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IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA

UNITED STATES OF AMERICA, Plaintiff, v. E.I. duPONT de NEMOURS & CO., UNION OIL CO. OF CALIFORNIA, GREAT WESTERN CHEMICAL CO., KTI CHEMICALS INC., ASHLAND OIL, INC., INTERNATIONAL BUSINESS MACHINES CORP., ROMIC CHEMICAL CORP., VI-TEX PACKAGING, INC., ESSELTE PENDAFLEX CORP., H.H. ROBERTSON CO., and A.J. DAW PRINTING INK CO., INC., Defendants.	CIVIL. NO. PARTIAL CONSENT DECREE

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WHEREAS, the United States of America (hereinafter "United States"), on behalf of the Administrator of the United States Environmental Protection Agency (hereinafter "EPA"), has filed concurrently with the lodging of this Consent Decree a complaint in this matter pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601, et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986, Pub. L. No. 99-499, 100 Stat. 1613 (1986) (hereinafter "CERCLA"), seeking to compel the Defendants (those parties identified in Section II of this document, and hereinafter referred to as "Defendants") to perform remedial actions and to recover oversight costs that will be incurred by the United States in response to releases and threatened releases of hazardous substances from the facility known as the Lorentz Barrel and Drum Site (hereinafter "Lorentz" or the "Site") located in San Jose, California;

WHEREAS, the Lorentz Barrel and Drum Site is a facility as defined in Section 101(9) of CERCLA, 42 U.S.C. § 9601(9);

WHEREAS, the Defendants are persons, as defined in Section 101(21) of CERCLA, 42 U.S.C. § 9601(21), and materials allegedly sent by the Defendants to the Site and found at the Site are "hazardous substances," as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14);

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WHEREAS, the past, present, and potential migrations of hazardous substances from the Site constitute actual and threatened releases, as that term is defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22), and the Defendants are persons subject to liability under Section 107 of CERCLA, 42 U.S.C. § 9607(a);

WHEREAS, pursuant to Sections 121 and 122 of CERCLA, 42 U.S.C. §§ 9621 and 9622, the defendants have each stipulated to the making and entry of this Partial Consent Decree (hereinafter "Decree" or "Consent Decree") prior to the taking of any testimony;

WHEREAS, the United States and Defendants agree that the settlement of this matter and entry of this Consent Decree is in good faith, in an effort to avoid expensive and protracted litigation, without any admission as to liability for any purpose.

NOW THEREFORE, it is ORDERED, ADJUDGED, AND DECREED as follows:

I. JURISDICTION

The Court has jurisdiction over the subject matter of this action and the signatories to this Consent Decree pursuant to CERCLA, 42 U.S.C. §§ 9601, et seq. and 28 U.S.C. §§ 1331 and 1345. The Defendants shall not challenge the Court's jurisdiction to enter and enforce this Consent Decree. Defendants waive service of summons and for the purpose of this Consent Decree, agree to submit themselves to the jurisdiction of this Court.

II. PARTIES

The parties to this Consent Decree are the United States of America and the Defendants. Defendants are those entities listed below:

E.I. du Pont de Nemours & Company (including its subsidiary Conoco)

Union Oil Company of California (Amsco)

Great Western Chemical Company

KTI Chemicals Inc.

Ashland Oil, Inc. (including its subsidiary Ashland Chemical, Inc.)

International Business Machines Corporation

Romic Chemical Corporation

Vi-Tex Packaging, Inc. (the successor in interest to the assets of George Schmitt & Co., Inc.)

Esselte Pendaflex Corporation (Dymo Visual Systems)

H.H. Robertson Company

A.J. Daw Printing Ink Co., Inc.

III. SITE BACKGROUND

A. The Lorentz Barrel and Drum facility was operated from approximately 1946 to 1985. During that time, the operator of the facility accepted used barrels for cleaning and recycling. Defendants allegedly sent used barrels to the facility for cleaning and reclamation. These barrels sent to the facility al-

legedly contained residues of hazardous substances, as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), some of which were released into the environment as a result of the Lorentz operation.

B. The Lorentz Barrel and Drum Site is included on the National Priorities List pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605.

IV. DEFINITIONS

A. "Appendix A" shall mean the Record of Decision for the shallow groundwater operable unit.

B. "Appendix B" shall mean the shallow groundwater operable unit scope of work and schedule for implementation of the scope of work.

C. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986, Pub. L. No. 99-499, 100 Stat. 1613 (1986).

D. "Contractor" shall mean the individual, company, or companies retained by or on behalf of the Defendants to undertake and complete the Remedial Action.

E. "Costs" or "response costs" shall mean all oversight, administrative, enforcement, removal, investigative and remedial or other expenses incurred or to be incurred by EPA with respect to the Lorentz Barrel and Drum Site.

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F. "Covered Matters" shall mean all tasks to be completed by Defendants pursuant to this Consent Decree, including the construction of a shallow groundwater extraction and treatment system and the treatment of the shallow groundwater.

G. "Defendants" shall mean those parties listed as Defendants in Section II (Parties) of this Consent Decree.

H. "EPA" shall mean the United States Environmental Protection Agency.

I. "Environment" shall have the same meaning as provided in Section 101(8) of CERCLA, 42 U.S.C. § 9601(8).

J. "Final remedy" shall mean any remedial action based on any future record of decision, other than the Covered Matters and past remedial actions.

K. "Hazardous substances" shall mean any substance included in the definition of Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

L. "Lorentz Barrel and Drum Site" or the "Site" shall mean the "facility" as that term is defined in Section 101(9) of CERCLA, located at 1515 South Tenth Street, on the southwest corner of East Alma Avenue and South Tenth Street in the southern portion of the City of San Jose, Santa Clara County, California.

M. "National Contingency Plan" or "NCP" shall refer to the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300, and shall be used as that term is referred to in Section 105 of CERCLA, 42 U.S.C. § 9605.

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N. "Oversight" shall mean the United States' inspection of remedial work and all actions necessary to verify the adequacy of performance of activities and reports of the Defendants as required under the terms of this Consent Decree.

O. "Parties" shall mean the Plaintiff and the Defendants.

P. "Plaintiff" shall mean the United States of America and the Environmental Protection Agency.

Q. "RD/RA" shall mean the Remedial Design and Remedial Action.

R. "Record of Decision" or "ROD" shall mean the document signed by the EPA Region IX Regional Administrator on September 25, 1988, which describes the shallow groundwater operable unit Remedial Action to be conducted at the Site, and which is attached hereto as Appendix A.

S. "Release" shall mean any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminants) as defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

T. "Remedial Action" shall mean the implementation, in accordance with Section VII hereof (Work to be Performed), of the operable unit Record of Decision, as defined in this Consent

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Decree and as may be modified pursuant to the provisions of this Consent Decree, and any schedules or plans required to be submitted pursuant thereto.

U. "Remedial Construction" shall mean the phases of the Remedial Action involving the construction of the remedy in accordance with the Remedial Design documents, the ROD and this Consent Decree.

V. "Remedial Design" shall mean the phases of the work wherein engineering plans and technical specifications are developed for implementation of the Remedial Actions, in accordance with the ROD and this Consent Decree.

W. "Remedial Design Report" shall mean the reports developed by the Defendants in compliance with this Consent Decree, detailing the work and the results of the Remedial Designs at the four phases described in the EPA Superfund Remedial Design and Remedial Action Guidance, dated February 1985 ("RD/RA guidance").

X. "SPUR report" shall mean the cost accounting report prepared by EPA listing EPA's costs incurred, including direct costs, employee salaries and indirect costs.

Y. "State" shall mean the State of California.

Z. "Workplan" or "workplans" shall mean the workplans developed by the Defendants which detail the work to be conducted pursuant to this Consent Decree.

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V. PURPOSE

A. The purpose of this Consent Decree is to serve the public interest by protecting the public health, welfare, and the environment from releases and threatened releases of hazardous substances from the Lorentz Barrel and Drum Site by implementation of the Covered Matters.

B. The shallow groundwater extraction and treatment system RD/RA is intended to eliminate or at least significantly reduce the levels of hazardous substances released from the Lorentz Barrel and Drum Site into the shallow groundwater beneath and adjacent to the facility. The RD/RA is intended to meet the substantive standards of all "applicable requirements" and "relevant and appropriate requirements" as those terms are defined at 40 C.F.R. § 300.6, and as generally described in CERCLA and CERCLA Compliance with Other Environmental Statutes, October 2, 1985 (50 Fed. Reg. 47946, November 20, 1985).

C. Both Plaintiff and Defendants recognize that this operable unit does not constitute the final remedy for this Site. Plaintiff and Defendants recognize that the final remedy will only be determined after completion of a remedial investigation/feasibility study ("RI/FS") and execution by the EPA of a record of decision which determines the final remedy.

D. Defendants have agreed to the making and entry of this Consent Decree, pursuant to Section 122 of CERCLA, 42 U.S.C. § 9622, prior to the taking of any testimony, based upon the pleadings filed in the case, without any admission of liability or

fault. Plaintiff and Defendants agree that settlement of this matter and entry of this Consent Decree are made in good faith in an effort to avoid further expense and protracted litigation.

VI. BINDING EFFECT

A. Each undersigned representative of the parties to the Consent Decree certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such party to this document.

B. This Consent Decree shall apply to and be binding upon each of the Defendants and Plaintiff, as well as their successors and assigns, acting as an entity and through their officers, directors, officials, or other agents. No change in ownership or corporate or partnership status will in any way alter the Defendants' responsibilities under this Consent Decree.

C. Defendants agree to provide a copy of this Consent Decree, as entered, along with all relevant additions and modifications to this Consent Decree, as appropriate, to each person, including all contractors and subcontractors, retained to perform the Remedial Design/Remedial Action ("RD/RA") contemplated by this Decree, within 30 days of retainer, and shall condition any contract for the Remedial Action on compliance with the applicable terms of this Consent Decree.

D. Defendants agree that they are jointly and severally liable for compliance with all provisions of this Consent Decree, except in the case of penalties for failure of an individual

1 Defendant to comply with a request from Plaintiff directed to it.
2 In the event of inability to pay or insolvency of one or more of
3 the Defendants, regardless of whether that Defendant or Defen-
4 dants enter into formal bankruptcy proceedings, or in the event
5 that for any reason one of the Defendants does not participate in
6 the implementation of the Covered Matters, the remaining Defen-
7 dants agree to fully comply with the terms and conditions of this
8 Consent Decree.

9 VII. WORK TO BE PERFORMED

10 A. Defendants shall, at their own expense, implement and
11 complete the Covered Matters according to the schedule in Appen-
12 dix B and in accordance with EPA oversight and approval. Plain-
13 tiff may grant extensions of time to deadlines in Appendix B.
14 Except for events constituting a force majeure, Plaintiff's deci-
15 sion to grant an extension and the length of the extension
16 granted are within Plaintiff's discretion and neither issue is
17 subject to dispute resolution.

18 B. Reports, plans, specifications, schedules, appendices,
19 and attachments required by this Consent Decree are, upon ap-
20 proval by EPA, incorporated into this Consent Decree. Noncom-
21 pliance with such EPA approved reports, plans, specifications,
22 schedules, appendices, or attachments shall be considered a
23 failure to comply with this Consent Decree and shall be subject
24 to stipulated penalties as set forth in Section XX of this Con-
25 sent Decree.

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C. As part of the shallow groundwater remediation, Defendants shall complete the following tasks:

1. Design and Construction. Defendants shall design and construct the shallow groundwater extraction and treatment system pursuant to Appendix B.

2. Operation and Maintenance. Defendants shall operate and maintain the shallow groundwater extraction and treatment system until the level of hazardous substances in the shallow groundwater complies with "applicable" and "relevant and appropriate" requirements identified in Appendix A.

D. Documents to be submitted ("Deliverables"):

(1) Monthly Progress Reports:

Defendants shall provide written progress reports to EPA on a monthly basis. These progress reports shall describe all actions taken to comply with this Consent Decree, including a general description of activities commenced or completed during the reporting period, Remedial Action activities projected to be commenced or completed during the next reporting period, and any problems that have been encountered or are anticipated by Defendants in commencing or completing the Remedial Action activities. These progress reports shall be submitted to EPA by the 10th of each month for work done the preceding month and planned for the current month.

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(2) Sampling and Analysis Plans

(a) Defendants shall submit a Sampling and Analysis Plan for each of the following: (i) physical sampling, (ii) the treatability study, and (iii) operations and maintenance. The Sampling and Analysis Plans should, where applicable, be prepared in accordance with current EPA guidance, Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80. The Sampling and Analysis Plan for Operation and Maintenance shall include a description of the mechanism used to verify that the remedy is operating within the limits set forth in the ROD. Each Sampling and Analysis Plan shall consist of a Field Sampling Analysis Plan ("FSAP") and a Quality Assurance/Project Plan ("QA/PP").

(b) Defendants shall use the procedures set out in the approved plan, and shall utilize standard EPA sample chain of custody procedures, as documented in National Enforcement Investigations Center Policies and Procedures Manual as revised in June 1985 and the National Enforcement Investigations Center Manual for the Evidence Audit published in September 1981, for all sample collection and analysis activities.

(c) In order to provide quality assurance and maintain quality control regarding all samples collected pursuant to this Consent Decree, Defendants shall:

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(i) Ensure that all contracts with laboratories utilized by the Defendants for analysis of samples taken pursuant to this Consent Decree provide for access of EPA personnel and EPA authorized representatives to assure the accuracy of laboratory results related to the Site.

(ii) Ensure that laboratories utilized by the Defendants for analysis of samples taken pursuant to this Consent Decree perform all analyses according to approved EPA methods or methods deemed in advance to be satisfactory to EPA. Accepted EPA methods are documented in the Contract Lab Program Statement of Work for Inorganic Analysis and the Contract Lab Program Statement of Work for Organic Analysis, dated July, 1985.

(iii) Ensure that all laboratories utilized by the Defendants for analysis of samples taken pursuant to this Consent Decree participate in an EPA or EPA equivalent quality assurance program. As part of the quality assurance program and upon request by EPA, such laboratories shall perform at Defendants' expense analyses of samples provided by EPA to demonstrate the quality of each laboratory's data.

(3) Conceptual Design. Defendants shall submit a conceptual design (30% final design) for the RA that includes, but is not limited to:

(a) Preliminary drawings (30% status) to include the site plan, illustration of the general arrangement of system components, process and instrumentation diagrams and electrical and

line drawings.

(b) Design standards for major system components to include electrical, mechanical process and instrumentation equipment.

(c) Preliminary construction specifications.

(d) Specifications (90% complete) for major equipment.

(e) Preliminary cost estimates.

(f) Compliance with ARARs.

(4) Prefinal/Final Design. Defendants shall submit a Prefinal and Final RA Plan in two parts as follows:

(a) the Prefinal Plan shall show 90% completion of the design and include, but not be limited to:

(i) all revisions of and additions to the conceptual design.

(ii) construction drawings.

(iii) specifications.

(iv) schedules.

(v) cost estimates.

(b) Final Design shall include, but not be limited to:

(i) all revisions of and additions to the 90% design.

(ii) final construction drawings.

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E. Defendants shall, pursuant to Appendix B, submit a draft and a final of each of the above deliverables (except the monthly report). The Prefinal Design is the draft for the Final Design. Any failure of Defendants to submit a deliverable in compliance with the schedule will be deemed a violation of this Consent Decree.

F. EPA will, pursuant to the schedule, review and provide written comments on each draft deliverable submitted by Defendants.

G. Defendants shall, within the time allotted in the schedule, respond to EPA's comments on the draft and incorporate changes pursuant to EPA directives into the final and submit the final deliverable. Failure to do so is a violation of this Consent Decree.

H. All documents submitted to Plaintiff for approval pursuant to this Consent Decree shall be sent by overnight mail or some equivalent delivery service.

I. EPA may determine that additional work concerning the shallow groundwater extraction and treatment system, including, without limitation, remedial work, investigations, engineering analysis, and interim response measures are necessary to carry out the purposes of this Consent Decree. Defendants shall perform the additional work pursuant to EPA oversight and in accordance with the specifications, standards, requirements and schedules determined or approved by EPA. The time deadline for performance of additional work under this paragraph and any ac-

tivity dependent on such additional work will be extended by EPA for an amount of time equal to that required to perform the additional work.

