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Superfund Record of Decision:

Sacramento Army Depot, CA

50272-101

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First Remedial Action

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16. Abstract (Limit: 200 words)

The 485-acre Sacramento Army Depot (SAAD) site, 7 miles southeast of downtown Sacramento, California, is surrounded by land zoned as commercial and light industrial property. SAAD is an electronic maintenance and repair depot consisting of storage, maintenance, and office facilities. Present operations include shelter repair, electro-optics equipment repair, metal plating, and treatment of metal plating wastes. From approximately 1947 to 1972 paint sludges, oil, grease wood, trash, solvents and other industrial wastes were burned and disposed of onsite in burn pits. SAAD has since removed most of the burned material from the burn pits. The burn pits were subsequently covered with soil and revegetated. Ground water samples, collected by SAAD from 1981 to 1984, indicated that several chemical compounds were present at levels above drinking water standards in two areas. The primary contaminants of concern affecting the ground water are VOCs including TCE and PCE.

The selected remedial action for this interim remedy includes ground water pumping and treatment using ultraviolet light/chemical oxidation followed by discharge to the regional treatment plant and industrial reuse of the treated ground water. The estimated capital cost of the remedy is $1,764,000 with an estimated annual O&M cost of $264,000.

17. Document Analysis a. Descriptors
Record of Decision - Sacramento Army Depot, CA
First Remedial Action
Contaminated Medium: gw
Key Contaminants: VOCs (TCE, PCE)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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(Formerly NTIS-35)
Department of Commerce

RECORD OF DECISION FOR ON-SITE GROUND WATER REMEDIATION AT THE SACRAMENTO ARMY DEPOT

1. DECLARATION

Site Name and Location:

* Sacramento Army Depot (SAAD)
(On-Site ground water Contamination)
Sacramento, California 95813-5052.

Statement of Basis and Purpose:

The basis of this Record of Decision (ROD) is:

* The Administrative Record for the Site which contains:

* The Operable Unit Feasibility Study (OUFS) which contains site investigation data.

* The Proposed Plan (PP).

* The Responsiveness Summary, which summarizes the public comments on the OUFS and the PP.

The purpose of this ROD is:

* To set forth the interim remedial action to be conducted at SAAD to remedy ground water contamination associated with the former burn pits located in the southwest corner of the Depot. This is the first of several potential remedial actions addressing soil and ground water contamination which may be conducted at SAAD. Subsequent ROD's will address other potential threats posed by the site, both on and off-site.

Summary:

* The U.S. Environmental Protection Agency, Region IX (EPA IX) and State of California (DHS) concur on the selected interim remedial action.

* This interim remedial action is consistent with the Comprehensive Environmental Response Compensation and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA/SARA), to the extent practicable, the National Contingency Plan (NCP), the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

Assessment of Site: Ground water samples collected by SAAD from 1981 to 1989 indicate that several chemical compounds are present, primarily trichloroethene, tetrachloroethene, 1,2-dichloroethane, and cis/trans-1,2-dichloroethene. These compounds have been detected at levels above drinking water standards in the ground water. An area known as the former burn pits located in the southwest corner of the Depot is considered the likely source of the organic compounds found in ground water.

Description of Selected Remedy:

The major components of the selected remedy include:

* Installation of seven ground water extraction wells down gradient from the former burn pits.

* Extraction of contaminated ground water on-site at approximately 350 gallons per minute.

* Treatment of contaminated ground water by ultraviolet light/chemical oxidation without toxic air emissions or creation of residual hazardous waste.

* Discharge of treated ground water to the Regional Treatment Plant pending completion of beneficial reuse analysis.

* Completion of construction and start-up of the extraction and treatment system within the next twelve months.

* Restoration of the contaminated ground water on-site to current drinking water standards within approximately ten to fifteen years of system operations.

Declaration: This interim remedial action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements directly associated with this action and is cost-effective. This action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The statutory preferences for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element have been addressed and are encompassed by this response action.

IT IS SO AGREED:

FOR THE U.S. DEPARTMENT OF THE ARMY:

9/28/89 — Lewis D. Walker

Date

Lewis D. Walker
Deputy for Environmental, Safety,
and Occupational Health
Office of the Assistant Secretary
of the Army (I&L)

John Donahoe.

Date

John F. Donahoe
Colonel, SC
Commander, Sacramento Army Depot

FOR THE STATE OF CALIFORNIA:

Date

Alex Cunningham
Chief Deputy Director
Toxic Substances Control Program
California Department of Health
Services

FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY:

9.29.89 — Daniel W. McGovern

Date

Daniel W. McGovern
Regional Administrator
United States Environmental
Protection Agency, Region IX

2. DECISION SUMMARY

Site Name, Location, and Description

Site Name: Sacramento Army Depot (SAAD) (On-Site Ground water Contamination)

Location: 8350 Fruitridge Road, Sacramento, California, 95813-5052.

Description: SAAD is an electronics maintenance and repair depot consisting of storage, maintenance, and office facilities. Present operations at SAAD include shelter repair, electro-optics equipment repair, metal plating, and treatment of metal plating wastes.

SAAD is located in the center of Sacramento County, approximately 7 miles southeast of downtown Sacramento. Encompassing approximately 485 acres (approximately 2 square kilometers), SAAD is immediately surrounded on all sides by land zoned as commercial/light industrial property.

