip

Telephone _____

5. Owner of the land:

_____
Name

_____
Address

_____
City State Zip

6. County Assessor's ID:

Book | Map | Parcel

DESCRIPTION OF WELL TO BE ABANDONED:

7. Abandonment will begin: Month____ Year____ **8.** Well Diameter____inches **9.** Well Depth____feet

10. Type of Casing _____

11. Materials and methods to be used to abandon the well: _____

_____

12. Reason for abandonment: _____

13. To your knowledge, is there any information that exists which indicates that the water in this well may be or is contaminated? Yes____ No____. If yes, explain on an attached sheet.

14. Licensed Driller performing abandonment: Firm Name _____ License No.____

Address _____ City _____ State____ Zip____

GENERAL INSTRUCTIONS

1. This form is to be used to obtain authority to abandon a well.
2. If this well has just been discovered pursuant to A.R.S. §45-593.D., and has not been registered, this form will serve to register the well when properly abandoned and reported.
3. Fill out this form in DUPLICATE and send to 15 South 15th Avenue, Phoenix, AZ 85007.
4. Construction standards for abandonment shall be in accordance with Department Rules and Regulations.

I state that this Notice is filed in compliance with A.R.S. §45-594 and A.A.C. R12-15-816 and is complete and correct to the best of my knowledge and belief.

Date: _____ Signature of Well Owner: _____

ARIZONA DEPARTMENT OF WATER RESOURCES
15 South 15th Avenue
Phoenix, Arizona 85007

WELL ABANDONMENT COMPLETION REPORT

A.R.S. §45-594; R12-15-816: Within 30 days after a well is abandoned, the well drilling contractor shall file a well Abandonment Completion Report on a form prescribed and furnished by the Director.

1. **Well Registration No. 55-**_____

2. **Well Location:** _____N/S _____E/W _____ _____1/4 _____1/4 _____1/4
   Township Range Section 10 Acre 40 Acre 160 Acre

3. **Owner of the Land:**
   Name:_____
   _____
   Address City State Zip

4. **Well Description:** _____ _____ _____
   Hole Depth Diameter Type of Casing

5. **Reason for abandonment:** _____
   _____
   _____

6. Prior to abandoment, did the well have 20' of steel surface casing AND 20' of grout in the annular space surrounding the surface casing? Yes____ No____

7. If the answer to No. 6 is no, was the top 20' of casing removed prior to setting the cement plug? Yes____ No____

8. Identify the materials and methods used to abandon the well: _____
   _____
   _____

9. Is this Abandonment Completion Report filed in accordance with R12-15-816,F.?: Yes____ No____

10. How deep does the cement plug extend below land surface?_____

11. Was the well backfilled above the cement plug? Yes____ No____

12. Date abandonment completed: _____

13. **Drilling firm:**
    Name:_____
    _____
    Address City State Zip

DATE:_____ **SIGNATURE OF WELL DRILLER**_____

1. Constructed in full conformance with R12-15-811 and R12-15-812 and either sealed with a cap or equipped with a pump.

2. Abandoned in accordance with R12-15-816.

HISTORICAL NOTE

Adopted effective March 5,1984 (Supp. 84-2). Amended effective June 18,1990 (Supp. 90-2).

R12-15-816. Abandonment

A. Well abandonment shall be performed only by a licensed well drilling contractor or single well licensee.

B. Except as provided in subsection (F) of this Section, the owner of a well shall file a notice of intent to abandon the well prior to abandonment, on a form prescribed and furnished by the Director, which shall include:

1. The name and mailing address of the person filing the notice.

2. The legal description of the land upon which the well proposed to be abandoned is located and the name and mailing address of the owner of the land.

3. The legal description of the location of the well on the land.

4. The depth, diameter and type of casing of the well.

5. The well registration number.

6. The materials and methods to be used to abandon the well.

7. When abandonment is to begin.

8. The name and well drilling license number of the well drilling contractor or single well licensee who is to abandon the well.