VIII. WORKER HEALTH AND SAFETY PLAN

The Worker Health and Safety Plan that the Defendants will submit pursuant to Section VII (Work to be Performed) and Appendix B of this Consent Decree shall satisfy the requirements of the Occupational Safety and Health Guidance for Hazardous Waste Site Activities [October 1985 (DHH 5 NIOSH) Publications No. 85-115] and EPA's Standard Operating Safety Guides (EPA, OERR. November 1984). The Emergency Response Plan that the Defendants will submit pursuant to Section VII (Work to be Performed) and Appendix B of this Consent Decree shall address both workers at the Site and public exposure to releases or spills at or from the Site.

IX. PERIODIC REVIEW TO ASSURE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

A. In light of the fact that hazardous substances and pollutants or contaminants will remain at the Site, and pursuant to Section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and any applicable regulations, EPA will review the Remedial Action at the Site at least once every five (5) years after the entry of this Consent Decree to assure that human health and the environment are being protected by the Remedial Action being implemented. If upon such

review, EPA determines that further response action in accordance with Sections 104 or 106 of CERCLA, 42 U.S.C. §§ 9604 and 9606, is appropriate at the Site then, consistent with Section XVII (Reservations and Waivers of Rights) of this Consent Decree, EPA may take, request or require that Defendants or other potentially responsible parties take such action.

B. Upon completion of its review pursuant to this Section, EPA shall notify the Defendants of its determination and may initially request the Defendants or others to undertake the additional response action or, in the alternative, may order additional response action pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, to assure protection of human health and the environment. The Defendants shall be provided with an opportunity to confer with EPA on any response action proposed as a result of EPA's 5-year review and to submit written comments for the record. After the period for submission of written comments is closed, and absent the Defendants' undertaking the additional response action to Plaintiff's satisfaction, the Regional Administrator of EPA may either issue a Section 106 order or take other action, as the Regional Administrator deems appropriate. EPA's determination that additional work is needed pursuant to this Section shall be subject to judicial review pursuant to the dispute resolution provisions in Section XXI (Dispute Resolution), only to the extent permitted by CERCLA.

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X. PROJECT COORDINATORS

A. By the effective date of this Consent Decree, EPA and Defendants shall each designate a Project Coordinator to monitor the progress of the RD/RA and to coordinate communication between Plaintiff and Defendants. EPA and the Defendants each have the right to change their respective Project Coordinator. Such a change shall be accomplished by notifying the other party in writing at least seven (7) calendar days prior to the change. To the maximum extent possible, communications between the Defendants and EPA and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Consent Decree, shall be directed through the Project Coordinators.

B. EPA's Project Coordinator will be an EPA employee and shall have the authority vested in the On-Scene Coordinator by 40 C.F.R. Part 300, 50 Fed. Reg. 47912 (Nov. 20, 1985), including such authority as may be added by amendments to 40 C.F.R. Part 300, as well as the authority to ensure that the RD/RA is performed in accordance with all applicable statutes, regulations, and this Consent Decree. If the EPA On-Scene Coordinator and the EPA Project Coordinator are two different individuals, EPA will make its best efforts to coordinate any direction given to the Defendants by the On-Scene Coordinator and the EPA Project Coordinator.

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C. EPA's Project Coordinator shall also have the authority to require a cessation of the performance of the Remedial Action or any other activity at the Site that may present or contribute to an endangerment to public health, welfare, or the environment or cause or threaten to cause the release of hazardous substances from the Site.

D. The absence of EPA's Project Coordinator from the Site shall not be cause for stoppage of the work.

E. Defendants' Project Coordinator may assign other representatives, including other contractors, to serve as a Site Representative for oversight of performance of daily operations during remedial activities.

F. EPA's Project Coordinator may assign other representatives, including other EPA employees or contractors, to serve as a Site Representative for oversight of performance of daily operations during remedial activities. A Site Representative will have the same authority as the EPA Project Coordinator, except that a Site Representative may not issue a notification initiating the accrual of stipulated penalties.

G. Prior to invoking the provisions of Section XXI (Dispute Resolution), any unresolved disputes arising between the EPA Site Representative and the Defendants or their contractors shall be referred to EPA's and Defendants' Project Coordinators.

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XI. SITE ACCESS

A. To the extent that access to or easements over property is required for the proper and complete performance of this Consent Decree, Defendants shall obtain access agreements from the present owners or those persons who have control within sixty (60) calendar days of the effective date of this Consent Decree. Plaintiff shall cooperate with Defendants as appropriate in their efforts to secure access. Site access agreements shall provide reasonable access to Defendants, contractor(s), the United States and any of its agencies, the State of California, and their representatives.

B. In the event that sufficient Site access agreements are not obtained within the 60 day period, the Defendants shall notify EPA within 65 calendar days of the effective date of this Consent Decree regarding both the lack of, and efforts to obtain, such agreements.

C. During the effective period of this Decree, the United States, the State of California, and their representatives, including contractors, shall have access at all times to the Site and any contiguous property owned or controlled by Defendants.

D. Any person obtaining access pursuant to this provision shall comply with all applicable provisions of the Worker Health and Safety Plan as submitted in the work plans required by this Consent Decree and reviewed by EPA.

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XII. SAMPLING AND INVESTIGATION

A. At the request of Plaintiff's Project Coordinator, Defendants shall provide to Plaintiff split or duplicate samples of any samples taken pursuant to this Consent Decree. Plaintiff shall, pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604, have the right to take any samples it deems necessary to complete or monitor progress of the Covered Matters. In taking any such samples, Plaintiff shall comply with the Sampling and Analysis Plans approved pursuant to this Consent Decree to the extent practicable.

B. During the design and construction of the RA, Defendants shall notify Plaintiff's Project Coordinator of any planned sampling conducted by Defendants or anyone acting on their behalf in the monthly report submitted prior to the sampling. Defendants will use best efforts to provide at least fourteen (14) days notice of planned sampling to Plaintiff but in no event will notice be received by Plaintiff less than forty-eight (48) hours prior to sampling. Plaintiff shall be notified thirty (30) days prior to the disposal of any sample taken pursuant to the Consent Decree, and shall have an opportunity to take possession of all or a portion of such sample.

C. Defendants shall permit Plaintiff to inspect and copy all records, documents, photographs and other materials, including all sampling and monitoring data that in any way concerns the Site.

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D. At the request of Defendants, Plaintiff will provide split or duplicate samples collected by or at the direction of Plaintiff and the analytical results obtained from the samples. If Plaintiff collects any such samples, or undertakes any other testing work at the Site, it will notify Defendants' Project Coordinator at least forty-eight (48) hours in advance and permit Defendants to observe the work.

E. Pursuant to 40 C.F.R. Part 2, Defendants may assert a confidentiality claim, covering part or all of the information gathered and submitted pursuant to this Consent Decree. If Defendants do not make a confidentiality claim pursuant to this subsection at the time the information is submitted to Plaintiff, it may be made available to the public without any notice to Defendants.

F. The Defendants shall make the results of all sampling and/or tests or other data generated by Defendants, or on the Defendants' behalf, with respect to the implementation of this Consent Decree available to EPA in accordance with the provisions of this Consent Decree. EPA will make available to Defendants the results of sampling and/or tests or other data similarly generated by EPA. Defendants recognize that the data and reports generated under this Consent Decree are not subject to the protection of Section 1905 of Title 18 and 40 C.F.R. Part 2 as confidential information. Moreover, the parties explicitly recognize that the provisions of Section 104(e)(7)(F) of CERCLA, 42 U.S.C. § 9604(e)(7)(F), apply to data and information genera-

ted by the Defendants. The Defendants shall not assert a claim of confidentiality regarding any hydrogeological or chemical data, any data submitted in support of a remedial proposal, or any other scientific or engineering data generated at or directly concerning the Site.

G. All verified data, factual information, and documents submitted by the Defendants to EPA pursuant to this Consent Decree shall be subject to public inspection, subject to the provisions of subparagraph E above.

XIII. ASSURANCE OF ABILITY TO COMPLETE WORK

A. Defendants shall demonstrate their ability to complete the Covered Matters and to pay all claims that arise from the performance of the Covered Matters by obtaining, and presenting to Plaintiff for approval within thirty (30) calendar days after the effective date of this Consent Decree, one of the following items: 1) performance bond, 2) letter of credit, or 3) guarantee by a third party. Plaintiff may disapprove the financial assurance mechanism presented if in Plaintiff's determination it does not provide adequate assurance that Defendants are able to complete the Covered Matters.

B. In lieu of any of the three items listed above, Defendants may present for Plaintiff's review and determination, internal financial information sufficient to satisfy Plaintiff that the Defendants have enough assets to make it unnecessary to require additional assurances. If Defendants rely on internal

financial information for financial assurance, Defendants shall submit such internal financial information within thirty (30) calendar days after the effective date of this Consent Decree, if not previously provided, and thereafter upon Plaintiff's request. If Plaintiff determines the financial assurances to be inadequate, Defendants shall obtain one of the three other financial instruments listed above within 30 calendar days of such determination.

XIV. COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS

All actions required to be taken pursuant to this Consent Decree shall be undertaken in accordance with the requirements of all applicable local, state and federal laws, regulations and permitting requirements, in accordance with CERCLA, the NCP, and Appendix A to this Consent Decree. In accordance with Section 121(e)(1) of CERCLA, 42 U.S.C. § 9621(e)(1), no federal, state, or local permit shall be required for any portion of any removal or remedial action conducted entirely onsite, where such removal or remedial action is selected and carried out in compliance with Section 121 of CERCLA.

XV. RETENTION OF RECORDS

A. Defendants shall preserve and retain one set of all records and documents in their possession or control that relate in any manner to the operable unit, regardless of any document retention policy to the contrary, for ten (10) years after the

completion of the Covered Matters or termination of this Consent Decree, whichever is later, unless the notice of termination provides for a shorter time period.

B. Until completion of the Covered Matters and termination of this Consent Decree, Defendants shall preserve, and shall instruct their contractor, their contractor's subcontractors, and anyone else acting on Defendants' behalf at the Site to preserve (in the form of originals or exact copies, or in the alternative, microfiche of all originals) one set of all records, documents and information of whatever kind, nature, or description relating to the performance of the Covered Matters at the Site. Upon the completion of the Covered Matters, one set of all such records, documents, and information shall be delivered to Plaintiff's Project Coordinator.

XVI. REIMBURSEMENT OF COSTS

A. At the end of each calendar year, Plaintiff shall submit to Defendants a SPUR report or other equivalent cost accounting of all response and oversight costs incurred by Plaintiff with respect to the Covered Matters under this Consent Decree. Failure to include all relevant response costs in the submittal at the end of any particular calendar year will not preclude Plaintiff from submitting such costs in any subsequent year nor will such failure provide Defendants with a reason to refuse payment.

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ORIGINAL MATERIAL

B. Defendants agree, within thirty (30) calendar days of receipt of the SPUR report or other equivalent cost accounting, or, in the case of Defendants invoking the dispute resolution procedures with respect to this Section, within thirty (30) calendar days of resolution of that dispute, to remit a certified check for the amount of those costs made payable to the "EPA-Hazardous Substance Superfund." Defendants shall pay interest as provided in Section 107(a) of CERCLA, 42 U.S.C. § 9607(a). A copy of each check and transmittal letter shall be sent to the Plaintiff's Project Coordinator.

C. Checks should specifically reference the identity of the Site and the Site Number (# 9T89) and be addressed to:

U.S. Environmental Protection Agency
Superfund Accounting
P.O. Box 371003M
Pittsburgh, PA 15251
Attention: Collection Officer for Superfund

D. Payment made pursuant to this Section shall not constitute an admission by Defendants of any liability to Plaintiff or any other person.

XVII. RESERVATIONS AND WAIVERS OF RIGHTS

A. Plaintiff reserves the right to take any enforcement action pursuant to CERCLA and/or any other legal authority, including the right to seek injunctive relief, monetary penalties, and punitive damages for any civil or criminal violation of law or this Consent Decree.

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B. Plaintiff reserves the right both to disapprove of work performed by Defendants and to request that Defendants perform tasks in addition to those detailed in the RD/RA, as provided in this Consent Decree.

C. As provided in this Section, Plaintiff reserves the right to undertake any Covered Matters at any time and to recover all costs of those actions not reimbursed by Defendants. In the event EPA determines that the Defendants have failed to implement any portion of the Remedial Action in an adequate and timely manner, or at any other time, EPA may perform any and all portions of the Remedial Action as EPA determines may be necessary. If the EPA decides to perform work which is the subject of this Consent Decree, the EPA will provide the Defendants' Project Coordinator with advance notice of intent to perform a portion or all of the Remedial Action. Nothing in this Consent Decree shall be deemed to limit the response authority of EPA under Section 104 of CERCLA, 42 U.S.C. § 9604, and under Section 106 of CERCLA, 42 U.S.C. § 9606, or under any other federal response authority.

D. Defendants reserve any defenses or rights they may have with respect to any actions concerning the Site except any rights expressly waived in this Decree.

E. Defendants waive any right they might have to challenge Plaintiff's or the Court's authority to enter into or enforce this Consent Decree.

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F. Defendants waive any right they might have to seek reimbursement from the Superfund pursuant to the provisions of CERCLA for any costs incurred by them pursuant to this Consent Decree.

G. By entering into and performing this Consent Decree, Defendants do not admit liability for (1) the Site, or (2) any response costs which may have been incurred by any person except as expressly provided elsewhere in this Consent Decree.

H. Compliance with the terms of this Consent Decree, including the completion of the Covered Matters, does not constitute a release of Defendants by Plaintiff from any liability to Plaintiff other than liability for Covered Matters.

I. Defendants reserve all of their rights against all persons and entities other than Plaintiff.

J. It is the present intention of the United States, subject to the lawful exercise of its unreviewable prosecutorial discretion, to seek performance of or payment for the final remedy from persons other than those who are signatories to this Consent Decree.

XVIII. PRIORITY OF CLAIMS

In any action brought by Defendants against any other responsible party or parties for contribution or indemnification or cost recovery of all or a portion of the costs incurred pursuant to this Consent Decree, the rights of Defendants shall be subordinate to the rights of the United States as provided in Section 113(f)(3)(C) of CERCLA, 42 U.S.C. § 9613(f)(3)(C).

Defendants shall notify Plaintiff of any such action with regard to the Site on or before the date the complaint is filed for such action.

XIX. WAIVER OF CLAIM SPLITTING DEFENSE

All parties recognize and acknowledge that the settlement embodied in this Consent Decree is only a partial resolution of issues related to the remediation of conditions at the Site. Defendants hereby waive the defenses of res judicata, collateral estoppel, and claim-splitting by the Plaintiff, only with respect to the Plaintiff's right to pursue subsequent litigation regarding Defendants' responsibility for phases of Site work and costs not covered by this Consent Decree. Nothing in this Section shall be construed to deprive Defendants of the defense of compliance with the terms of this Consent Decree.

XX. STIPULATED PENALTIES

A. Pursuant to Sections 122(e) and 109 of CERCLA, 42 U.S.C. §§ 9622(e) and 9609, the Parties agree that stipulated penalties shall accrue against Defendants for violations of this Consent Decree, as provided in this Section. Stipulated penalties shall be assessed in accordance with the schedule and classification set forth in Paragraphs L and M of this Section. Except as otherwise provided in this Consent Decree, Defendants agree to pay stipulated penalties as provided in this Section for each day in which Defendants fail to submit a deliverable, or in which Defen-

dants otherwise fail to meet the requirements of this Consent Decree. In no event shall stipulated penalties accrue prior to the effective date of this Consent Decree.

B. For late submittal of deliverables, or late performance of tasks, penalties shall accrue beginning the date performance was due. For defective performance of tasks, penalties shall accrue upon receipt of Plaintiff's written disapproval of the task. For defective final deliverables, penalties shall accrue beginning the date performance was due. Final deliverables shall be deemed defective if Defendants have failed to respond to Plaintiff's comments or to modify the draft document, as required in Section VII(G).