Site History and Enforcement Actions

The former burn pits (See Figure 1), the suspected source of the ground water contamination, were used beginning between 1947 - 1953 and used through approximately 1972 to dispose of wastes by burning including paint sludges, oil, grease, wood, trash, solvents and other industrial wastes. SAAD excavated the burn pits when incineration activities were stopped around 1972. Based upon a recent soil gas investigation of the burn pits, it appears that most of the burned material was removed from the burn pits. Currently, the burn pits are covered with soil and have considerable vegetative growth.

No environmental enforcement actions have been taken against SAAD. In December 1988, the Army, EPA, and DHS entered into a Federal Facility Agreement governing the conduct of the Installation Restoration Program on SAAD.

Highlights of Community Participation

Public notice was placed in two of the local daily newspapers of general circulation (Sacramento Bee, Sacramento Union) beginning 15 July 1989 announcing the availability of the OUFS and the PP for review and comment. These documents are part of the SAAD Administrative Record and are available at the following local repositories: SAAD Visitor Control Center, and at the California State University, Sacramento, Library. The OUFS and PP were also available for public review at the Sacramento office of DHS, and at

EPA headquarters in San Francisco. DHS has also noticed the contiguous property owners to the Depot.

Public review and comment was invited for a period of thirty-five days from 22 July 1989 to 26 August 1989. No written or telephone comments were received.

A public meeting on the PP was held on 8 August 1989 at Will C. Wood Middle School, which is located near the Depot. The meeting was attended by three members of the public from the local SAAD area and responses are summarized in Section 3.

The Depot environmental contamination and management program have also been the subject of numerous newspaper, radio, and television articles over the past five years. Additionally, two previous public meetings have been held in 1987 and 1988 to discuss the Depot Installation Restoration Program.

Scope and Role of Operable Unit

An operable unit is an interim measure that prevents , minimizes, stabilizes, mitigates or eliminates the release of a hazardous substance, consistent with or until a permanent remedy is developed. The Operable Unit proposed by SAAD will contain, extract and treat on-site contaminated ground water associated with the former burn pits located in the southwest corner of the installation. The ground water cleanup is intended to reduce potential health risks from exposure to contaminated ground water by treating the water to meet Federal and State drinking water standards. Ground water extraction wells will extract contaminated ground water at approximately 350 gallons per minute down-gradient from the former burn pits and the contaminants will be destroyed as the contaminated ground water passes through an ultraviolet light/chemical oxidation treatment system. The treated water will be used for industrial processes once evaluation of potential uses has been completed and an agreement with an industrial facility has been concluded. Construction of the treatment system will be completed within the next twelve months. The overall quality of the ground water will be restored to meet current drinking water standards after ten to fifteen years of operation.

This is the first of several potential remedial actions addressing soil and ground water contamination which may be conducted at SAAD. Subsequent ROD's will address other potential threats posed by the site, both on and off-site.

Site Characteristics

SAAD has a topography that is relatively flat with ground surface elevations ranging from 36 to 42 feet above mean sea level. SAAD is situated within the

Morrison Creek drainage basin with Morrison Creek being the only surface water located near the depot. Until it was diverted around the southern border of the site by the U.S. Army Corps of Engineers in 1945, Morrison Creek bisected SAAD at the center of the eastern boundary and flowed across the site toward the west. Morrison Creek discharges into the two overflow basins of the Sacramento and American Rivers and eventually empties into the Sacramento River. Mean annual precipitation at the site is approximately 17 inches.

Depth to ground water beneath the site is approximately 78 feet. The ground water gradient is approximately 1.5 feet per thousand feet and the flow direction is to the south-southwest.

Subsurface geologic data from SAAD indicates a number of small sand channels exist in the upper 140 feet which are difficult to trace. This upper section has been grouped into two zones, "A" and "B", based on the relative permeabilities of the lithologies encountered. Beneath the "B" zone at a depth of about 140 feet, a silty zone occurs with a thickness varying from 8 to 14 feet. This zone appears to be a relatively continuous confining layer. This zone overlies the "C" zone, which has an approximate thickness of 20 to 25 feet. The "C" zone is underlain by a clayey silt zone approximately 8 to 15 feet thick. The "C" zone overlies the "D" zone, which is encountered at approximately 200 feet below ground surface.

A review of aerial photographs by EPA showed several areas where past industrial practices may have created contamination. Ground water samples collected by SAAD from 1981 to 1988 indicated that several chemical compounds were present, primarily trichloroethene, tetrachloroethene, 1,2-dichloroethane, and cis/trans-1,2-dichloroethene. These compounds have been detected at levels above drinking water standards in the "A" and "B" zones (See Figure 2).

Summary of Site Risks

A variety of carcinogenic and noncarcinogenic chemicals have been identified in on-site and off-site monitoring wells. From this initial list of contaminants nine indicator chemicals were selected based on factors such as ground water concentration levels, potential toxicity and environmental fate and persistence. The indicator chemicals and a quantitative summary of the baseline public health evaluation bases upon EPA ARAR's (See Figure 3).

Evaluation of the site-specific conditions in the 2 mile radius study area indicates that the ground water transport is the only release mechanism applicable to the OUFS analysis. Ground water concentrations of the chemicals were estimated using off-site ground water monitoring data and

ground water modeling. Monitoring data provides a look at the present day concentration near the potential exposure point.

Modeled ground water concentrations were predicted at two primary exposure points:

1. The nearest business and nearest residence located down-gradient of the former burn pits, and
2. All identified down-gradient municipal drinking water wells located within the study area.