9. The reason for the abandonment.

10. Such other information as the Director may require.

C. The Director shall, upon receipt of a proper notice of intent to abandon, mail a well abandonment authorization card to the designated well drilling contractor or single well licensee.

D. Except as described in subsection (F) of this Section, a well drilling contractor or single well licensee may commence abandoning a well only if the driller has possession of an

abandonment card at the well site, issued by the Director in the name of the driller, authorizing the abandonment of that specific well or wells in that specific location.

E. Within 30 days after a well is abandoned pursuant to this Section, the well drilling contractor or single well licensee shall file with the Director a Well Abandonment Completion Report on a form prescribed and furnished by the Director which shall include the date the abandonment of the well was completed and such other information as the Director may require.

F. In the course of drilling a new well, the well may be abandoned without first filing a notice of intent to abandon and without an abandonment card. If the well is abandoned pursuant to this subsection without first filing a notice of intent to abandon and without an abandonment card, the well drilling contractor or single well licensee shall provide the following information in the Well Abandonment Completion Report:

1. The legal description of the land upon which the well was abandoned and the name and mailing address of the owner of the land.

2. The legal description of the location of the well on the land.

3. The depth, diameter and type of casing of the well prior to abandonment.

4. The well registration number.

5. The materials and methods used to abandon the well.

6. The name and well drilling license number of the well drilling contractor or single well licensee who abandoned the well.

7. The date of completion of the abandonment of the well.

8. The reason for the abandonment.

9. Such other information as the Director may require.

G. The abandonment of a well shall be accomplished through filling or sealing the well so as to prevent the well, including the annular space outside the casing, from being a channel allowing the vertical movement of water.

H. A well not penetrating an aquifer shall include a surface seal which shall be accomplished as follows:

1. If the casing is removed from the top 20 feet of the well, a cement grout plug shall be set extending from two feet below the land surface to a minimum of twenty feet below the land surface, and the well shall be backfilled above the top of the cement grout plug to the

original land surface.

2. If the casing is not removed from the top 20 feet of the well, a cement grout plug shall be set extending from the top of the casing to a minimum of twenty feet below the land surface and the annular space outside the casing shall be filled with cement from the land surface to a minimum of twenty feet below the land surface.

I. In addition to the surface seal required in subsection (H):

1. A well penetrating a single aquifer system with no vertical flow components shall be filled with cement grout, concrete, bentonite drilling muds, clean sand with bentonite, or cuttings from the well.

2. A well penetrating a single or multiple aquifer system with vertical flow components shall be sealed with cement grout or a column of bentonite drilling mud of sufficient volume, density, and viscosity to prevent fluid communication between aquifers.

J. Materials containing organic or toxic matter shall not be used in the abandonment of a well.

K. The owner or operator of the well shall notify the Director in writing no later than 30 days after abandonment has been completed. The notification shall include the well owners name, the location of the well, and the method of abandonment.

HISTORICAL NOTE

Adopted effective March 5, 1984 (Supp.84-2). Amended effective June 18,1990 (Supp.90-2).

R12-15-817. Exploration wells

A. Notification. Prior to drilling one or more exploration wells, the well owner, lessee, or exploration firm shall file a notice of intention to drill on forms provided by the Director. If the notice of intention to drill is filed for the project as a whole, the drilling card shall be issued for the project as a whole.

B. Construction and abandonment

1. If an exploration well which is to be left open for re-entry at a later date encounters groundwater, it shall be cased and capped in accordance with R12-15-811, R12-15-812, and R12-15-822. The minimal length of surface seal shall be either 20 feet, or five feet into the first encountered consolidated formation, whichever is less. If no groundwater is encountered, the well shall be cased, grouted and capped in such a manner so as to prevent contamination of the well bore from the surface.

2. Exploration wells not left open for re-entry shall be abandoned in accordance with

that the variance will not adversely affect other water users or the local aquifers.