C. For late submittal of deliverables subject to Class III penalties as provided in Paragraphs L and M of this Section, penalties shall accrue beginning the date performance was due. For defective deliverables and late or defective performance of tasks subject to Class III penalties as provided in Paragraphs L and M of this Section, stipulated penalties shall accrue upon receipt of Plaintiff's written disapproval of the deliverable or performance.

D. Any notifications required in this Section shall be signed by the Project Coordinator or a higher EPA official.

E. For each violation, stipulated penalties shall continue to be assessed for each day of violation, except as provided in this paragraph. In instances in which the deliverable is a draft, stipulated penalties will be limited to thirty (30) days

if the final is delivered on schedule. In instances in which the late deliverable is a draft and Defendants deliver the draft within ten (10) days of the due date, no stipulated penalties will accrue if the final is delivered on schedule. In all other instances, Defendants shall pay stipulated penalties for late delivery of both draft and final deliverables. For late delivery of monthly reports, stipulated penalties will only continue to accrue after day thirty (30) if Plaintiff notifies Defendants in writing that the report has not been received.

F. Stipulated penalties shall be paid by certified check made payable to the "EPA-Hazardous Substance Superfund," and mailed to U.S. Environmental Protection Agency, Superfund Accounting, P.O. Box 371103M, Pittsburgh, PA 15251, by the fifteenth (15th) day of the month following the month in which EPA demands payment of the stipulated penalties. A copy of the check and the letter forwarding the check, including a brief description of the violation, shall be submitted to Plaintiff's Project Coordinator.

G. The stipulated penalties set forth above shall be in addition to any other remedies or sanctions available to Plaintiff for violation of this Consent Decree subject only to the limitation that Defendants are entitled to a credit in the amount of stipulated penalties paid, to be applied against any civil penalty imposed for the same day of the same violation, up to the amount of the civil penalty imposed.

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H. Plaintiff may not collect stipulated penalties for Defendants' failure to pay stipulated penalties. Failure to pay stipulated penalties is a refusal to comply with a term or condition of this Consent Decree, as provided in Section 122(l) of CERCLA, 42 U.S.C. § 9622(l), subject to statutory penalties as provided in Section 109 of CERCLA, 42 U.S.C. § 9609.

I. Plaintiff can not be required to terminate this Consent Decree until Defendants have paid all stipulated penalties accrued and demanded prior to that date.

J. Defendants may dispute Plaintiff's basis for imposing stipulated penalties but may not dispute the decision to seek stipulated penalties nor the amount of stipulated penalties.

K. Plaintiff may provide Defendants a cure period to correct any deficiency in any deliverable or work. No stipulated penalties shall accrue during a cure period. The decision to grant a cure period and the length of the cure period are within Plaintiff's discretion and neither issue is subject to dispute resolution.

L. Daily stipulated penalty amounts are as follows:

	days 1-14	days 15-30	after day 30
Class I	$5000/day	$10,000/day	$15,000/day
Class II	$2500/day	$5000/day	$7500/day
Class III	$1000/day	$2000/day	$3000/day

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M. The following deliverables and tasks are subject to stipulated penalties as provided in this Section in accordance with the following classification:

Class I

Submittal of 30 % Design

Submittal of Prefinal Design

Submittal of Final Design

Mailing of invitation for bid for equipment

Initiation of on-site construction of the extraction system

Initiation of treatment of the shallow groundwater

Class II

Health and Safety Plan - draft
final

Sampling and Analysis Plans - draft
- final

Treatment Optimization Report - draft
final

Final Operations and Maintenance Plan - draft
- final

Class III

Monthly Reports

All other deliverables and tasks required by the Consent Decree and additional work under Section VII(I), if any.

N. In the event Defendants are in violation of the terms of this Consent Decree, Plaintiff may in its discretion exercise its rights under this paragraph. In the event Plaintiff exercises its right to take over any aspect of the Covered Matters, stipulated penalties shall accrue for that noncompliance until such time as Plaintiff completes the task or deliverable. If Plaintiff in its discretion exercises its right to take over all remaining Covered Matters because it has determined that Defendants have suspended performance of all or a portion of the Covered Matters or that Defendants will not complete the Covered Matters, Defendants shall be deemed to be in violation of this Consent Decree and shall pay a stipulated penalty of $1,000,000 in lieu of other stipulated penalties under this Consent Decree. Plaintiff shall notify Defendants in writing if it chooses to exercise this option to take over all remaining Covered Matters.

XXI. DISPUTE RESOLUTION

A. Dispute resolution under this Section may be invoked to resolve any dispute which may arise pursuant to the implementation of this Consent Decree, except as specifically provided otherwise.

B. If Defendants object to any decision of Plaintiff's pursuant to this Consent Decree, Defendants shall notify Plaintiff's Project Coordinator, in writing, within fourteen (14) days of receipt of Plaintiff's decision. Plaintiff and Defendants shall then have fourteen (14) days to informally discuss

the respective sides of the dispute. A meeting may be held at Defendants' or Plaintiff's request to facilitate resolution of the dispute. All Parties agree to use best efforts to resolve disputes expeditiously. At the end of the fourteen (14) day discussion period, Plaintiff will issue a written determination of its decision regarding the dispute. The Parties may agree to extend the time periods provided in this paragraph.

C. Imposition of the Dispute Resolution procedure itself will not postpone the work schedule under this Consent Decree with respect to the disputed issue, nor will it stay the accrual of stipulated penalties. Plaintiff agrees not to demand payment of penalties accrued for the matters in dispute until completion of the Dispute Resolution process.

D. If Defendants disagree with the Plaintiff's decision regarding the dispute, Defendants may file with the Court a petition briefly describing the dispute and their suggested resolution. If Defendants do not file such a petition, Plaintiff's decision shall be final.

E. Plaintiff shall have 45 days to respond to the petition.

F. In any such dispute, pursuant to the provisions of Section 113(j)(2) of CERCLA, 42 U.S.C. § 9613(j)(2), the Court shall uphold Plaintiff's decision unless Defendants can demonstrate on the Administrative Record of the dispute that Plaintiff's decision was arbitrary and capricious or not otherwise in accordance with the law. The Administrative Record of the dispute shall

consist of Plaintiff's decision and the documents before Plaintiff at the time of its decision, including all matters submitted by Defendants in support of their position and documents referenced therein in the administrative record file for the Site.

G. If the Court finds on review of the Administrative Record that Plaintiff's decision was arbitrary and capricious or not otherwise in accordance with the law, then no stipulated penalties for the disputed conduct shall be payable. A finding that Plaintiff's decision was arbitrary and capricious or not otherwise in accordance with the law shall not excuse stipulated penalties for failure to perform actions not in dispute except to the extent Defendants can show that it was unsafe or infeasible to perform those actions pending resolution of the dispute.

H. If the Court does not find that Plaintiff's decision was arbitrary and capricious, Defendants shall transmit payment of all stipulated penalties which have accrued during the dispute, plus interest at the rate specified in 28 U.S.C. § 1961, to the EPA Hazardous Substance Superfund within fifteen (15) working days of resolution of the dispute.

I. EPA in its discretion may waive stipulated penalties if Defendants' position had substantial merit and was taken in good faith.

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XXII. FORCE MAJEURE

A. Defendants shall perform all the requirements of this Consent Decree according to the schedule and referenced supporting documents or any modification thereto unless their performance is prevented or delayed by events which constitute a force majeure.

B. For the purposes of this Decree, a force majeure is defined as any event arising from causes beyond the control of Defendants or their contractors, subcontractors or consultants, which delays or prevents performance. Neither economic hardship nor increased costs shall be considered an event beyond the control of Defendants, and shall not trigger the force majeure clause.

C. Defendants have the burden of proving that any delay is or will be caused by events beyond their control and that the duration of the delay requested is necessary.

D. In the event of a force majeure, the time for performance of the activity delayed by the force majeure shall be extended for the minimum time necessary to allow completion of the delayed activity, but in no event longer than the time period of the delay attributable to the force majeure. The time for performance of any activity dependent on the delayed activity shall be similarly extended. After conferring with Defendants, Plaintiff will determine whether requirements are to be delayed and

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the time period granted for any delay. Defendants shall adopt all practicable measures to avoid or minimize any delay caused by a force majeure.

E. In the event of a force majeure, Defendants shall orally notify Plaintiff's project coordinator immediately (no later than 48 hours after Defendants become aware of the force majeure) and shall notify Plaintiff in writing within seven (7) calendar days after discovery of a force majeure. The written notification should describe the alleged force majeure, the anticipated length of the delay and any measures Defendants are taking to mitigate the event or the delay.

XXIII. FORM OF NOTICE

A. When notification to or communication with Plaintiff, or the State is required by the terms of this Consent Decree, it shall be in writing, postage prepaid, and addressed as follows:

For Plaintiff:

Chief
Environmental Enforcement Section
Land and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611, Ben Franklin Station
Washington, D.C. 20044

EPA Project Coordinator - LBD Site
South Bay Section (H-6-3)
U.S. Environmental Protection Agency
Region 9
215 Fremont Street
San Francisco, CA 94105

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For the State of California:

David Wang
Toxic Substances Control Division
California Department of Health Services
700 Heinz Street
Berkeley, CA 94710

When notification to or communication with Defendants is required by the terms of this Consent Decree, it shall be in writing, postage prepaid, and addressed to Defendants' Project Coordinator, except that in the absence of a Project Coordinator for Defendants and for notices pursuant to Section XX, paragraph N, of this Consent Decree, notice shall also be sent in writing, postage prepaid and addressed as follows:

E. I. du Pont de Nemours & Company
John W. Keiter, Esq.
Senior Counsel
Legal Department (D-7012-1)
1007 Market Street
Wilmington, DE 19898

Sarah G. Flanagan, Esq.
Pillsbury, Madison & Sutro
235 Montgomery Street
Post Office Box 7880
San Francisco, CA 94120

Union Oil Company of California
Lois Ellen Gold, Esq.
Assistant Counsel
Union Oil Company of California
1201 West 5th Street
Los Angeles, CA 90051

Great Western Chemical Company
Mr. Douglas Richardson
Environmental Compliance Manager
Great Western Chemical Company
808 S.W. 15th
Portland, OR 97205

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KTI Chemicals, Inc.
W. C. Thurber
KTI Chemicals, Inc.
1178 Sonora Road
Sunnyvale, CA 94086

Ashland Oil, Inc. (including its subsidiary Ashland Chemical, Inc.)
William S. Hood, Esq.
Senior Attorney
Ashland Chemical, Inc.
5200 Blazer Memorial Parkway
Dublin, OH 43017

International Business Machines Corporation
James K. Guerin, Esq.
Staff Counsel
IBM Corporation
208 Harbor Drive
P.O. Box 10501
Stamford, CT 06904-2501

Romic Chemical Corporation
Mr. Stephen R. Henshaw
Environmental Engineer
Romic Chemical Corporation
2081 Bay Road
East Palo Alto, CA 94303

Keith Howard, Esq.
Cooper, White & Cooper
1333 N. California Blvd., Ste. 450
Walnut Creek, CA 94596

Vi-Tex Packaging, Inc.
Mr. Chester L. Martin
Plant Manager
Vi-Tex Packaging, Inc.
511 Swift Street
Santa Cruz, CA 95060

Esselte Pendaflex Corporation
John J. O'Connor, Esq.
Assistant General Counsel
Esselte Pendaflex Corporation
71 Clinton Road
Garden City, NY 11530

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H.H. Robertson Company
David J. Clark, Esq.
Senior Counsel
H.H. Robertson Company
Two Gateway Center
Pittsburgh, PA 15222

Mr. James R. Douglass
Executive Vice-President
H.H. Robertson Company
Two Gateway Center
Pittsburgh, PA 15222

A.J. Daw Printing Ink Co., Inc.
Mr. James C. Daw
President
A.J. Daw Printing Ink Co., Inc.
3559 So. Greenwood Avenue
Los Angeles, CA 90040

B. Defendants shall send a copy of all deliverables to the State of California. The requirement of this paragraph is not subject to Section XX of this Consent Decree.

XXIV. MODIFICATION

There shall be no modification of this Consent Decree without written approval of all parties to this Consent Decree and entry by the Court.

XXV. ADMISSIBILITY OF DATA

In the event that the Court is called upon to resolve a dispute concerning implementation of this Consent Decree, the parties waive any evidentiary objection to the admissibility into evidence of data gathered, generated, or evaluated pursuant to, and in compliance with, this Consent Decree.

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XXVI. EFFECTIVE DATE

This Consent Decree is effective upon the date of its entry by the Court.

XXVII. COMMUNITY RELATIONS

Defendants shall cooperate with Plaintiff in providing information to the public. As requested by Plaintiff, Defendants shall participate in the preparation of all appropriate information disseminated to the public and in public meetings(s) which may be held or sponsored by Plaintiff to explain activities at or concerning the Site.

XXVIII. PUBLIC PARTICIPATION

A. Plaintiff will publish notice of the availability for review and comment of this Consent Decree upon its lodging with the United States District Court as a proposed settlement in this matter.

B. Plaintiff will provide persons who are not parties to the proposed settlement with the opportunity to file written comments during at least a thirty (30) day period following such notice. Plaintiff will file with the Court a copy of any comments received and its responses to such comments.

C. After the closing of the public comment period, Plaintiff will review all comments and determine whether the comments disclose facts or considerations which indicate that the proposed Consent Decree is inappropriate, improper or inadequate, and

therefore that the Consent Decree should be modified. If a modification is deemed necessary by Plaintiff based on public comment, Plaintiff will notify Defendants.

XXIX. NOTICE TO THE STATE

Plaintiff has furnished the State of California notice pursuant to the requirements of Section 106(a) of CERCLA, 42 U.S.C. § 9606.

XXX. CONSISTENCY WITH THE NCP

Plaintiff and Defendants agree that the Covered Matters, if performed in full accordance with the requirements of this Consent Decree, are consistent with the provisions of the NCP, pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605.

XXXI. INDEMNIFICATION OF THE UNITED STATES

Notwithstanding any approvals which may be granted by Plaintiff, Defendants agree to indemnify, save and hold harmless Plaintiff, its officials, employees, agencies, and contractors from any liability for injuries or damages proximately caused by any act or omission of Defendants, their contractors, subcontractors, or any other person acting within the scope of his or her employment contract with Defendant during execution of the Covered Matters or in complying with this Consent Decree, arising subsequent to the entry of this Consent Decree. This indemnification does not extend to any such claim or cause of action

attributable to a tortious act or omission of Plaintiff, its officials, employees, agencies, contractors, subcontractors or any other person acting on Plaintiff's behalf in carrying out activities at the Site.

For the purposes of this Consent Decree, Plaintiff is not a party to any contract with Defendants.

XXXII. OTHER CLAIMS

With respect to any person, firm, partnership, or corporation not a signatory to this Consent Decree, nothing in this Consent Decree shall constitute or be construed as a covenant not to sue with respect to, or as a release from, any claim, cause of action, or demand in law or equity. This Consent Decree does not constitute a preauthorization of funds under Section 111(a)(2) of CERCLA, 42 U.S.C. § 9611(a)(2). In consideration of entry of this Consent Decree, Defendants agree not to make any claims pursuant to CERCLA Sections 112 or 106(b)(2), 42 U.S.C. §§ 9612 or 9606(b)(2), or any other provisions of law directly or indirectly against the Hazardous Substance Superfund, or make other claims against the United States for those costs expended in connection with this Consent Decree.

XXXIII. CONTINUING JURISDICTION

The Court specifically retains jurisdiction over both the subject matter of and the Parties to this action for the duration of this Consent Decree for the purposes of issuing such further

orders or directions as may be necessary or appropriate to construe, implement, modify, enforce, terminate, or reinstate the terms of this Consent Decree or for any further relief as the interests of justice may require with respect to the Covered Matters.

XXXIV. TERMINATION AND SATISFACTION

The provisions of this Consent Decree shall be deemed satisfied upon the Defendants' receipt of written notice from EPA that the Defendants have demonstrated, to the satisfaction of EPA, that all of the terms of this Consent Decree have been completed. Defendants shall give written notice to EPA when they believe that they have completed all terms of the Consent Decree. Defendants' written notice shall be accompanied by a final report detailing Defendants' completion of the terms of this Consent Decree. EPA must respond with its written determination on completion within ninety (90) days or completion shall be deemed denied, and Defendants will be entitled to invoke the dispute resolution procedure.