The nearest business/residence scenario represents the maximum exposed individual (MEI) present in the study area. The potential carcinogenic risks posed by these contaminants are significantly higher for the MEI than for the individuals consuming water from the municipal well sources. A 95% upper-bound confidence interval lifetime cancer risk of 4.4E-04 was calculated for the MEI based upon the lifetime consumption of drinking water at the highest concentrations modeled at the respective nearest business/residence drinking water well. In other words, the MEI (a fictitious person who lives next to SAAD and and drinks 2 liters per day of 120 part per billion tricholorethene contaminated ground water for 70 years) would have a 440 in a million increased chance of contracting cancer. No significant risk to the public or the environment would remain, once clean-up goals are attained.

Description of Alternatives and Summary of Comparative Analysis of Alternatives

Fourteen clean-up options for the SAAD site were considered in the On-Site Ground water Operable Unit Feasibility Study (OUFS). The six most feasible alternatives were evaluated with respect to nine evaluation criteria, which are summarized below. Number five was selected as the preferred alternative.

1. Short-term effectiveness - Addresses the period of time needed to complete the remedy, and to minimize any adverse impact on human health and the environment that may be posed during the construction and implementation period, until the clean-up goals are achieved.

2. Long-term Effectiveness and Permanence - Refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

3. Reduction of Toxicity, Mobility and Volume (TMV) Through Treatment - Refers to the anticipated ability of a remedy to reduce the toxicity, mobility, and volume of the hazardous components present at the site.

4. Implementability - Refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to carry out a particular option.

5. Cost - Evaluates the estimated capital and operation and maintenance costs of each alternative.

6. Overall Protection of Human Health and the Environment - Addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

7. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) - Addresses whether or not a remedy will meet all ARARs of federal and state environmental statutes and/or provide grounds for invoking a waiver.

8. State Acceptance - Indicates whether, based on its review of the information, the state concurs with, opposes, or has no comment on the preferred alternative.

9. Community Acceptance - Indicates whether community concerns are addressed by the remedy and whether or not the community has a preference for a remedy. Although public comment is an important part of the final decision, EPA is compelled by law to balance community concerns with all of the previously mentioned criteria.

After evaluating options for technical feasibility, implementability, and cost, a detailed analysis was performed on the six most feasible alternatives. Each of the six alternatives is briefly described below:

1. No Action - The no-action alternative was used as a baseline to evaluate other potential alternatives. Under the no action alternative, no control or remediation of the affected ground water would occur. However, a limited ground water monitoring program would monitor for the presence of the organic compounds and track their migration from the SAAD site. Immediate implementation of this alternative is possible.

Estimated Construction Cost:	$51,000
Estimated Annual Maintenance Costs:	$25,000

2. Ground Water Extraction, Treatment by Air Stripping, and Surface Discharge - Under this alternative, wells extract the affected ground water, contamination is removed from the extracted ground water by air stripping, and treated ground water is discharged to Morrison Creek. Compounds

removed from the ground water by the air stripper would be transferred to the air without further treatment. Other alternatives using air stripping with air emission control were considered, however, were eliminated during preliminary screening due to excessive costs. This alternative also includes monitoring of ground water, surface water, treatment plant influent, and discharge water over the term of the operation to assess the effectiveness of extraction and treatment, and compliance with discharge requirements. Construction could be completed within approximately 12 months. The overall quality of ground water in the aquifer would be restored to meet current drinking water standards after 10 to 15 years of operation.

Estimated Construction Cost: $1,170,000
Estimated Annual Maintenance Costs: $242,000

3. Ground Water Extraction, Treatment by Air Stripping, and Industrial Reuse - This alternative is similar to Alternative 2 above, except that treated water would be discharged to a local industrial facility for reuse instead of to Morrison Creek. Other construction details and monitoring requirements will be the same. The overall quality of ground water in the aquifer would be restored to meet current drinking water standards after 10 to 15 years of operation.
Estimated Construction Cost: $1,345,000
Estimated Annual Maintenance Costs: $207,000

4. Ground Water Extraction, Treatment with Ultraviolet/Chemical Oxidation, and Surface Discharge - This alternative is similar to Alternative 2 except that ultraviolet light/chemical oxidation is used for treatment of ground water, not air stripping. The organic contamination in the extracted water would be destroyed as the water passes through the treatment process, without releases to the air or creation of residual wastes. Tests conducted using this alternative technology demonstrated a high degree of effectiveness in destroying SAAD organic contaminants. After two minutes exposure to ultraviolet light/chemical oxidation, the organic contaminants were rendered non-detect using EPA analytical methodologies. Other construction details and monitoring requirements will be the same. Construction of this alternative could be completed in approximately 12 months. The overall quality of ground water in the aquifer would be restored to meet current drinking water standards after 10 to 15 years of operation.

Estimated Construction Cost: $1,530,000
Estimated Annual Maintenance Costs: $298,000

5. Ground Water Extraction, Treatment with Ultraviolet/Chemical Oxidation, and Industrial Reuse - This alternative is similar to Alternative 4 above, except the treated water would be discharged to a local industrial

facility, not to surface water. Other construction details and monitoring requirements will be the same. Construction of this alternative could be completed within about 12 months. The overall quality of ground water in the aquifer would be restored to meet current drinking water standards after 10 to 15 years of operation.