C. A variance shall not be effective until the well drilling contractor or owner receives from the Director a written approval of the variance and a new drilling card stamped "variance issued."

HISTORICAL NOTE
Adopted effective March 5,1984 (Supp.84-2). Amended effective June 18,1990 (Supp. 90-2).

R12-15-821. Special requirements

If the Director determines that the literal application of the minimum well construction requirements contained in this Article would not adequately protect the aquifer or other water users, the Director may require that further additional measures be taken, such as increasing the length of the surface seal or increasing the well's minimum distance from a potential source of contaminations.

HISTORICAL NOTE
Adopted effective March 5,1984 (Supp. 84-2). Amended effective June 18,1990 (Supp.90-2).

R12-15-822. Capping of open wells

A. The owner of an open well shall either install a cap on the well or abandon the well in accordance with R12-15-816. Within five days after capping the well, the owner of the well shall file with the Department a notice of well capping on a form approved by the Director which shall include the following information:

1. The name and address of the well owner.
2. The name and address of the person installing the cap.
3. The well registration number.
4. The legal description of the location of the well.
5. The date the well was capped.
6. The method of capping.
7. The type and diameter of casing.

B. If no casing exists in an open well, or if the integrity of the existing casing is insufficient to allow installation of a cap, the well owner shall install a surface seal in accordance with

R12-15-811(B) prior to capping.

C. The owner of a well on which a cap is installed shall make the cap tamper resistant by welding the cap to the top of the casing by the electric arc method of welding, except that the owner of a well may make the cap tamper resistant by securing the cap to the top of the casing with a lock during temporary periods of well maintenance, modification or repair, not to exceed 30 days, or at any time if the well is a monitor well or piezometer well.

HISTORICAL NOTE

Adopted as an emergency effective March 2, 1989, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 89-1). Emergency expired. Readopted without change as an emergency effective June 2, 1989, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 89-2). Emergency expired. Readopted without change as an emergency effective September 5, 1989, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 89). Emergency expired. Readopted without change as an emergency effective December 1, 1989, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 89-4). Emergency expired. Readopted without change as an emergency effective March 23, 1990, pursuant to A.R.S. § 41-1026, valid for only 90 days (Supp. 90-1). Permanent rule adopted with changes effective June 18, 1990 (Supp. 90-2).

Historical Notes to R12-15-801 through R12-15-822 reprinted with permission of the Office of the Arizona Secretary of State.

LEGEND

BOUNDARIES

- EXISTING PROPERTY LINE (GOV'T OWNED LAND)
- EXISTING PROPERTY LINE WITH FENCE
- E — EXISTING PROPERTY LINE (GOV'T EASEMENT(E) OR LEASE(L))
- APPROACH-DEPARTURE ZONE & R/W CLEARANCES

AIRFIELD PAVEMENTS

- (CONCRETE PAVEMENT) EXISTING TO REMAIN (ASPHALT CONCRETE PAVEMENT)
- EXISTING SHOULDER STABILIZATION
- EXISTING OVERRUN
- EXISTING ABANDONED

STRUCTURES

- EXISTING PERMANENT
- EXISTING SEMI-PERMANENT
- EXISTING TO BE REMOVED

ROADS, PARKING & RR'S

- EXISTING TO REMAIN (PAVED)
- EXISTING TO REMAIN (NOT PAVED)
- EXISTING FENCE LOCATED AWAY FROM PROPERTY LINE
- EXISTING RAILROAD

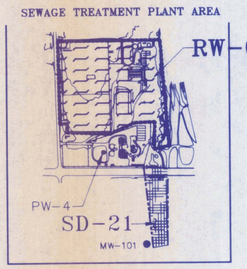
NATURAL FEATURES

- INDEX CONTOUR (IN FEET)
- EXISTING DRAINAGE DITCH WITH DIRECTION OF FLOW
- EMBANKMENT
- DENOTES 100 YEAR FLOOD CONTOUR

DESIGNATION OF PSCS

- POL PRODUCTS
- BURIALS / LANDFILLS
- OPEN CANALS
- PCB STORAGE
- DPDO STORAGE
- SKEET RANGE
- NO FURTHER INVESTIGATION
- PRODUCTION/MONITORING WELL

SEWAGE TREATMENT PLANT AREA



NOTE:
FINAL DETERMINATION REVEALS NO PRIME OR UNIQUE FARMLAND ON BASE.