XXXV. COVENANT NOT TO SUE

A. Except as provided herein, upon the approval by EPA of the final report specified in Section XXXIV and certification of completion of the remedy, including operations, maintenance and monitoring, the United States covenants not to sue the Defendants with regard to Covered Matters which are performed satisfactorily

by Defendants. This Section is not, and shall not be construed as a covenant not to sue any person or entity not a party to this Consent Decree.

B. Defendants hereby release and covenant not to sue the United States, including any and all departments, agencies, officers, administrators, and representatives thereof, for any claim, counter-claim, or cross-claim asserted, or that could have been asserted prior to the effective date of this Consent Decree, arising out of or relating to the Site; provided, however, that nothing in this Consent Decree deprives Defendants of the right to seek contribution, indemnification or other recovery of response costs paid or incurred by Defendants from any responsible person, including governmental entities.

C. Defendants are expressly not released from, and the provisions of paragraph A of this Section shall not apply to, any matter not expressly addressed by this Consent Decree, including the following claims:

1. Claims based on a failure by the Defendants to meet the requirements of this Consent Decree;

2. Any other claims of the United States for any other costs or actions necessary to the Site which are not expressly and exclusively undertaken pursuant to the terms of this Consent Decree;

3. Claims based on the Defendants' liability arising from the past, present, or future disposal of hazardous substances outside of the Site;

4. Claims for costs incurred by the United States as a result of the failure of the Defendants to meet the requirements of this Consent Decree;

5. Any claim or demand for damage to federal property located any place that the Remedial Actions are being performed;

6. Claims based on criminal liability;

7. Claims based on liability for damage to natural resources as defined in CERCLA;

8. Claims based on liability for hazardous substances removed from the Site;

9. Claims based on liability for future monitoring or oversight expenses incurred by the United States except as those expenses are recovered by the United States pursuant to Section XVI, herein (Reimbursement of Costs); or

10. Liability for any violations of Federal or State law not pre-empted by CERCLA/SARA, if any, which occur during implementation of the Covered Matters.

D. Notwithstanding any other provision of this Consent Decree, the United States reserves the right to institute proceedings or to issue an Order seeking to compel the Defendants to perform any additional response work at or emanating from the Site if:

(a) Prior to EPA certification of completion of the Covered Matters,

i. conditions at the Site, previously unknown to the United States, are discovered after the

entry of this Consent Decree, or

ii. information is received, in whole or in part, after the entry of this Consent Decree,

and these previously unknown conditions or this information indicates that the Covered Matters are not protective of human health and the environment; or

(b) Subsequent to EPA certification of completion of the Covered Matters,

i. conditions at the Site, previously unknown to the United States, are discovered after the certification of completion by EPA, or

ii. information is received, in whole or in part, after the certification of completion by EPA,

and these previously unknown conditions or this information indicates that the Covered Matters are not protective of human health and the environment.

E. Notwithstanding any other provision in this Consent Decree, this covenant not to sue shall not relieve the Defendants of their obligation to meet and maintain compliance with the requirements set forth in this Consent Decree. The United States reserves all its rights to take response actions at the Site, including the right to take response action in the event of a breach of the terms of this Consent Decree and to seek recovery of costs which: 1) result from such a breach; 2) relate to

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any portion of the work funded or performed by the United States; or 3) are enforcement costs incurred by the United States associated with the Consent Decree.

F. Nothing in this Consent Decree shall constitute or be construed as a release or a covenant not to sue regarding any claim or cause of action against any person, firm, trust, joint venture, partnership, corporation or other entity not a signatory to this Consent Decree for any liability it may have arising out of or relating to the Site.

G. The parties to this Consent Decree agree that the United States shall be under no obligation to assist the Defendants in defending against suits for contribution brought against the Defendants which allege liability for matters covered by this covenant not to sue, by persons or entities that have not entered into this settlement.

XXXVI. SECTION HEADINGS

The section headings set forth in this Consent Decree and its Table of Contents are included for convenience of reference only and shall be disregarded in the construction and interpretation of any of the provisions of this Consent Decree.

XXXVII. COUNTERPARTS

This Consent Decree may be executed and delivered in any number of counterparts, each of which when executed and delivered shall be deemed to be an original, but such counterparts shall together constitute one and the same document.

XXXVIII. TECHNICAL ASSISTANCE GRANTS

In the event EPA approves a technical assistance grant, as described in 40 C.F.R. § 35.4000, *et seq.*, for the Site, Defendants shall provide the Recipient's Project Manager with a copy of each deliverable and shall provide the Recipient's technical advisor reasonable access to the Site, subject to compliance with all applicable Site Health and Safety Plans, to fulfill the purposes of the grant. The requirement of this Section is not subject to Section XX of this Consent Decree.

XXXIX. CONTRIBUTION PROTECTION

Based upon Defendants' satisfactory performance of the Covered Matters, Defendants shall have contribution protection to the maximum extent provided by Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2).

SIGNED and ENTERED this 6 day of July, 1990.

EUGENE F. LYNCH

UNITED STATES DISTRICT JUDGE

Appendix A - Record of Decision

Appendix B - Operable Unit Work Plan and Schedule

By the signatures below, the Parties hereby consent to the foregoing Consent Decree:

FOR PLAINTIFF UNITED STATES OF AMERICA:

Dated: 1/31/90

GEORGE W. VAN CLEVE
Deputy Assistant Attorney General
Land and Natural Resources Division
U.S. Department of Justice

Dated: 1/31/90

ROBERT D. BROOK
Environmental Enforcement Section
Land and Natural Resources Division
U.S. Department of Justice
P.O. Box 7611, Ben Franklin Station
Washington, D.C. 20044

JOSEPH P. RUSSONIELLO
United States Attorney

Dated: 2-20-90

PAUL E. LOCKE
Assistant United States Attorney
Northern District of California
Federal Building, 16th Floor
450 Golden Gate Avenue
San Francisco, California 94102

Daniel W. McGovern

Dated: 1.22.90

DANIEL W. McGOVERN
Regional Administrator
U.S. EPA Region IX
215 Fremont Street
San Francisco, California 94105

Michael B. Hingerty

Dated: 1/5/90

MICHAEL B. HINGERTY
Assistant Regional Counsel
U.S. EPA Region IX
215 Fremont Street
San Francisco, California 94105

The undersigned Defendants hereby consent to the foregoing Partial Consent Decree, United States v. E.I. du Pont de Nemours & Co., et al.

FOR E.I. du Pont de Nemours & Company (including its subsidiary Conoco):

By: _____ Dated: 1-12-90

Name: R. W. Fasick

Title: Group Vice-President

Address: Automotive Products Department
1007 Market Street
Wilmington, DE 19898

The undersigned Defendants hereby consent to the foregoing Partial Consent Decree, United States v. E.I. du Pont de Nemours & Co., et al.

FOR Union Oil Company of California (Amsco):

By: _____ Dated: 1/9/90

Name: N. E. Lynam

Title: Senior Vice President, Petrochemicals

Address: 1345 N. Meacham Road
Schaumburg, IL 60196

The undersigned Defendants hereby consent to the foregoing Partial Consent Decree, United States v. E.I. du Pont de Nemours & Co., et al.

FOR Great Western Chemical Company:

By: Don Aultman Dated: 1-5-90

Name: Don Aultman

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The undersigned Defendants hereby consent to the foregoing Partial Consent Decree, United States v. E.I. du Pont de Nemours & Co., et al.

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By: [signature] Dated: 1/15/90

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Title: President

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The undersigned Defendants hereby consent to the foregoing Partial Consent Decree, United States v. E.I. du Pont de Nemours & Co., et al.

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Dated: January 7, 1990

Name: Peter D. Schneider

Title: President

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The undersigned Defendants hereby consent to the foregoing Partial Consent Decree, United States v. E.I. du Pont de Nemours & Co., et al.

FOR Vi-Tex Packaging, Inc. (the successor in interest to the assets of George Schmitt & Co., Inc.):

By: Vi-Tex Packaging, Inc.

Dated: January 15, 1990

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Title: Plant Manager

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The undersigned Defendants hereby consent to the foregoing Partial Consent Decree, United States v. E.I. du Pont de Nemours & Co., et al.

FOR Esselte Pendaflex Corporation (Dymo Visual Systems):

By: John J. O'Connor Dated: 1-10-90

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The undersigned Defendants hereby consent to the foregoing Partial Consent Decree, United States v. E.I. du Pont de Nemours & Co., et al.

FOR H.H. Robertson Company

By: _____ Dated: 01/15/90

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The undersigned Defendants hereby consent to the foregoing Partial Consent Decree, United States v. E.I. du Pont de Nemours & Co., et al.

FOR A.J. Daw Printing Ink Co., Inc.:

By: James C. Daw

Dated: January 15, 1990

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Title: PRESIDENT

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IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA

UNITED STATES OF AMERICA, Plaintiff, v. E.I. duPONT deNEMOURS & CO., UNION OIL CO. OF CALIFORNIA, GREAT WESTERN CHEMICAL CO., KTI CHEMICALS INC., ASHLAND OIL, INC., INTERNATIONAL BUSINESS MACHINES CORP., ROMIC CHEMICAL CORP., VI-TEX PACKAGING, INC., ESSELTE PENDAFLEX CORP., H.H. ROBERTSON CO., and A.J. DAW PRINTING INK CO., INC., Defendants.	CIVIL NO. APPENDIX A TO PARTIAL CONSENT DECREE

LORENTZ BARREL & DRUM
ENGINEERING EVALUATION/COST ANALYSIS
RECORD OF DECISION
9/22/88

PART 1 - DECLARATION

PART 2 - DECISION SUMMARY

PART 3 - RESPONSIVENESS SUMMARY

LORENTZ BARREL & DRUM
ENGINEERING EVALUATION/COST ANALYSIS
RECORD OF DECISION

PART 1
DECLARATION

RECORD OF DECISION
DECLARATION

Statutory Preference for treatment as a principal element is met.

SITE NAME AND LOCATION

Lorentz Barrel & Drum
San Jose, California

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Expedited Response Action (ERA)/Operable Unit for the Lorentz Barrel & Drum (LB&D) site in San Jose, California. This remedial action was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by Superfund Amendment and Reauthorization Act of 1986 (SARA), and the National Contingency Plan. The ERA/Operable Unit is the result of the Engineering Evaluation/Cost Analysis (EE/CA). Final remedial actions are being studied as part of the ongoing Remedial Investigation/Feasibility Study (RI/FS). The attached index identifies the items which comprise the administrative record upon which this Record of Decision (ROD) is based.

The State of California concurs with the selected remedy.

DESCRIPTION OF THE REMEDY

This ERA/Operable Unit is the second action of three operable units for the site. The first action was the removal of drums, stored hazardous materials, and severely contaminated soils. This document addresses an ERA/Operable Unit for treatment of the offsite contaminated shallow groundwater. Both the shallow and deep groundwater and onsite contaminated soils are being studied in further detail during the ongoing RI/FS.

The remedy selected herein addresses the principal near-term threats in the site vicinity. Threat of contamination of the deep drinking water aquifer and nearby surface water bodies will be addressed by extracting the contaminated shallow groundwater and treating it to action levels prescribed by Applicable or Relevant and Appropriate Requirements (ARARs).

The major components of the shallow groundwater remedy include:

- o construction and operation of a groundwater extraction system to intercept several shallow groundwater plumes;

- construction and operation of a groundwater treatment system; and

- disposal of treated groundwater to the storm sewer, from which it flows to Coyote Creek.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and state requirements that are applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy satisfies the statutory preference for remedies that reduce toxicity, mobility, and/or volume as a principal element. It also utilizes permanent solutions to the maximum extent practicable. The applicability of the 5-year facility review provision will be determined after the RI/FS is completed.

9.21.88	John Wise
Date	Signature (DRA)
9.25.88	David W. McGoren
	Signature (AA/RA)

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Superfund Program

Mary Masters
Mary Masters
Remedial Project Manager
South Bay Section (T-4-5)

9/14/88
Date

Mary Masters for Amy Zimpfer
Amy Zimpfer
Chief
South Bay Section (T-4-5)

9/14/88
Date

Phil Bobel
Phil Bobel
Chief
Superfund Remedial Branch (T-4-A)

9/14/88
Date

Jerry Clifford
Jerry Clifford
Assistant Director for Superfund
Toxics and Waste Management Division (T-4)

9/22/88
Date

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Toxics and Management Division

Laura K. Yoshii for
Jeff Zelikson
Director
Toxics and Waste Management Division

9.14.88
Date

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Water Management Division

Keith Takata

Harry Seraydarian
for Director
Water Management Division

9-13-88
Date

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Office of Policy and Management

Nora M. McGee

Nora McGee
Director
Office of Policy and Management

9-19-88
Date

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Office of Regional Counsel

Nancy J. Marvel
Nancy Marvel
Regional Counsel
Office of Regional Counsel

Sept 20, 1988
Date

Lorentz Barrel and Drum

RECORD OF DECISION

Concurrence -- Air Management Division

for Dave Howekamp
Director
Air Management Division (A-1)

9/21/98
Date

LORENTZ BARREL & DRUM
ENGINEERING EVALUATION/COST ANALYSIS
RECORD OF DECISION

PART 2
DECISION SUMMARY

LORENTZ BARREL & DRUM

ENGINEERING EVALUATION/COST ANALYSIS RECORD OF DECISION

DECISION SUMMARY

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1.0 SITE LOCATION AND DESCRIPTION

The Lorentz Barrel & Drum (LB&D) site is located at 1515 South Tenth Street, on the southwest corner of the intersection of East Alma Avenue and South Tenth Street in the southern portion of the City of San Jose, Santa Clara County, California (Figure 1-1). A land use map of the site and vicinity is shown in Figure 1-2.

The residential district to the north and east of the LB&D site includes Spartan Field (San Jose State University football stadium), San Jose Bees Stadium (City of San Jose), and San Jose State University recreation fields. The closest housing to the site consists of San Jose State University student housing, roughly 1/4 mile north of the site.

Topography of the site is nearly level, with a slight slope from the southwest corner to the northeast corner. The highest elevation at the southwest corner is 106 feet and the lowest point at the northeast corner is 102 feet above sea level.

The site is located in the southeastern corner of the San Jose subarea as defined by The California Department of Water Resources (DWR, 1967). This subarea is one of the most important natural source of groundwater in the south San Francisco Bay area ("south bay"). The deep aquifer (250 to 400 feet below ground surface) is a major source of potable groundwater, from which it is estimated that Santa Clara Valley extracts 107,000 acre-feet per year. Three public water supply well fields (owned by San Jose Water Company), located at the 12th Street, Cottage Grove, and Needles Stations, are within 1 mile of the site. A San Jose State University well is located at the Spartan Stadium.

The major surface water stream in the vicinity is Coyote Creek. It is less than 1/2 mile from the site, toward the northeast. Coyote Creek perennial flows are regulated by Coyote and Anderson reservoirs, which are controlled by the Santa Clara Valley Water District.

At the time drum processing operations started in 1947, the site included 10 1/2 acres of land. The current site is L-shaped and covers 5 1/4 acres of which approximately 4 1/2 acres are capped with tar and gravel. The area that is now sealed was used for drum storage and covers sections of soil which were discolored and possibly contaminated.