Estimated Construction Cost:	$1,764,000
Estimated Annual Maintenance Costs:	$264,000

6. Ground Water Extraction and Discharge to the Sacramento Regional Wastewater Treatment Plant - Under this alternative wells would extract ground water, which would then be discharged without treatment to the Sacramento Regional Wastewater Treatment Plant (regional treatment plant). The organic compounds in the water would be diluted in the sewer system and ultimately released to the air in the treatment plant, and discharged to the Sacramento River. This alternative also includes monitoring of ground water and discharge water to assess the effectiveness of the extraction process, and compliance with discharge requirements. Construction of the alternative could be completed in about 12 months. The quality of ground water in the aquifer would be restored to meet current drinking water standards after 10 to 15 years of operation.

Estimated Construction Cost:	$1,316,000
Estimated Annual Maintenance Costs:	$197,000

Selection of the Preferred Alternative

A summary of the alternatives is presented in Figure 4 and 5. All of the final alternatives except Alternative 1 (No Action) considered use ground water extraction to control migration and remove contaminated ground water. The main differences are: 1) the treatment technology, if any, to be used to treat contaminated ground water prior to discharge, and 2) the discharge option to be used.

All of the alternatives considered except Alternative 1 provide protection of human health and the environment and meet the current ARARs. However, only alternatives that use ultraviolet light/chemical oxidation result in permanent destruction of the contaminants, unlike air stripping or discharge to the regional treatment plant. The potential health risk associated with operation of a ultraviolet light/chemical oxidation system is much lower than for air stripping because the organic compounds are not released to the air. Therefore, the most desirable alternative would use ultraviolet light/chemical oxidation for ground water treatment.

Three disposal options for the extracted ground water were evaluated: 1) surface water discharge to Morrison Creek, 2) industrial reuse, and 3) discharge to the regional treatment plant. Although no significant public health or environmental impacts are expected to result from the disposal options, alternatives that entail industrial reuse are preferred because the water would serve beneficial purposes. More time may be needed to implement industrial reuse because a long-term agreement with the industrial user would be necessary. Negotiating a water reuse agreement could delay implementation of the alternative; however, a delay will be avoided by temporarily discharging the treated ground water to the regional treatment plant.

The public comment period has closed and no changes have been suggested. Therefore, based on the information presented in the Proposed Plan and the OUFS report, Alternative 5 (ground water extraction, treatment with ultraviolet light /chemical oxidation, and eventual industrial reuse) has been selected as the preferred alternative.

In summary, the preferred alternative is believed to provide the best balance among alternatives relative to the evaluation criteria used to weigh the potential options. Based on the information available at this time, the Army, the EPA IX and the DHS believe the preferred alternative will be protective of human health and the environment, will attain current ARARs, would be cost-effective, and will use permanent solutions and alternative treatment technologies to the maximum extent practicable.

Statutory Determinations

* The U.S. Environmental Protection Agency, Region IX (EPA IX) and State of California (DHS) concur on the selected Interim Remedial Action.

* This interim remedial action is consistent with the Comprehensive Environmental Response Compensation and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA/SARA), to the extent practicable, the National Contingency Plan (NCP), the National Environmental Policy Act (NEPA), and the California Environmental Quality Act (CEQA).

* The preferred alternative represents the most economic and environmentally acceptable alternative since the contaminants are destroyed on site without generating additional toxic waste, and without generating toxic air contaminants.

* Construction of the treatment system will be completed within next twelve months following approval of the ROD. The overall quality of the ground water will be restored to meet current drinking water standards (see Figure 2 for chemical specific ARARs) after ten to fifteen years of operation.

* This interim remedial action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements directly associated with this action and is cost-effective. This action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The statutory preferences for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element have been addressed and are encompassed by this response action.

3. RESPONSIVENESS SUMMARY

The Depot environmental contamination and management program have also been the subject of numerous newspaper, radio, and television articles over the past five years. Additionally, two previous public meetings have been held in 1987 and 1988 to discuss the Depot Installation Restoration Program.

Public notice was placed in the local community daily newspapers (Sacramento Bee, Sacramento Union) starting on 15 July 1989 announcing the availability of the OUFS and the PP for review and comment. These documents are part of the SAAD Administrative Record and are available at the following local repositories: SAAD Visitor Control Center, and at the California State University, Sacramento, Library. The OUFS and PP were available at the Sacramento office of DHS, and EPA headquarters in San Francisco. DHS has also noticed the contiguous property owners to the Depot.

Public review and comment was invited for a period of thirty-five days from 22 July 1989 to 26 August 1989. No written or telephone comments were received.

A public meeting on the PP was held on 8 August 1989 at Will C. Wood Middle School, which is located near the Depot. The meeting was attended by three members of the public from the local SAAD area and a summary of questions and answers include:

A. Why wasn't the public informed of this meeting and this situation?

The public was informed of the meeting via the public notices in the local newspaper and the notices to contiguous property owners. The Depot environmental contamination has been the subject of numerous newspaper, radio, and television articles over the past five years. Additionally, two previous public meetings in 1987 and 1988 have been held

to present and discuss the Depot Installation Restoration Program. The Depot intends to expand its public information process to include additional public meetings, fact sheets, and updating its mailing list.

B. When did the Depot first know that it had a problem?

The original Records Assessment and limited Remedial Investigation were conducted between 1979 - 1981. Although they revealed soil and ground water contamination on the Depot, the Investigation Report concluded that it was unlikely that the ground water contamination would migrate beyond Depot boundaries and that the ground water contamination could be coming from an off-Depot source. The Depot initiated additional actions in 1983 when the Depot suspected that it could be a source for contamination discovered off-site and immediately beyond Depot boundaries.