NOTE ON FLOOD CONTOURS
THERE ARE NO PROTECTED WETLANDS. THE 500 YEAR FLOOD CONTOURS HAVE NOT BEEN DETERMINED

NATIONAL PRIORITIES LIST (NPL) SITES FOR LUKE AFB

- *OT-01 OLD INCINERATOR SITE
- RW-02 WASTE TREATMENT ANNEX LANDFILL
- LF-03 OUTBOARD RUNWAY LANDFILL
- **OT-04 PERIMETER ROAD POL WASTE SITE
- ** DP-05 POL WASTE DISPOSAL TRENCH
- ** FT-06 SOUTH FIRE TRAINING AREA
- ** FT-07 NORTH FIRE TRAINING AREA
- *OT-08 F-15 BURIAL SITE
- *OT-09 CANBERRA BURIAL SITE
- *OT-10 CONCRETE RUBBLE BURIAL SITE
- SS-11 FORMER OUTSIDE TRANSFORMER STORAGE
- OT-12 OLD EOD BURIAL PIT
- DP-13 DRAINAGE DITCH DISPOSAL AREA
- LF-14 OLD SALVAGE YARD BURIAL SITE
- *SS-15 FACILITY 328 SPILL SITE
- *SS-16 FACILITY 321 USTs STORAGE
- SS-17 FORMER DPDO YARD
- ** ST-18 FACILITY 993
- * ST-19 BX LEAKING USTs
- SD-20 OIL/WATER SEPARATOR CANAL AND EARTH FISSURES
- SD-21 SEWAGE TREATMENT PLANT EFFLUENT CANAL
- ** DP-22 POL TRENCH NORTHEAST RUNWAY
- ** DP-23 OLD SURFACE IMPOUNDMENT AREA, WEST OF 999
- * DP-24 BASE AMMO STORAGE AREA
- LF-25 NORTHWEST LANDFILL
- SD-26 HUSH HOUSE CANAL
- LF-37 NORTHEAST LANDFILL
- ** SD-38 SOUTHWEST OIL-WATER SEPARATOR AT THE AUTO HOBBY SHOP
- SD-39 WASTE DISCHARGE AT OLD LOCKHEED SITE
- ** SD-40 TAXIWAY FUEL DISCHARGE
- OT-41 SKEET RANGE

OU-1 PSC'S

* NO FURTHER INVESTIGATION

ALL UNMARKED PSCs ARE TO BE INVESTIGATED FOR ALL MEDIA IN OU-1.

IN ADDITION, ALL OTHER MEDIA EXCLUDING SOIL WILL BE INVESTIGATED AT OU-2 SITES

OU-2 PSC'S

** PSCs ARE TO BE INVESTIGATED FOR SOILS.

LUKE/CAD FILE NO. LUKE271A.DWG/SCALE 1=800 CAD 11-07-91 MANUAL 5-05-92 JVP

GERAGHTY & MILLER, INC.
Environmental Services

SCALE VERIFICATION
THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.
0 1"
USE TO VERIFY FIGURE SCALE

REV. NO.	DATE	DESCRIPTION	BY	APPR.

DRAWING NO: AZ29901-D
DRAWN BY: BJH DATE: 1/7/91
CHECKED BY: DATE:
APPROVED BY: DATE:

LOCATION OF POTENTIAL SOURCES OF CONTAMINATION

ADDENDA FOR THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY PLANNING DOCUMENTS

LUKE AFB, ARIZONA

FIGURE 2