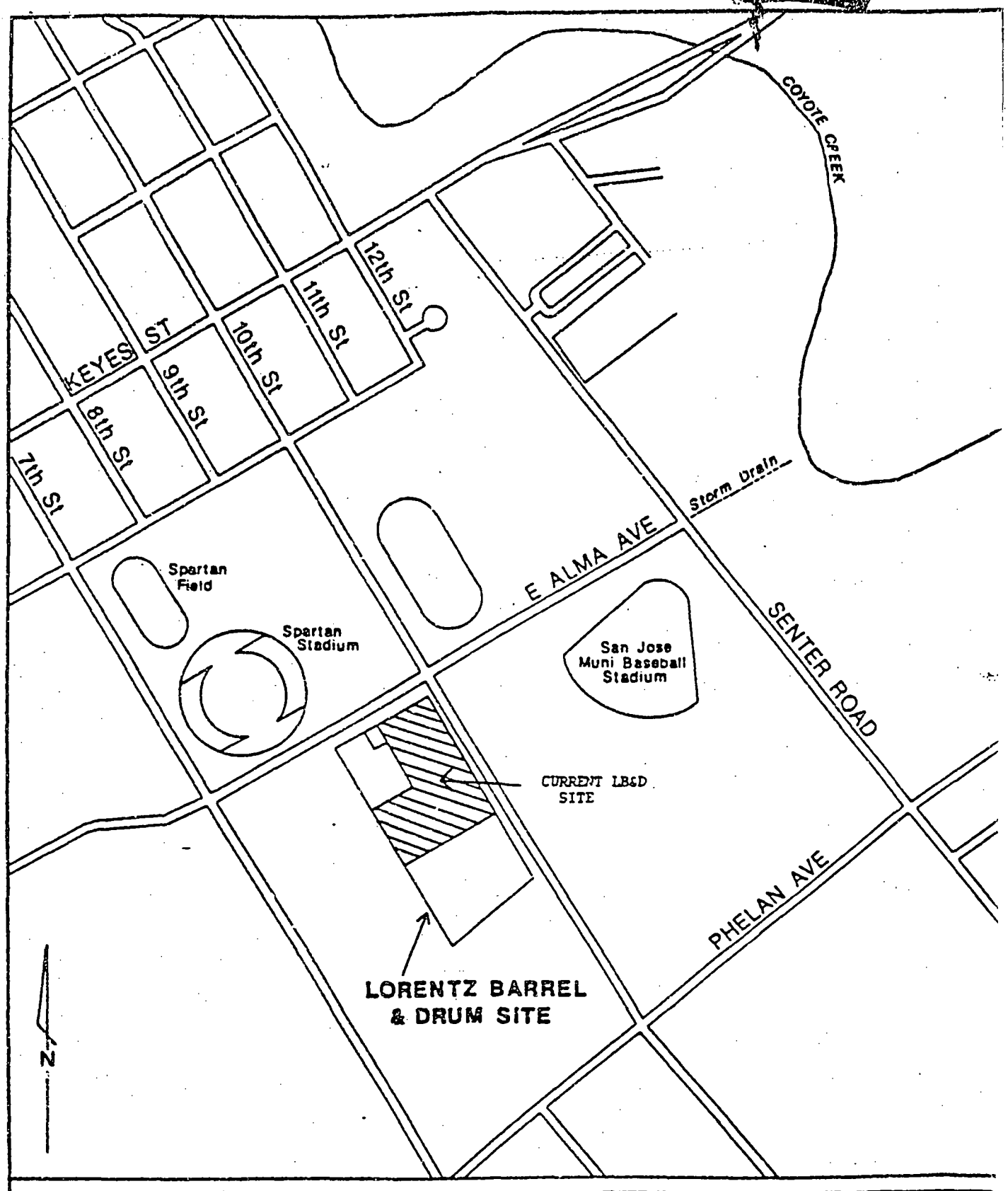
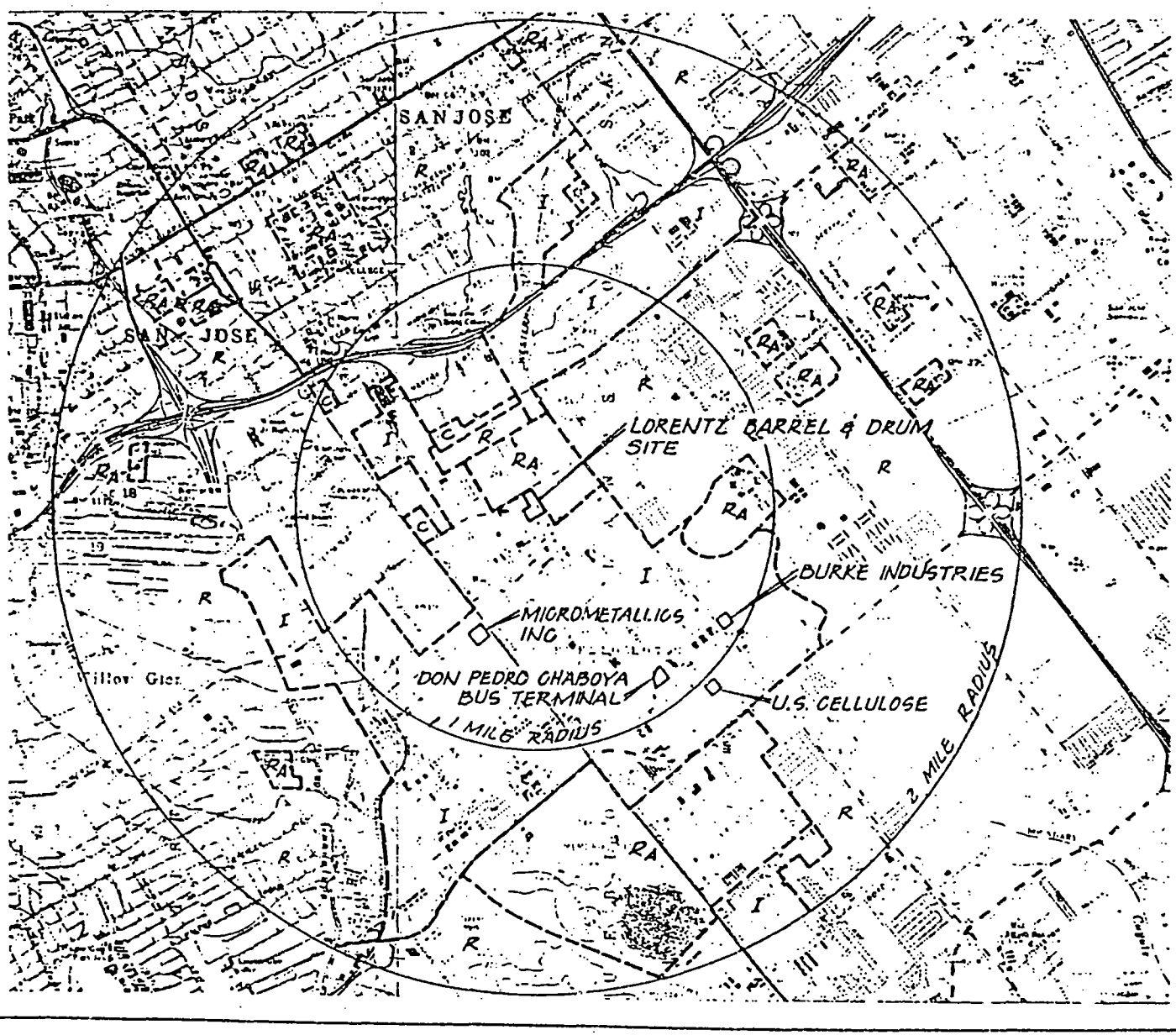


FIGURE 1-1
SITE LOCATION
LORENTZ BARREL & DRUM



N

2200 0 2200

SCALE IN FEET

LEGEND

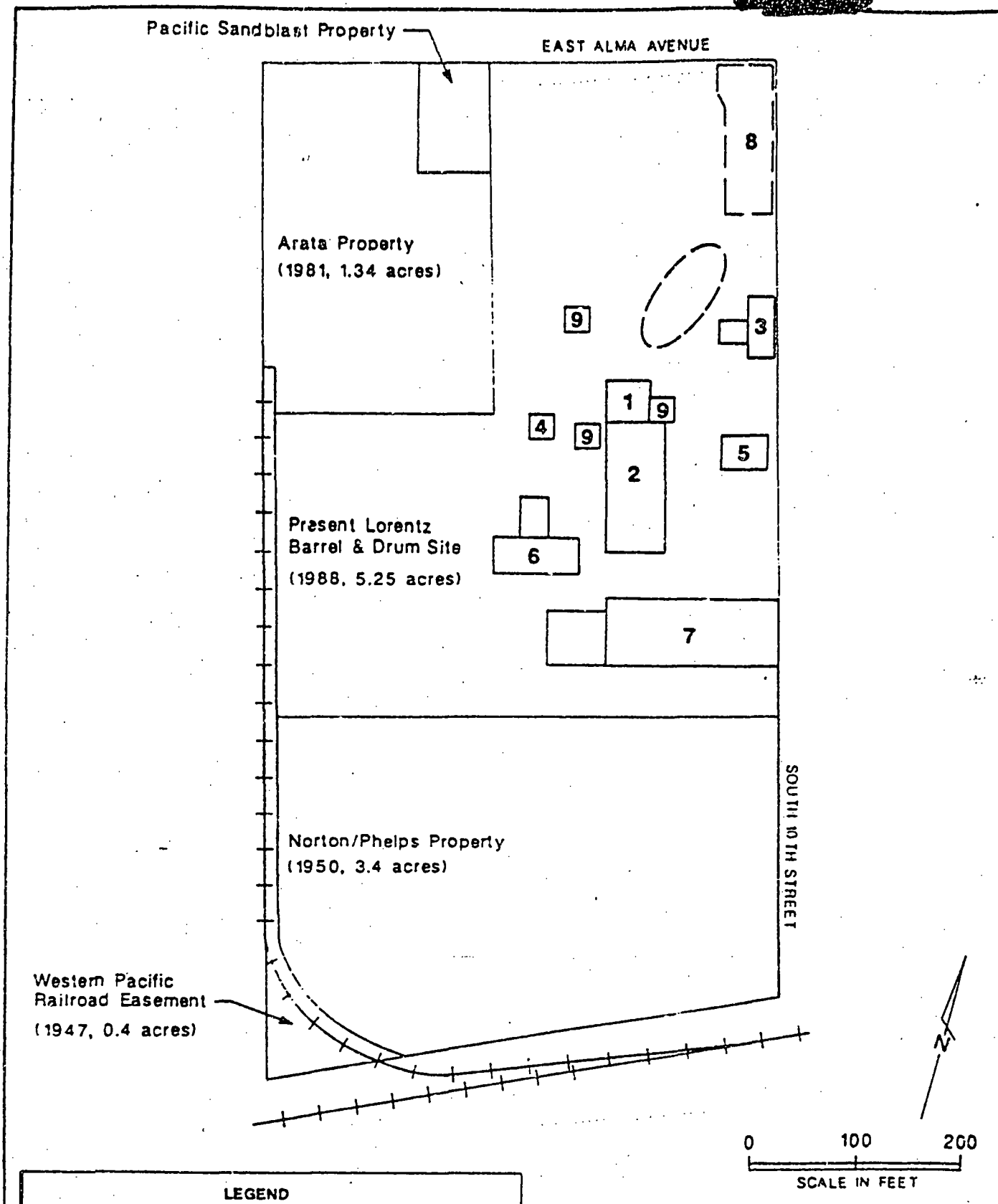
R RESIDENTIAL
I INDUSTRIAL AND MANUFACTURING
C COMMERCIAL
RA SCHOOLS, SPORTS COMPLEX, ETC

FIGURE 1-2

GENERAL MAP OF SITE VICINITY

LORENTZ BARREL & DRUM

The remaining 3/4 acre includes five buildings which housed the drum reconditioning facilities. Two sumps and one open storage bin adjacent to the facility have held liquid and sludge. The facilities show signs of extended use with minimal upkeep, as evidenced by eroded concrete, rusted metal structures, and conduits in various stages of disrepair. Figure 1-3 shows the locations of the onsite facilities.



LEGEND

1 Treatment Facility
2 Processing Facility
3 Former location of Lorentz residence
4 Incinerator
5 Shop and Bathrooms
6 Storage Facility
7 Warehouse and Office
8 Former Sump
9 Existing Sump
[ ] 1987 Excavations

FIGURE 1-3
SITE FACILITIES
LORENTZ BARREL & DRUM

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 HISTORY OF SITE ACTIVITIES

The Lorentz family started recycling drums at the site in 1947. During the early years, portions of the site were also rented or leased to other companies. Several facilities were in operation around 1954, including an autowrecker, a junkyard, a roofing company, a construction company, and sandblasting services.

Drums for recycling were received from both private and public sources throughout California and Nevada. Private sources included over 800 different companies, representing chemical, food, health care, electronics, paint, ink, and paper industries. Public sources included military bases, research laboratories, and county agencies. Drums arrived at the site containing residual aqueous wastes, organic solvents, acids, oxidizers, and oils. (Under current law, drums sent to a recycling facility can contain no more than 1 inch of residual material.) Lorentz Barrel & Drum (LB&D) also received polyethylene carboys or drums containing caustic residues.

From the 1950s until some time between 1976 and 1978, a drainage ditch (which probably drained processing waste) existed north of the processing structure (buildings 1 and 2 in Figure 1-3). The northeastern corner of the site had a large sump (30 feet by 80 feet) from the 1950s through the late 1970s. Aerial photographs of the area revealed the presence of liquids in the sump, drainage ditch, and various ponded areas during this period of time. The sump appeared to have been filled in with soil prior to 1980.

Research into San Jose City records has shown that prior to 1968, the waste stream from the drum recycling processes flowed from the processing structure, through the drainage ditch, to the large sump in the northeast corner of the site. It was then discharged to the storm drain system. Between 1968 and 1971 the discharge was diverted to the sanitary sewer. Previous investigations have indicated that discharge to the sanitary sewer ceased in 1983 or 1984. After 1984, liquid wastes were reportedly reduced in volume by evaporation, drummed and disposed of as hazardous waste along with incinerator ash, residual liquids, and sludge. Surface runoff was reportedly collected and recycled in the hot caustic wash cycle of the drum recycling process.

2.2 HISTORY OF SITE INVESTIGATIONS

Since 1981 there have been several environmental sampling studies at the LB&D site aimed at investigating the extent and nature of contamination. The California Department of Health

Services (DHS), their consultants and various consultants to LB&D have collected soil and groundwater samples from onsite and offsite monitoring wells. On six occasions, groundwater or soil samples were taken from the site. Numerous metals, organics, and polychlorinated biphenyls (PCBs) were found above Total Threshold Limit Concentrations (TTLC). Sampling results from these efforts are summarized in Section 5.0 of this Decision Summary.

2.3 HISTORY OF ENFORCEMENT ACTIONS

Since 1968, there have been many regulatory actions at the LB&D site. A complete chronological list of enforcement events is given in Appendix B of the Engineering Evaluation and Cost Analysis (EE/CA) (Ebasco, May 1988).