C. Why has it taken the Army so long to take any action on this problem?

One of the most critical factors in arriving at a solution to any environmental contamination problem is the identification of the size and extent of the problem. This work was begun in 1983 and continues to this day. Once the identification of the size and extent of the problem were established, the alternatives to remediating the problem were explored. The geohydrology of the Depot is extremely complex. Over seventy ground water wells have been installed and additional actions, such as supplying bottled water to one private business and removing underground tanks, have occurred. Additionally, the technical, administrative, and legal process required to comply with applicable federal, state, and local environmental laws and regulations governing remedial actions is very detailed, complex, and time consuming.

D. What are the ground water contaminants?

The ground water contaminants are primarily organic contaminants and include; trichloroethene, tetrachloroethene, 1,2-dichloroethane, and cis/trans-1,2-dichloroethene.

E. What is the major contaminant?

Trichloroethene represents the major [concentration of contamination] contaminant in the ground water with a maximum concentration of one hundred and twenty parts per billion (micrograms per liter). The state and federal action level for trichloroethene is five parts per billion. Drinking water action levels are established to protect public health. For the contaminant trichloroethene in drinking water, the action level is based upon a risk of contracting cancer of one-in-one million. That means that a person exposed by drinking 2 liters of water per day for 70 years contaminated with 5 parts per billion of trichloroethene would have a one-in-one million chance of contracting cancer as a result of drinking the water.

F. Are the Depot employees drinking the contaminated water?

Depot employees do not drink the contaminated ground water because the City of Sacramento supplies the Depot with drinking water.

G. Who is drinking the contaminated water?

To the best of our knowledge there is no one drinking the contaminated water. There are two private businesses (just beyond the Depot southwest boundary) that are using contaminated water which exceeds drinking water standards for industrial purposes only.

H. What is the health risk from drinking the contaminated ground water?

To the best of our knowledge no one drinks the contaminated ground water. However, health risks are established by calculating the long term exposure to the contaminants as if someone were drinking the water. In this instance, for example, the health risk for contracting cancer to an adult individual weighing seventy kilograms consuming two liters of this contaminated ground water per day over their 70 year lifespan would be 4.4E-04 (440 in a million). By comparison, the acceptable risk factor established by EPA and DHS is E-06 (1 in a million). On this basis, the decision to treat the contaminated ground water was made.

I. How far has the contaminated ground water spread?

Contamination has been found south-west beyond the Depot boundaries in an area within (approximately) 100 yards south of Elder Creek Road, and approximately one-quarter mile west of the Depot (See Figure 6).

J. How long will it take to clean up?

The current estimate is that it will take approximately ten to fifteen years of extraction and treatment to restore the ground water to drinking water standards.

K. Is the Depot using the latest technology to clean-up the contamination?

While the ultraviolet light/chemical oxidation technology has been used widely for the disinfection of drinking water, it's application to cleaning up organic contaminated ground water is a fairly new, but proven technology. EPA and DHS are looking very closely at the Depot project as a possible alternative which may be applicable for wide-spread use. This technology represents the "best" technology for dealing with the Depot contamination in that it permanently destroys contaminants, leaves no hazardous residues and does not generate toxic air contaminants.

L. What does this technology do to the contamination in the water?

The ultraviolet light/chemical oxidation uses a destructive chemical treatment process that oxidizes the contaminants to innocuous compounds. The oxidation process oxidizes the organic contaminants in the presence of ultraviolet light. The products of the reaction are carbon dioxide, water, and a minute amount of chlorine which remains dissolved in the

water. The chemical treatment process has the advantage of destroying the contaminants and producing no toxic by-products.

M. What is the Depot going to do with the cleaned-up water?

The Depot will be discharging the treated ground water directly to the Sacramento Regional Treatment Plant on a temporary basis until alternate beneficial reuses (currently industrial reuses) can be studied. Studies of alternative reuses are underway at this time.

N. Why is the Depot dumping the contamination into Morrison Creek?

The Depot does not discharge contamination into Morrison Creek. The only Depot discharge into Morrison Creek is the storm drain system.