In summary, the major enforcement episodes have been:

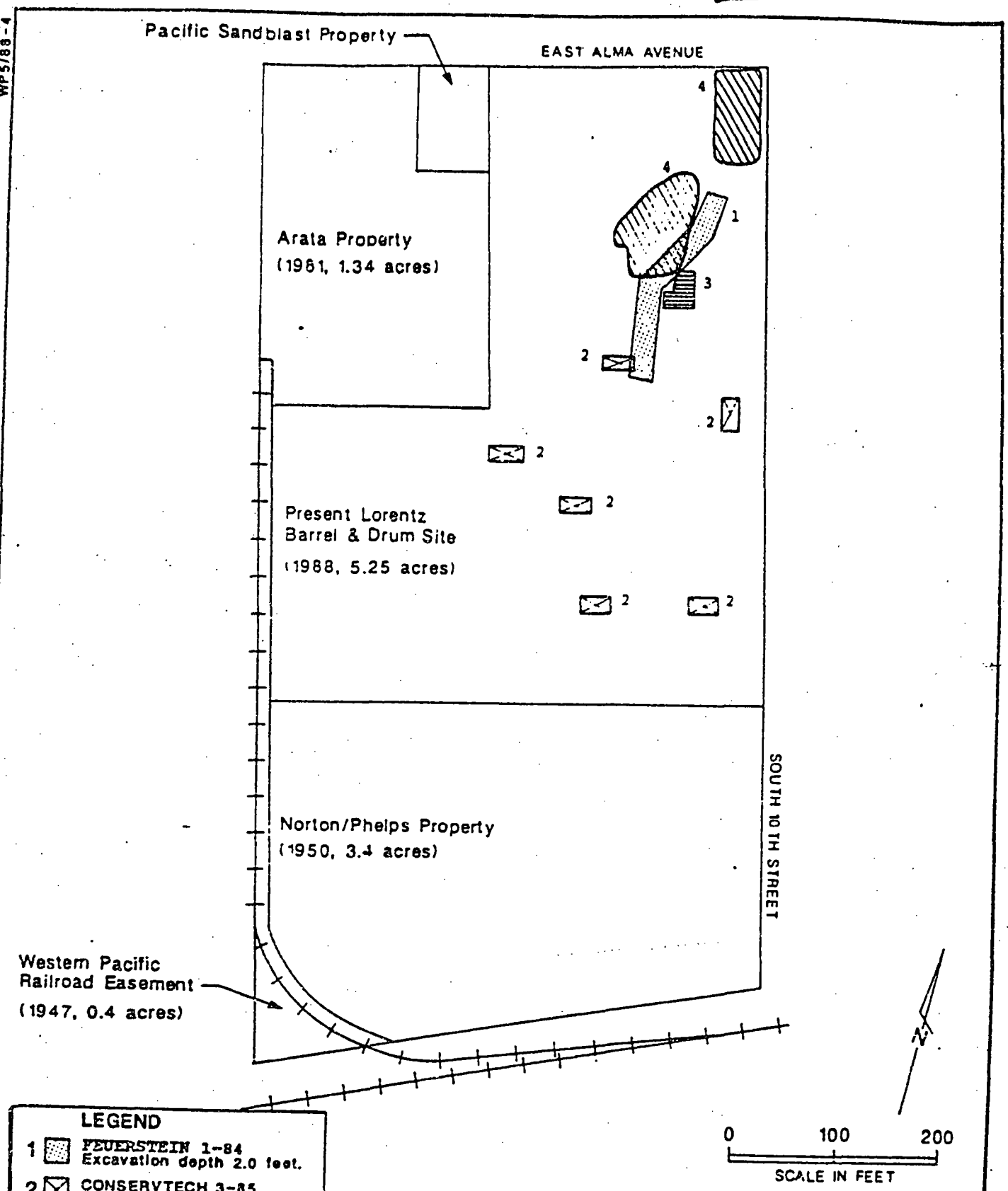
- 1982 - The DHS investigated soil contamination, resulting in a Remedial Action Order in 1987.
- 1982 - The Regional Water Quality Control Board (RWQCB) investigated groundwater contamination, resulting in Clean Up & Abatement Order No. 86-001.
- 1984 - The United States Environmental Protection Agency (EPA) formally proposed LB&D as a candidate for the National Priority List.
- 1987 - The LB&D facility ceased operation due to a temporary restraining order from DHS. The EPA assumed the lead agency responsibility for the site remediation.
- Since 1984, several parties have excavated known "hot spots" of contaminated soil from the sump areas. These include three contractors hired by LB&D, as well as a DHS contractor (Canonie Environmental). Excavated areas are shown in Figure 2-1.
- In December 1987, EPA initiated an Expedited Response Action (ERA)/Operable Unit for the shallow groundwater plume extending northward from the site. The EE/CA recommended extraction of the groundwater, followed by treatment and disposal to the storm sewer.

Other agencies which have cited LB&D for some type of violation include:

- California Department of Fish & Game (CDFG);
- San Jose/Santa Clara Water Pollution Control Plant;

[redacted]

WP5/88-4



LEGEND

1 FEUERSTEIN 1-84
Excavation depth 2.0 feet.

2 CONSERVTECH 3-85
Excavation depth 2.0 feet.

3 REED CORPORATION 6-85
Excavation depth ?

4 CANONIE 10-87
Excavation depth 4-12 feet.

FIGURE 2-1

LOCATIONS OF PREVIOUS SOIL EXCAVATIONS
LORENTZ BARREL & DRUM

[redacted]

- California Department of Occupational Safety & Health (OSHA);
- San Jose Fire Department; and
- Santa Clara District Attorney's Office (Civil and Criminal Proceedings).

3.0 COMMUNITY RELATIONS HISTORY

A history of the community relations activities at the Lorentz Barrel & Drum (LB&D) site, the background on community involvement and concerns, and specific comments and responses on the Engineering Evaluation and Cost Analysis (EE/CA) are summarized in the Responsiveness Summary (Part 3) of this Record of Decision (ROD).

4.0 SCOPE OF RESPONSE ACTION

4.1 OBJECTIVES OF RESPONSE ACTION

This Expedited Response Action (ERA)/Operable Unit will address the three principal hazards posed by the contaminated shallow aquifer. These hazards are: further migration of the plume; potential plume discharge into Coyote Creek; and potential contamination of the drinking water supply (deep aquifer). The United States Environmental Protection Agency (EPA) believes that the drinking water supply is potentially at risk, and action should not be delayed until the Remedial Investigation/Feasibility Study (RI/FS) process is completed.

4.1.1 Plume Migration

A groundwater extraction system is proposed in order to prevent existing contamination in the shallow aquifers from migrating deeper and farther from the site. The groundwater extraction system will consist of a series of linear well fields. Each row of extraction wells, pumped simultaneously, will create a trough in the water table beyond which groundwater should not flow. Final design of the extraction system will be based upon data obtained during the RI (which has already been initiated) concerning aquifer yield and water quality parameters which can affect system hydraulics (e.g., hardness) and effluent limitations (e.g., nickel).

4.1.2 Plume Discharge to Coyote Creek

Existing data suggest that portions of the shallow aquifer are hydraulically connected with (i.e., discharge to) Coyote Creek. As a result, contamination in the shallow aquifer may lead to Coyote Creek contamination, posing a threat to aquatic life and human populations (via fish or shellfish ingestion or dermal contact). The proposed extraction system will attempt to retard north and northeasterly migration of the plumes toward Coyote Creek, thus preempting such a threat.

4.1.3 Contamination of the Drinking Water Supply

The San Jose Water Company relies on water contained in the deep aquifer underlying the contaminated aquifer. Contamination of the deep aquifer could eventually occur as the result of discontinuities in the 50-foot aquitard, either natural or as created around abandoned private supply wells located within the plume areas (see Chapter 5.0 for a more detailed discussion of the area's groundwater regime). In June, five San Jose Water Company municipal wells were sampled. The analytical data are not yet available, but those

wells will be sampled again during the RI, and results will be presented in RI report. To date, no contamination has been found in the San Jose Water Company municipal wells.

The proposed extraction and treatment system will remove contaminated water from the shallow aquifer and control continued lateral and/or vertical spreading of the plume. These actions will greatly reduce the possibility of contamination of potable water supplies.

4.2 RELEVANCE TO SITE REMEDIATION STRATEGY

The remedial actions taken to date have been aimed at reducing or stabilizing further infiltration of contaminants into the shallow aquifer. These actions have included removal of contaminated drums from the site, drainage of the existing storage tanks; removal of the heavily contaminated soil, particularly underneath the former northeast sumps; and (in early 1988) paving most of the site to preclude surface water infiltration from being a continued vector of contaminant transport into groundwater.

The proposed action will further EPA's interim remediation of the site by retarding contaminant migration in groundwater and removing and treating some of the water presently contaminated. This action is referred to as ERA/Operable Unit 1, and it is considered to be consistent with future action expected to be implemented to permanently remediate site conditions. While the ongoing RI/FS will include evaluation of potential source removal (i.e., contaminated soils) the problem is mainly one of groundwater contamination, a principal remedy of which is groundwater pumping and treatment. The remediation presented in this ROD is therefore relevant to and consistent with the overall site remediation strategy.

5.0 SITE CHARACTERISTICS

5.1 PREVIOUS INVESTIGATIONS

The Lorentz Barrel & Drum (LB&D) site has been the subject of numerous investigations. The following discussion of regional and site-specific hydrogeology has been adapted from a report entitled "Technical Memorandum: Preliminary Hydrogeologic Assessment" (CH2M Hill, November 1987a), as modified by observations and measurements made by Ebasco in a limited sampling program performed in June 1988 and bench scale treatability-related studies done in July/ August 1988.

5.1.1 Regional Hydrogeology of the Santa Clara Valley

The LB&D site lies near the center of the Santa Clara Valley between the Santa Cruz Mountains to the west and the Diablo Range to the east. The Santa Clara Valley is a broad alluvial basin trending northwesterly. The sediments are divided into the lower Plio-Pleistocene Santa Clara Formation, which is somewhat consolidated and has been deformed, and the upper Quaternary alluvium, which is poorly consolidated. Both units consist of interbedded gravel, sand, silt, and clay, and they cannot be reliably differentiated in well logs (CH2M Hill, February 1987).

The San Jose subarea, in which LB&D is located, is considered one of the most important parts of the South Bay Groundwater Basin due to the thickness and permeability of the water-bearing units. At least two major water-bearing units or aquifers are believed to exist in the LB&D area, separated by a marine clay layer or aquitard, formed during past incursions of San Francisco Bay. The upper water-bearing unit is a shallow aquifer zone that may be confined. Below this is an aquitard; below the aquitard and approximately 250 feet below the surface lies the stressed confined aquifer zone from which municipal wells are pumped. The lateral extent of this major aquitard is not fully known, but it seems to be present in the LB&D area.

5.1.2 Site-Specific Hydrogeology

Within the site, the sediments are primarily composed of fine-grained, unconsolidated silts and clays with interbedded sand and gravel lenses.

A generalized cross-section of the site-specific hydrogeology is shown in Figure 5-1. Based on the information available, a layer of clayey-silt underlies the site to a depth of about 5 feet. Beneath this is a layer of sand and gravel which ranges from 2 to 15 feet thick. Below the sand and gravel layer is a silty clay layer to about 70 feet below surface. This layer

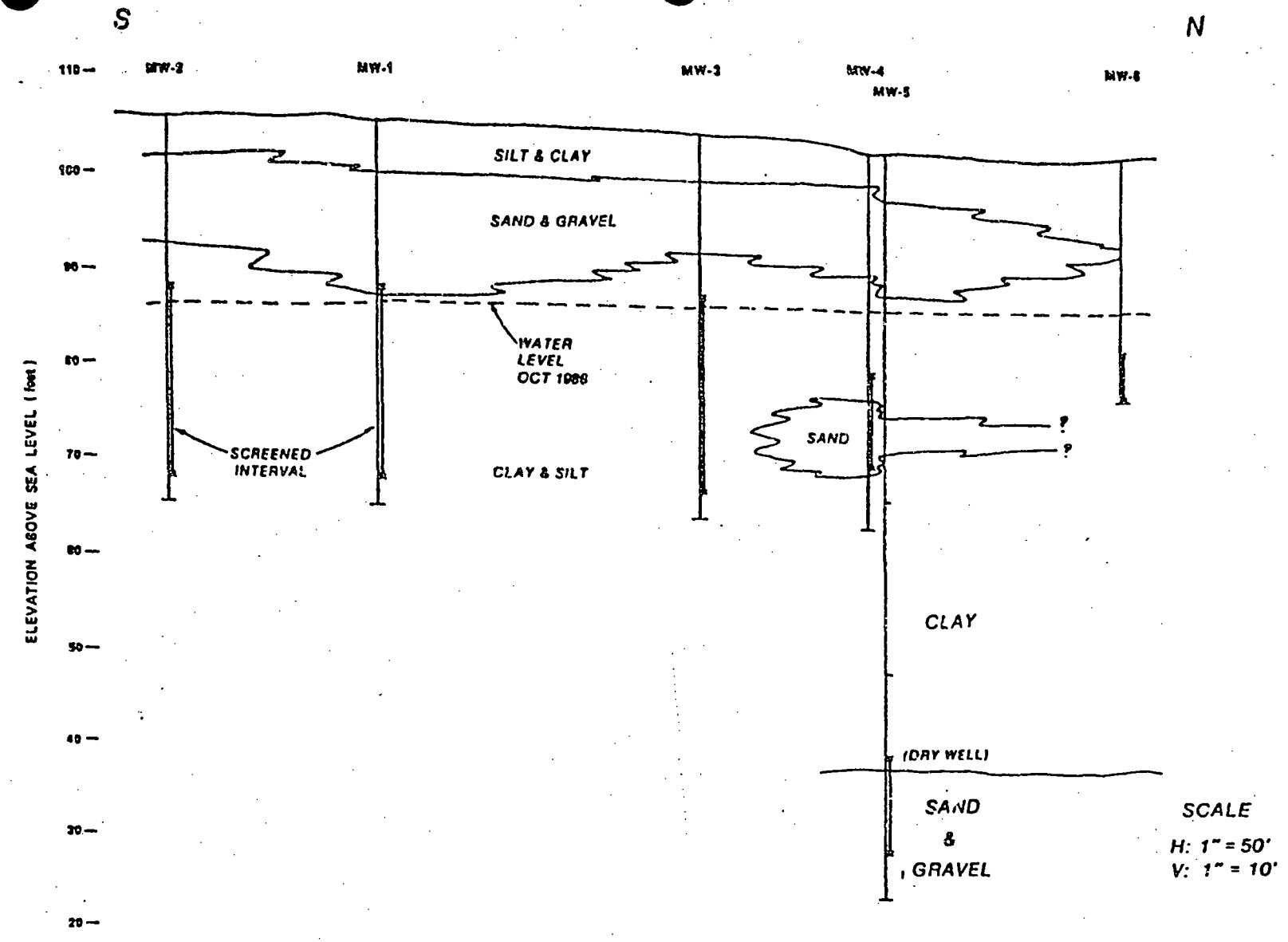


FIGURE 5-1

GENERAL GEOLOGIC CROSS-SECTION (adapted from CH2M Hill PSAR, February 1987) LORENTZ BARREL & DRUM

contains scattered sand lenses which may or may not be connected to the overlying sand. Below the clay layer is another sand and gravel layer approximately 15 feet thick. Well locations used to establish the onsite stratigraphy and groundwater levels are shown in Figure 5-2.

Based on previous sampling by DHS and EPA, there are three aquifers of concern at the site: a potential shallow water table that could be affected by seasonal recharge; a shallow upper aquifer; and a deep aquifer. Each of these three aquifers are described in the following sections.

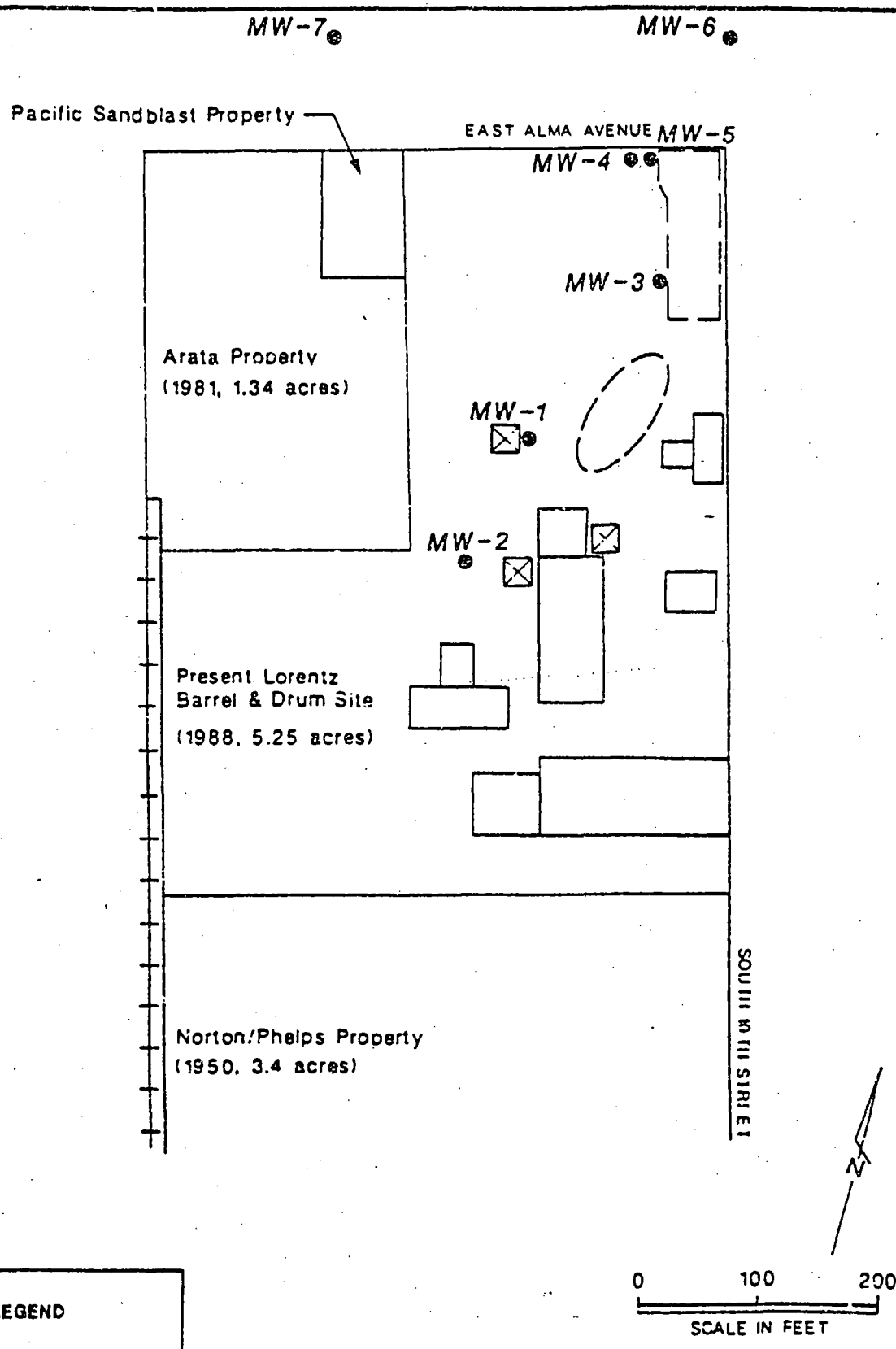
Shallow Water Table

It is possible that a seasonal shallow water table could exist above the silty clay layer. This water table was not found by either DHS or EPA. However, both of those previous sampling events occurred following extended dry periods. It is possible that a seasonal water table could form during the wet season. If so, then it is likely that it would be contaminated. The RI/FS will address this potential seasonal aquifer.