SITE MAP

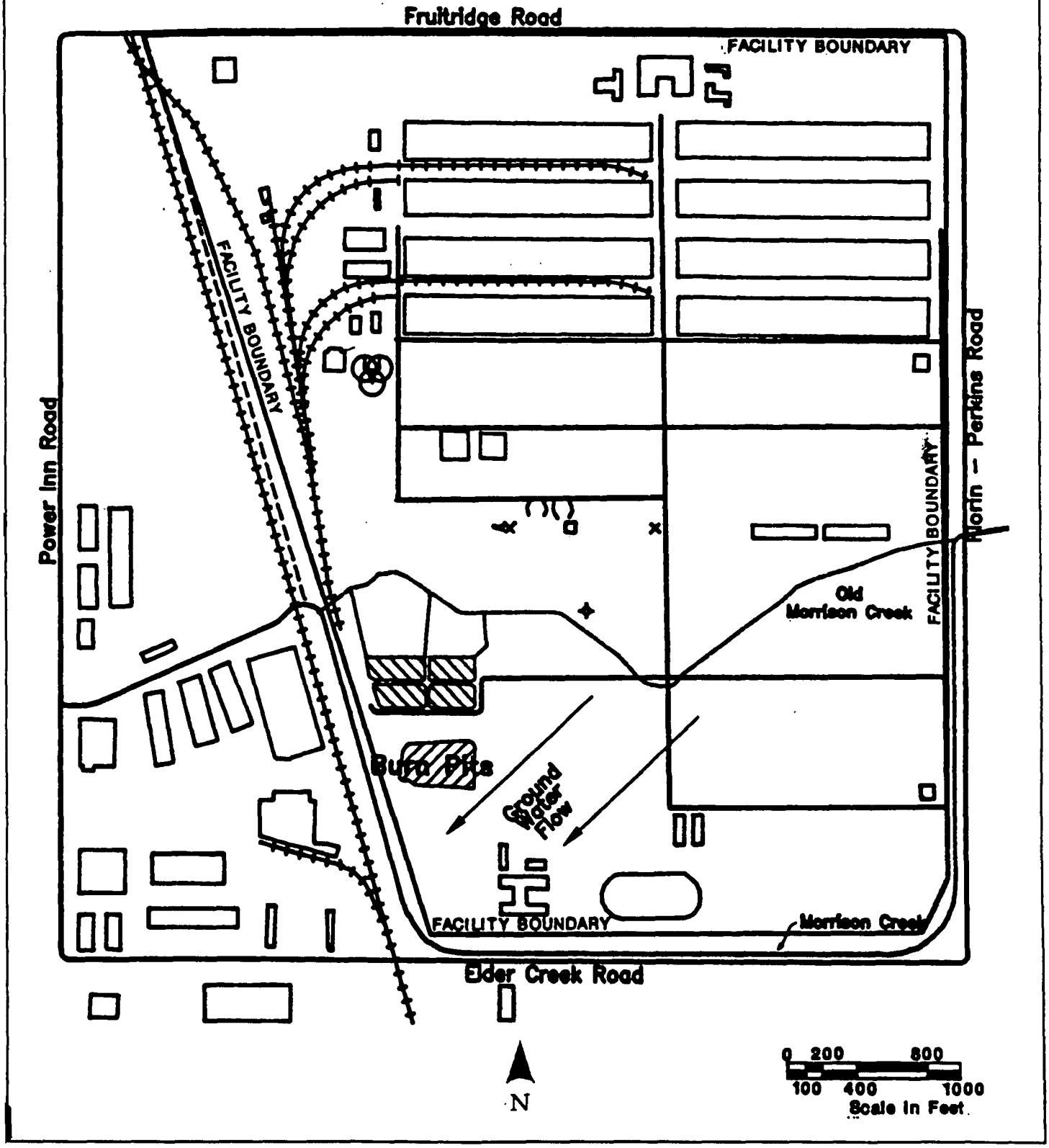

FIGURE 1

GROUNDWATER CONTAMINANTS, DESIGN CONCENTRATIONS, AND TREATMENT OBJECTIVES

Contaminant	Average Concentration (ug/l)	Design Concentration (ug/l)	Treatment Objective (ug/l)
chloroform	4.9	7.4	100[1]
carbon tetrachloride	0.4	0.6	5
trichloroethene	64.2	96.3	5
tetrachloroethene	10.3	15.5	4
1,1-dichloroethane	0.5	0.8	5
1,1-dichloroethene	0.3	0.5	6
1,1,1-trichloroethane	0.1	0.2	200
trans-1,2-dichloroethene	8.6	12.9	16
1,2-dichloroethane	0.9	1.4	1
bromodichloromethane	0.2	0.3	100[1]
TOTAL	90.7	136.4	—

[1] Total trihalomethanes.

FEDERAL AND STATE CONTAMINANT ACTION LEVELS

Contaminant	Federal MCL (ug/l)	State SAL[3] (ug/l)
chloroform	100[2]	—
carbon tetrachloride	5	5
trichloroethene	5	5
tetrachloroethene	—	4
1,1-dichloroethane	5	20
1,1-dichloroethene	7	6
1,1,1-trichloroethane	200	200
trans-1,2-dichloroethene	—	16
1,2-dichloroethane	5	1

1 MCL = Maximum Contaminant Level.
2 MCL is for total trihalomethanes.
3 SAL=State Action Level which existed during OUFS development.

FIGURE 2

FIGURE 3

SUMMARY OF THE BASELINE PUBLIC HEALTH EVALUATION

Site: SAAD
Ground Water OUFS

Indicator Chemicals: 1. Arsenic, 2. Barium, 3. Cadmium, 4. Carbon Tetrachloride, 5. Chloroform
6. 1,2-Dichloroethene, 7. 1,1-Dichloroethene, 8. Tetrachloroethene.
9. Trichloroethene.

			Requirements/Criteria		Potential Carcinogenic Risk			Noncarcinogenic Risk					
Human Exposure Point	Exposure Pathway	Number of People Potentially Exposed	Compared	Standard Concentration Ratio	Risk Estimate	Dominant Chemical	Weight of Evidence for Dom. Chem.	Chronic Hazard Index	Dominant Chemical	Severity Rating for Dom. Chem.	Subchronic Hazard Index	Significant Sources of Uncertainty	Comments
Nearest Business/ Nearest Residence	1. Ingestion 2. Inhalation/ Dermal Absorption	1	1. EPA MCL	4.8E-05	6.9E-07			9.3E-01	PCE	7,10	N/A	Ground Water Modeling CPF for PCE	
			2. EPA MCL	2.8E-05	--								
			3. EPA MCL	2.3E-04	--								
			4. EPA MCL	4.8E-01	7.5E-06								
			5. N/A	--	1.1E-06	Chloroform	B2						
			6. EPA MCL	7.8E-01	1.6E-05								
			7. EPA MCL	2.3E-01	5.7E-05								
			8. N/A	--	1.4E-06	PCE	B2						
			9. EPA MCL	5.0E+01	1.1E-06	TCE	B2						
Maximum Impacted Municipal Drinking Water Well	1. Ingestion 2. Inhalation/ Dermal Absorption	16,905	1. EPA MCL	<2.0E-09	4.4E-11			1.5E-07	Carbon Tet.	10,10	N/A	Ground Water Modeling	
			2. EPA MCL	<1.0E-10	--								
			3. EPA MCL	<1.0E-08	--								
			4. EPA MCL	4.8E-07	1.8E-11								
			5. N/A	--	3.4E-11								
			6. EPA MCL	1.3E-06	3.4E-11								
			7. EPA MCL	3.4E-07	1.3E-10	1,1-DCE	C						
			8. N/A	--	5.3E-12								
			9.EPA MCL	3.6E-05	1.3E-10	PCE	B2						

SUMMARY OF DETAILED ANALYSIS OF GROUND WATER OUFS ALTERNATIVES

Assessment Criteria	Alternative No. 1 - No Action	Alternative No. 2 - Containment by Pumping, Air Stripping, Surface Discharge	Alternative No. 3 - Containment by Pumping, Air Stripping, Industrial Reuse
Description	No mitigating measures. Continued ground water monitoring.	Install extraction well system; Pump and treat using air stripping; Discharge to Morrison Creek; Ground water and performance monitoring.	Install extraction well system; Pump and treat using air stripping; Discharge to local industrial facility; Ground water and performance monitoring.
Short-Term Effectiveness	No significant risk from monitoring.	Low risk during construction.	Low risk during construction.
Long-Term Effectiveness and Permanence	Long-term health risks remain from ingestion of contaminated water from offsite production wells	No significant risk to public or environment would remain, once cleanup goals are attained.	No significant risk to public or environment would remain, once cleanup goals are attained.
Reduction in Toxicity, Mobility, and Volume	No treatment used.	The organic compounds are transferred to the air, but not destroyed unless vapor-phase carbon is used.	The organic compounds are transferred to the air, but not destroyed unless vapor-phase carbon is used.
Implementability	No technical impediments to implementation. Regulatory concurrence not probable.	Technologies used are readily available. About 12 months needed for construction.	Technologies used are readily available. About 12 months needed for construction. Negotiation with industrial user could delay implementation unless interim discharge to SRWTP is used.
Compliance with ARARs	Does not comply with ARARs.	Complies with ARARs, but does not meet statutory preference for treatment.	Complies with ARARs, but does not meet statutory preference for treatment.
Overall Protection of Human Health and the Environment	Does not provide protection. No mitigation of primary exposure pathway.	No significant health risk during construction and operation, except for air emission. No significant risk remains once cleanup goals are attained.	No significant health risk during construction and operation, except for air emission. No significant risk remains once cleanup goals are attained.
Cost	Capital $ 51,000 Annual $ 25,000 Present Worth $288,000 Economic Life 30 years	Capital $1,170,000 Annual $ 242,000 Present Worth $3,449,000 Economic Life 30 years	Capital $1,345,000 Annual $ 207,000 Present Worth $3,299,000 Economic Life 30 years

FIGURE 4

SUMMARY OF DETAILED ANALYSIS OF GROUND WATER OUFS ALTERNATIVES (CONTINUED)

Assessment Criteria	Alternative No. 4 - Containment by Pumping, UV Chemical Oxidation, Surface Discharge	Alternative No. 5 - Containment by Pumping, UV Chemical Oxidation, Industrial Reuse	Alternative No. 6 - Containment by Pumping, SRWTP Discharge
Description	Install extraction well system. Pump and treat using UV oxidation technology. Discharge to Morrison Creek. Ground water and performance monitoring.	Install extraction well system Pump and treat using UV chemical oxidation technology. Discharge to local industrial facility. Ground water and performance monitoring.	Install extraction well system. Pump and discharge untreated water to sewer routed to SRWTP. Ground water and discharge monitoring.
Short-Term Effectiveness	Low risk during construction.	Low risk during construction	Low risk during construction.
Long-Term Effectiveness and Permanence	No significant risk to public or environment would remain.	No significant risk to public or environment would remain, once cleanup goals are attained.	No significant risk to public or environment would remain, once cleanup goals are attained.
Reduction in Toxicity, Mobility, and Volume	Technology destroys volatile organic compounds without formation of residual by-products.	Technology destroys volatile organic compounds without formation of residual by-products.	Compounds are either removed during pure oxygen activated sludge process or levels reduced by dilution. No destruction of organics achieved.
Implementability	Only two vendors offer technology used, but they both have operating systems at other sites. About 12 months needed for construction.	Only two vendors offer technology used but they both have operating systems at other sites. About 12 months needed for construction. Negotiation with industrial user could delay implementation unless interim discharge to SRWTP used.	Easily implemented within 6 to 12 months. SRWTP has agreed to accept water.
Compliance with ARARs	Complies with ARARs.	Complies with ARARs.	Complies with ARARs, but does not meet statutory preference for treatment.
Overall Protection of Human Health and the Environment	No significant health risk during construction and operation. No significant risk remains once cleanup goals are attained.	No significant health risk during construction and operation. No significant risk remains once cleanup goals are attained.	No significant health risk during construction and operation. No significant risk remains once cleanup goals are attained.
Cost	Capital $1,530,000 Annual $ 298,000 Present Worth $4,341,000 Economic Life 30 years	Capital $1,764,000 Annual $ 264,000 Present Worth $4,250,000 Economic Life 30 years	Capital $1,316,000 Annual $ 197,000 Present Worth $3,177,000 Economic Life 30 years