Shallow Upper Aquifer

Data on the shallow upper aquifer are based on two sampling events: one event in October 1986 by DHS; and the second during August 1988 by EPA. The latter sampling followed 2 years of drought. During both events, the groundwater depth was roughly 25 feet below ground surface. This places the groundwater in the silty clay. The shallow groundwater appears to be in a semi-confined aquifer. The August 1988 sampling showed that the potentiometric surface of the groundwater was generally 1 to 5 feet above where the groundwater was first encountered during drilling, indicating that the upper groundwater surface is confined by the silty clay layer. The October 1986 sampling by DHS showed the presence of an unsaturated zone at the 75 foot depth, which is below the shallow upper aquifer. However, the integrity of the well that was used to identify the unsaturated zone has been questioned by State hydrogeologists. The presence of the unsaturated zone below the shallow upper aquifer is therefore not conclusive.

The direction of flow in the shallow upper aquifer is generally northward. However, the flow direction may have changed because of the recent drought. Data collected by DHS in October 1986 indicated a northward flow, with a groundwater gradient of 0.0015 ft/ft. However, data collected by EPA in August 1988 (after 2 years of drought) showed a negligible northward gradient and a slight eastward flow. It is believed



LEGEND

- Monitoring well
- 1987 Excavations
- Existing sump

FIGURE 5-2

FORMER MONITORING WELL LOCATIONS

LORENTZ BARREL & DRUM

that the August 1988 data are strongly affected by the drought, and do not reflect the long-term historical or future groundwater properties.

Slug tests to measure the characteristics of the shallow upper aquifer were conducted by EPA during August 1988. The tests were done using two monitoring wells that had screened sections extending 10 feet into the 30-foot saturated zone of the aquifer. Slug tests are considered to be accurate only to within an order of magnitude. The slug tests indicated an apparent aquifer transmissivity (T) of 0.22 gpm/ft and a storitivity (S) of 0.001. Assuming that the aquifer is homogeneous, the calculated radius of influence for a 5 gpm extraction well would be 50 feet, with a 10 foot drawdown.

Groundwater monitoring by DHS and EPA have shown that the shallow upper aquifer has been contaminated by the LB&D operations. This indicates that the silty clay layer above the shallow upper aquifer has not prevented vertical migration of contaminants. Additional hydrogeological data will be needed to fully design the shallow aquifer extraction system.

Deep Aquifer

Based on data collected by DHS, the LB&D site is underlain by a deep aquifer with an apparent water table roughly at the 100-foot depth. The deep aquifer is used for municipal drinking water supplies. The groundwater flow direction in the deep aquifer is governed by troughs created by municipal well fields. No sampling of the deep aquifer near the LB&D site has yet been conducted. It is therefore not yet known whether the silty clay layer prevents vertical migration of contaminants between the shallow upper aquifer and the deep aquifer. Sampling of the deep aquifer will be conducted in the future RI/FS for the LB&D site.

5.1.3 Soil and Groundwater Contamination

Previous investigations of contamination of soil and groundwater at the LB&D site date back to 1981, as summarized in Table 5-1. Also included in Table 5-1 are dates and locations of soil excavations performed as partial remedial actions. Table 5-2 summarizes the history of previous groundwater investigations done at the site, in terms of dates, contractors, and parameters measured.

5.2 SOURCES OF CONTAMINATION

Residues contained in the used barrels and drums accepted for processing at the site, incineration products of those residues, and other chemicals used to handle, store, or recondition the drums gradually contaminated site soils and groundwater.

TABLE 5-1
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
8-81	DHS	DHS	DHS	25 surface soil samples around site	Metals, Purgeables (EPA 624) Organophosphorus Pesticides (EPA 614) Chlorinated Pesticides/ PCBs (EPA 608)	Cd, Cr, Pb PCBs, DDE	N/A	Toluene, Xylenes, Ethylbenzene, Diazinon, Malathion, Ethion, etc. g-BHC, Heptachlor, Heptachlor Epoxide
9-82 10-82	LB&D	Associated Labs	Associated Labs	35 subsurface soils (A few sediment/liquids from around site)	Metals, Chlorinated Pesticides/PCBs (EPA 608)	Pb, Ni PCBs, DDD, DDE	N/A	Cr DDT
10-83	LB&D	Feuerstein	B&C	18 surface soils along drainage ditch	Chlorinated Pesticides/ PCBs (EPA 608)	PCBs, chlordane, DDD, DDE	N/A	DDT
11-83	LB&D	Geotechnical Consultants for Feuerstein	B&C	Monitoring wells 1 & 2 installed - soils sampled in borewells at 10' depth - groundwater from wells 1 & 2 sampled	Metals, CN^-, Phenols Purgeables (EPA 625) Chlorinated Pesticides/ PCBs (EPA 608) Extractables (EPA 625)	None	As, benzene, chloroform, PCE, TCE, 1,1-DCE	Soil: Various VOCs (TCE, Xylenes, etc.) Various VOCs and semi-VOCs
11-83	LB&D	Feuerstein	N/A	Excavation of soil in & around drainage ditch	Excavation only; no samples taken	N/A	N/A	N/A
1-84	LB&D	Feuerstein	B&C	12 soil samples taken at base of excavation	Chlorinated Pesticides/ PCBs (EPA 608)	PCBs, chlordane, DDD, DDE, DDT	N/A	None

TABLE 5-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
1-84	LB&D	Feuerstein		Further excavation of soil in and around drainage ditch	Excavation only; no samples taken	N/A	N/A	N/A
1-84	LB&D	Feuerstein	B&C	1 soil sample at base of excavation	Chlorinated Pesticides/ PCBs (EPA 608)	None	N/A	None
1-84	LB&D	Geotechnical Consultants for Feuerstein	B&C	Monitoring Well 3 Installed - soil sampled in borehole at 10' depth - groundwater sampled MW-3	Chlorinated Pesticides/ PCBs (EPA 608) Purgeable Halocarbons (EPA 601)	None	PCBs, TCE PCE, 1,1-DCE	Soil: PCBs, PCE Groundwater: 1,1,1-TCA
1-84	LB&D	Feuerstein	B&C	Monitoring wells 1, 2, 3 sampled	Purgeable Halocarbons (EPA 601)	N/A	1,1-DCE, 1, 2-DCE, Dichloro-propane, PCE, TCE	Freon 113, 1,1,1-TCA, 1-DCA
3-85	DHS	DHS	DHS & McKesson	4 surface soils on & offsite	Metals Purgeables Chlorinated Pesticides/ PCBs (EPA 608) Semi-volatiles (EPA 625) Total Hydrocarbons	DDD, DDE, DDT	N/A	PCBs, PCE, Toluene, Ethylbenzene, Xylenes

TABLE 5-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
3-85	LB&D	Feuerstein	N/A	Excavation of soil at 6 locations around	Excavation only; no samples taken	N/A	N/A	N/A
3-85	LB&D	Conservtech	Associated	5 soils at base of excavation	Metals Purgeables (EPA-624) Chlorinated Pesticides/ PCBs (EPA 608)	PCBs	N/A	DDD, DDE, Pb, TCE, PCE
4-85	LB&D	Geotechnical Cons.	Associates Labs	Monitoring wells 4 & 5 installed and sampled	Purgeable Halocarbons (EPA 601) Chlorinated Pesticides/ PCBs (EPA 608) Semi-volatiles (EPA 625)	N/A	1,2-DCE, 1,2-DCA, PCE, TCE	None
4-85	LB&D	Reed	B&C	Monitoring wells 1 & 5 sampled	Purgeables (EPA 624)	N/A	None	Freon 113
5-85	DHS LB&D	DHS Reed	DHS B&C	18 soil samples taken at base of excavation Splits sent to different labs	Pb PCBs	PCBs	N/A	Pb
6-85	LB&D	Reed	N/A	Excavation of soil in Area 3	N/A	N/A	N/A	N/A
6-85	DHS LB&D		DHS B&C	15 soil samples taken around the site, splits sent to different labs	Metals Chlorinated Pesticides/ PCBs (EPA 608) Organophosphorus Pesticides (EPA 614)	Cd, Pb, PCBs, DDE	N/A	Dieldrin, disulfoton, methyl parathion, ethion, azinphos-methyl

TABLE 5-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
6-85	DHS LB&D	DHS Reed	DHS B&C	32 soil samples from area near processing facility; Splits sent to different labs	Chlorinated Pesticides/ PCBs (EPA 608) Extractables (EPA 625) Organophosphorus pesticides (EPA 614) VOA's (EPA 5020-GC/MS)	PCBs	N/A	Parathion
7-85	DHS	DHS	DHS	1 soil sample east of main building	Metals PCBs	PCBs	N/A	None
6-86	LB&D	Reed	TMA (EAL)	Monitoring wells 6 & 7 installed and samples taken from monitoring wells 1, 2, 3, 4, 6, and 7	Purgeable Halocarbons (EPA 601)	N/A	1,2-Dichloro-propane, chlorform, TCE, vinyl chloride, 1,1,1-TCA, 1,1-DCE, 1,2-DCE, PCE, 1,2-DCA, PCE, 1,2-DCA	Chloroethane, 1,1-DCA, Bromodi-chloromethane
10-86	DHS	CH2M Hill	CH2M Hill	Monitoring wells 4 and 6 sampled	Metals Purgeables (EPA 624) Chlorinated Pesticides/ PCBs	N/A	Ba Benzene, vinyl chloride, 1,1-DCE 1,2-DCE 1,2-Dichloro-propane, TCE, 1,1,2,2-PCA chlordane, PCBs	Toxaphene, phthalates
8-87 11-87	DHS	CH2M Hill	TRC	Soil-gas and groundwater study offsite	Volatile organic compounds (TRC, November 1987	N/A	N/A	Offsite plume; TCE, TCA, Freon 113 Vinyl chloride

TABLE 5-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
Mid-87	DHS	Canonie	Canonie & Acurex	Soil sampled in Perimeter & "Hot Spot" areas in northern part of site	Metals VOCs (EPA 624) Semi-VOCs (EPA 625) Organochlorine Pesticides/PCBs (EPA 614)	Cd, Cr, Pb, Ni, PCBs, DDD, DDT, Xylenes, Benzene, Ethybenzene, Toluene	N/A	None
Late 87	DHS	Canonie	N/A	Excavation of soil Drum removal etc.	Excavation only; no samples taken	N/A	N/A	N/A
Early 88	DHS EPA	IT E&E	Curtis & Tomkins	Post excavation soil sampling	Metals, Semi-volatile Organics (EPA 3270) Organochlorine Pesticides/PCBs (EPA 8080) Volatiles (EPA 8240)	PCBs (some samples)	N/A	None
Early 88	EPA Emergency Response Division	EPA/E&E	Curtis & Tomkins	Incinerator ash from barrel on site sampled; more facility cleanup etc. CHIP and SEAL installed on drum storage area	Metals Dioxins and Furans (EPA 8280)	Pb	N/A	High Cr, Ni, Zn Low concentrations of heptachlorodibenzo-p-dioxin, octachlorodibenzo-p-dioxin, octachlorodibenzo furan
6-88	EPA	EBASCO	CLP	Municipal Well sampling (RI/FS)	Semi-Volatile organics (CLP RAS) Pesticide/PCBs (CLP RAS)	Data not received yet	Data not received yet	Data not received yet

TABLE 5-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES TO DATE AT THE LB&D SITE
(August 1981 through July 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
7-88	EPA	EBASCO	Hittman-Ebasco	Groundwater characterization sampling for treatability study (RI/FS)	Metals Semi-volatile organics (EPA 601/602, 624) Organochlorine pesticides/ PCBs (EPA 605/606) Phenols (EPA 606) Phthalate esters (EPA 604) Chemical & Physical Properties (EPA) Dioxins (EPA 8280) modified)	N/A Data not yet received (dioxins)	Vinyl chloride 1,1-DCA; 1,2-DCP; TCE; Benzene; PCE*	Acetone 1,1-DCA; trans-1,2-DCE; 1,1,1-TCA; Toluene; Chlorobenzene; Ethylbenzene*

ABBREVIATIONS:

B&C - Brown and Caldwell
Canonie - Canonie Environmental
CLP - Contract Laboratory Program
DHS - California Department of Health Services
E&E - Ecology & Environment
EBASCO - Ebasco Services, Incorporated
EPA - Environmental Protection Agency
Feuerstein - Feuerstein Associates Consulting Engineers
N/A - Not Applicable
IT - IT Corporation
LB&D - Lorentz Barrel & Drum
McKesson - McKesson Environmental
RAS - Routine Analytical Services
Reed - Reed Corporation
RI/FS - Remedial Investigation/Feasibility Study
TMA - Thermo Analystical, Inc.
TRC - Tracer Research Corporation
* - Results preliminary awaiting validation (Ebasco 1988)

TABLE 5-2

GROUNDWATER ANALYSES

Date Sampled	Client	Sampled By	Analyzed By	Analytical Method	Analyte/Method
11-23-83	LB&D	Feuerstein & Associates	Brown & Caldwell Laboratory	Unknown	Metals, CN, Phenols
				EPA 624	Purgeables/Gas Chromatography-Mass Spectrometry (GC-MS)
				EPA 625	Extractables/CG-MS
01-20-84	LB&D	Feuerstein & Associates	Brown & Caldwell Laboratory	EPA 601	Purgeable Halocarbons/GC
				EPA 608	Chlorinated Pesticides and PCBs/GC
03-02-84	LB&D	Feuerstein & Associates	Brown & Caldwell Laboratory	EPA 601	Purgeable Halocarbons/GC
04-04-85	LB&D	Geotechnical Consultants, Inc.	Associated Laboratories	EPA 601	Purgeables/GC
				EPA 624	Semivolatile Organics/GC-MS
				EPA 608	Chlorinated Pesticides and PCBs/GC
04-29-85	LB&D	Reed Corporation	Brown & Caldwell Laboratory	EPA 624	Purgeables
07-86	LB&D	Reed Corporation	Thermo Analytical, Inc./ Environmental Research Group	EPA 601	Purgeable Halocarbons/GC
10-02-86	DHS	CH2M Hill, Inc.	CH2M Hill Environmental Laboratory	Unknown	Metals
				EPA 624	Purgeables/GC-MS
				EPA 608	Organochlorine Pesticides and PCBs/GC
				EPA 525	Semivolatiles Organics/GC-MS
				Unknown	Minerals
06-30-88	EPA	Ebasco Services, Inc.	Contract Laboratory Program	CLP RAS	Semivolatile organics/GC-MS
				CLP RAS	Chlorinated Pesticides and PCBs/GC
07-16-88	EPA	Ebasco Services, Inc.	Hittman-Ebasco	EPA 608	Pesticides/PCB
				EPA 604	Phenols
				EPA 606	Phthalate Esters
				EPA 601/ 602 & 624	Volatile organics
				EPA 625	Semivolatiles
				EPA 200 Series	Metals
				EPA Various	Chemical & Physical Properties

5.3 NATURE AND EXTENT OF CONTAMINATION IN THE SHALLOW AQUIFER

The shallow groundwater beneath both onsite and offsite areas is contaminated with volatile organic compounds (VOCs), pesticides, polychlorinated biphenyls (PCBs), and some metals.