FIGURE 5

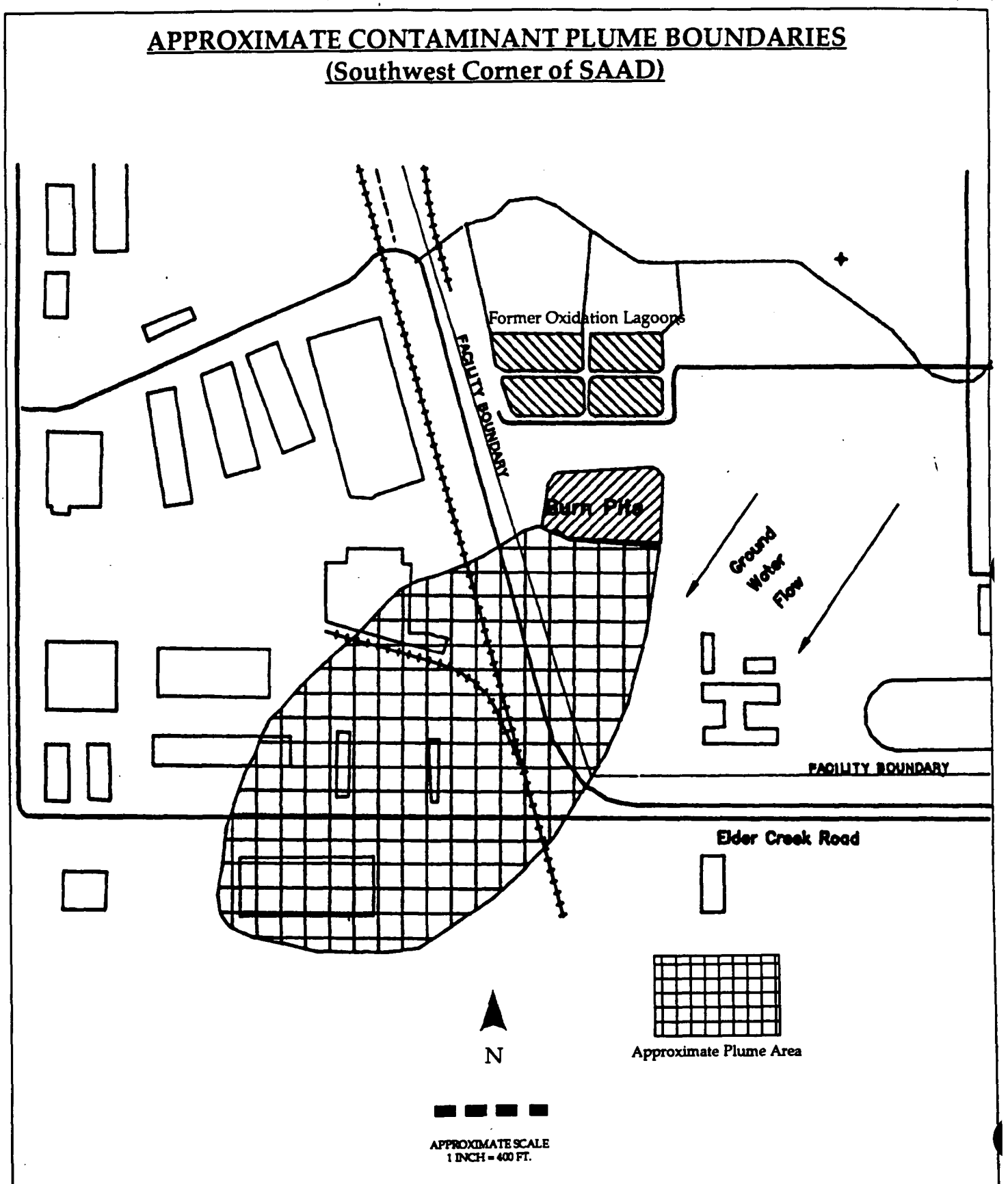
APPROXIMATE CONTAMINANT PLUME BOUNDARIES
(Southwest Corner of SAAD)
Former Oxidation Lagoons
FACILITY BOUNDARY
Burn Pits
Ground Water Flow
FACILITY BOUNDARY
Elder Creek Road
N
Approximate Plume Area
APPROXIMATE SCALE
1 INCH = 400 FT.

FIGURE 6

SACRAMENTO ARMY DEPOT

FEDERAL FACILITY AGREEMENT

ADMINISTRATIVE RECORD

INDEX OF DOCUMENTS

01 Sacramento Army Depot (SAAD) Federal Facility Agreement (FFA)

02 Proposed Plan for on-site Ground Water Remediation at the Sacramento Army Depot

03 Onsite Ground Water Operable Unit Feasibility Study (OUFS)

04 Public Health Evaluation - Sacramento Army Depot - Phase II OUFS - Ground Water Treatment System

05 Listing of CERCLA response Selection Guidance Documents Consulted for Proposed Grpound Water OUFS

July 27, 1989

06 Notice of Availability of Proposed Plan; and Notice of Intent to Adopt A Negative Declaration

July 31, 1989

FIGURE 7