Table 5-3 summarizes results of groundwater analyses performed to date by various consultants to LB&D. Table 5-4 provides the maximum contamination levels detected for selected contaminants. No remedial actions to date have addressed groundwater contamination. Therefore, all of these data must be considered in assessing site contamination. Results from Tracer Research Corporation (TRC) 1987 study are shown in Table 5-5. The Data Quality Level (DQL) for the previous studies was taken into consideration by the Regional Board (1981-1986) and DHS (1986-1987) in their decisions as lead agencies at LB&D. For this ROD, EPA has determined that the DQL is Level 3, appropriate for preliminary engineering design.

The 1987 TRC study showed a complex pattern of water contamination (Figure 5-3). In addition, the groundwater samples analyzed from well MW-6 indicate that contaminants other than VOCs have migrated offsite. The potential migration of PCBs is of particular concern. PCBs do not migrate readily in groundwater, but they are soluble in organic solvents (e.g., 1,1,1-TCA and TCE) and can be transported along with those solvents. The lack of information about the transport and actual extent of PCB contamination is one of the major data gaps that needs to be filled by collection and laboratory analysis of samples from groundwater monitoring wells before design of the treatment facility can be implemented. Samples collected for treatability studies in summer 1988 did not have measurable levels of PCBs, but further work needs to be done to confirm this.

Other data gaps which will be addressed during the RI/FS before further remedial action evaluation and design are completed include determination of:

- the types of contaminants comprising the plume(s);
- the vertical and horizontal extent and variability of contamination;
- the extent of actual or potential migration pathways, such as potential conduits between aquifers; and
- the potential for vertical migration between aquifers, via either natural or man-made discontinuities.

TABLE 5-3
SUMMARY OF MONITORING WELL DATA
(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-1				MW-2			MW-3			MW-4		MW-4A (a)	MW-4B (a)
	B & C (b) 11/83	3/84	4/85	TMA (c) 7/86	B & C (b) 11/83	3/84	TMA (c) 7/86	B & C (b) 1/84	3/84	TMA (c) 7/86	Associated 4/85	TMA (c) 7/86	CH2M Hill 10/86	CH2M Hill 10/86
METALS (ppb)														
Arsenic	3.0				4.0								---	---
Barium													160.0	160.0
Chromium (total)	0.3				0.1								---	---
Cobalt													60.0	50.0
Molybdenum													---	20.0
Nickel	43.0				33.0								130.0	120.0
Vanadium													30.0	30.0
Zinc	---				---								20.0	20.0
VOLATILE ORGANICS (ppb)														
Benzene	1.0				---								26.0 (d)	26.0 (d)
Chloroethane	---			---	---		---			---	---	24.0	---	---
Chloroform	---			11.0	2.0		1.4			29.0	---	---	---	---
1,1-Dichloroethane	10.0	51.0		11.0	---	---	---		46.0	40.0	---	85.0	38.0 (d)	41.0 (d)
1,2-Dichloroethane	---			---	---		---			18.0	---	58.0	---	---
1,1-Dichloroethene	12.0	9.0		9.0	---	---	---	29.0	47.0	22.0	---	160.0	90.0	97.0
Trans-1,2-Dichloroethene	9.0	10.0		8.4	---	---	---		105.0	91.0	240.0	750.0	430.0	488.0
Methylene Chloride	---			---	---		---			---	---	---	26.0 (d)	---
1,2-Dichloropropene	4.0	3.0		1.7	---	---	---		45.0	60.0	---	170.0	89.0	92.0
Tetrachloroethene	5.0	2.0		(e)	---	---	(e)	17.0	38.0	(e)	---	(e)	---	---
1,1,2,2-Tetrachloroethane	---			3.0(e)	---		---(e)			65.0(e)	---	140.0(e)	91.0	106.0
1,1,1-Trichloroethane	30.0	33.0		34.0	2.0	---	0.36	26.0	34.0	60.0	---	220.0	75.0	83.0
Trichloroethene	59.0	54.0		61.0	---	---	---	640.0	1000.0	950.0	510.0	1100.0	1766.0	2108.0
Vinyl Chloride	---			---	---		---			62.0	---	1100.0	455.0	553.0
Freon 113	30.0	26.0	4.0		7.0	6.0			41.0					
Carbon Disulfide	---				3.0								---	---
Bromodichloromethane	---			---	---		---			1.5	---	---	---	---
Dichlorotrifluoroethane	50.0				6.0									
C6H12 Cyclic Hydrocarbon	5.0													
SEMI-VOLATILE ORGANICS (ppb)														
Di-n-Butyl Phthalate (f)													31.0	24.0
Butylbenzyl Phthalate (f)													---	17.0
Bis(2-Ethyl Hexyl)Phthalate (f)											5100.0		73.0	680.0
Di-n-Octyl Phthalate (f)													---	60.0

(a) Splits of sample collected from MW-4 (10-86)
(b) Brown & Caldwell
(c) Thermo Analytical, Inc.
(d) Indicates an Estimated Trace Value
(e) Co-Eluting Compounds
(f) Phthalates are most probably laboratory contaminants
--- Not Detected
(blank) Not Analyzed

TABLE 5-3 (continued)
SUMMARY OF MONITORING WELL DATA
(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-5		MW-6		MW-7	MW-16	MW-16 (field duplicate)	MW-20
	Associated 4/85	B & C (b) 4/85	TMA (c) 7/86	CH2M Hill 10/86	TMA (c) 7/86	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88
METALS (ppb)								
Arsenic				---		---	---	---
Barium				110.0		141	128	99
Chromium (total)				10.0		1.9	2.4	2.3
Cobalt				20.0		13	15	11
Molybdenum				20.0				
Nickel				60.0		72	71	---
Vanadium				30.0		25	32	25
Zinc				---				
VOLATILE ORGANICS (ppb)								
Benzene				---		8	8	3
Chloroethene	---		---	---	---	---	---	---
Chloroform	---		9.9	---	---	---	0.5	---
1,1-Dichloroethane	---		35.0	18.0 (d)	1.0	14	16	3
1,2-Dichloroethane	4.8		8.5	---	270.0	---	20	---
1,1-Dichloroethene	---		49.0	33.0	1.7	27	29	86
Trans-1,2-Dichloroethene	---		120.0	61.0	---	52	56	14
Methylene Chloride	---		---	---	---	---	---	---
1,2-Dichloropropane	---		23.0	---	---	18	19	1
Tetrachloroethene	23.0		(e)	---	(e)	18	19	---
1,1,2,2-Tetrachloroethane	---		60.0(e)	22.0 (d)	---(e)	---	---	---
1,1,1-Trichloroethane			32.0	14.0 (d)	5.2	11	12	34
Trichloroethene	45.0		770.0	413.0	0.5	300	311	2
Vinyl Chloride	---		510.0	60.0	---	66	72	8
Freon 113		---						
Carbon Disulfide				---		---	---	---
Bromodichloromethane	---		---	---	---	---	---	---
Dichlorotrifluoroethane								
C6H12 Cyclic Hydrocarbon								
SEMI-VOLATILE ORGANICS (ppb)								
Di-n-Butyl Phthalate (f)				113.0		---	---	---
Butylbenzyl Phthalate (f)				32.0		---	---	---
Bis(2-Ethyl Hexyl)Phthalate (f)	---			39.0		---	---	---
Di-n-Octyl Phthalate (f)				---		---	---	---

(a) Splits of sample collected from MW-4 (10-86)
(b) Brown & Caldwell
(c) Thermo Analytical, Inc.
(d) Indicates an Estimated Trace Value
(e) Co-Eluting Compounds
(f) Phthalates are most probably laboratory contaminants
--- Not Detected
(blank) Not Analyzed

TABLE 5-3 (continued)
SUMMARY OF MONITORING WELL DATA
(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-1		MW-2		MW-3		MW-4		MW-4A (a)	MW-4B (a)
	B & C (b) 11/83 3/84 4/85	TMA (c) 7/86	B & C (b) 11/83 3/84	TMA (c) 7/86	B & C (b) 1/84 3/84	TMA (c) 7/86	Associated 4/85	TMA (c) 7/86	CH2M Hill 10/86	CH2M Hill 10/86
EXTRACTABLES (ppb)										
Isophorone	2.0									
Dimethylethoxyethanol	2.0									
>C9 Aldehyde	2.0									
Docosanoic Acid	2.0									
Hexadecanoic Acid	4.0									
C4 Benzoic Acid	2.0									
>C10 Fatty Acid			1.0							
MINERALS (ppm)										
Calcium									97.0	96.0
Magnesium									140.0	140.0
Potassium									0.92	1.0
Sodium									200.0	210.0
Bicarbonate									1293.0	1220.0
Carbonate									---	---
Chloride									79.0	78.0
Nitrate										
Phosphate										
Sulfate									83.8	82.0
Silica									24.0	26.0
CaCO3									24.0	26.0
PESTICIDES (ppb)										
Chlordane	---		---		---		---		0.2	0.1
Toxaphene	---		---		---		---		1.0	2.0
POLYCHLORINATED BYPHENYLS (ppb)										
PCB 1221									2.0	3.0
PCB 1242									1.0	---
PCB 1254									0.4	0.4
PCB 1260					0.36					

(a) Splits of sample collected from MW-4 (10-86)
(b) Brown & Caldwell
(c) Thermo Analytical, Inc.
(d) Indicates an Estimated Trace Value
(e) Co-Eluting Compounds
(f) Phthalates are most probably laboratory contaminants
--- Not Detected
(blank) Not Analyzed

TABLE 5-3 (continued)
SUMMARY OF MONITORING WELL DATA
(units for analysis are specified for each category of analyte in Colum 1.)

Analyte	MW-5		MW-6		MW-7	MW-16	MW-16 (field duplicate)	MW-20
	Associated 4/85	B & C (b) 4/85	TMA (c) 7/86	CH2M Hill 10/86	TMA (c) 7/86	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88
EXTRACTABLES (ppb)								
Isophorone								
Dimethylethoxyethanol								
>C9 Aldehyde								
Docosanoic Acid.								
Hexadecanoic Acid								
C4 Benzoic Acid								
>C10 Fatty Acid								
MINERALS (ppm)								
Calcium				73.0		70	67	123
Magnesium				110.0		123	118	15
Potassium				1.12		---	---	1.8
Sodium				290.0		297	285	659
Bicarbonate				1250.0				
Carbonate				---				
Chloride				55.0				
Nitrate								
Phosphate								
Sulfate				95.0		83	73	253
Silica				24.0				
CaCO3				24.0		613	601	870
PESTICIDES (ppb)								
Chlordane	---			---		---	---	---
Toxaphene	---			---		---	---	---
POLYCHLORINATED BYPHENYLS (ppb)								
PCB 1221				4.0		---	---	---
PCB 1242				---		---	---	---
PCB 1254				0.2		---	---	---
PCB 1260						---	---	---

(a) Splits of sample collected from MW-4 (10-86)
(b) Brown & Caldwell
(c) Thermo Analytical, Inc.
(d) Indicates an Estimated Trace Value
(e) Co-Eluting Compounds
(f) Phthalates are most probably laboratory contaminants
--- Not Detected
(blank) Not Analyzed

TABLE 5-4
MAXIMUM GROUNDWATER CONTAMINATION LEVELS
DETECTED AT LORENTZ BARREL AND DRUM SITE+

Analyte	DHS Action Criteria References[a,b] (ppb)	Highest Level Detected[a] (ppb)	Date
METALS			
Arsenic	0.002 (2)	4.00*	11/83
Barium	10.00 (3)	160.00*	10/86
Chromium (total)	51.00 (3)	10.00	10/86
Cobalt		60.00	10/86
Molybdenum		20.00	10/86
Nickel	150.00 (1)	130.00	10/86
Vanadium		30.00	10/86
Zinc	7,400 (3)	20.00	10/86
VOLATILE ORGANICS			
Benzene	0.70 (1,4)	26.00*	10/86
Chloroethane		24.00	07/86
Chloroform	0.50 (3)	29.00*	07/86
1,1-Dichloroethane	4,000.00 (3)	05.00	07/86
1,2-Dichloroethane	0.51 (3)	270.00*	07/86
1,1-Dichloroethene	LOQ (4)	160.00*	07/86
trans-1,2-Dichloroethene	70.00 (1)	750.00*	07/86
Dichloromethane	10.00 (4)	26.00*	10/86
1,2-Dichloropropane	10.00 (4)	170.00*	07/86
Tetrachloroethene	0.87 (3)	140.00*[c]	07/86
1,1,2,2-tetrachloroethane	0.17 (3)	106.00*	10/86
1,1,1-Trichloroethane	200.00 (4)	220.00*	07/86
Trichloroethene	1.80 (3)	2,108.00*	10/86
Vinyl Chloride	0.015 (3)	1,100.00*	07/86
Freon 113		41.00	03/84
PESTICIDES			
Chlordane	0.05 (4)	0.20*	10/86
Toxaphene	35.00 (2)	2.00	10/86
POLYCHLORINATED BIPHENYLS			
PCBs	0.008 (3)	6.40*	10/86

a Concentrations are shown in parts per billion (ppb) unless otherwise indicated.

b DHS Action Criteria are as defined in a March 17, 1986, memorandum from David J. Leu, Ph.D., DHS's Chief of Alternative Technology and Policy Development Section, Toxic Substances Control Division, to all Section Chiefs in DHS's Toxic Substance Control Division. Reference numbers are shown in parentheses and indicate the source of each criterion. These sources are listed in the Reference section following this table.

c 140.00 ppb is the sum of PCE and 1,1,2,2-tetrachloroethane concentrations.

NOTES: DHS = Department of Health Services
LOQ = Limit of Quantification
* = exceeds DHS Action Criterion

1. Draft Health Advisories. Office of Drinking Water. U.S. Environmental Protection Agency. Washington, D.C. September 30, 1985

2. Ambient Water Quality Criteria Documents. Office of Water Regulations and Standards. U.S. Environmental Protection Agency, Washington, D.C. October 1980. (Values adjusted for drinking water.)

3. Draft Health Effects Assessment Documents Office of Emergency and Remedial Response Office of Environmental Criteria and Assessment U.S. Environmental Protection Agency Cincinnati, Ohio. September 1984.

4. Sanitary Engineering Branch California Department of Health Services Berkeley, California. 1985

+ CH2M Hill. February 1987. Preliminary Site Assessment Report. Lorentz Barrel & Drum (LB&D). Prepared for California Department of Health Services (DHS).

TABLE 5-5

ANALYTICAL RESULTS OF GROUNDWATER
(Tracer Research Corporation, Groundwater Investigation at Lorentz Barrel & Drum, November 1987)

SAMPLE	DEPTH (feet)	DATE	FREON 113	TRICHLOROETHANE	TRICHLOROETHENE	PERCHLOROETHENE	CIS-1,2-DICHLOROETHENE	VINYL CHLORIDE	TOTAL HYDROCARBONS (w/out Methane)
W2	27	11/18	22	90	2600	11	<3	520	560
W3	27	11/18	3	5	54	0.2	<3	<0.2	8
W4	20	11/19	<0.3	28	30	0.1	<17	<0.2	14
W5	20	11/19	<0.02	60	<0.02	<0.004	<3	<0.2	66
W6	26	11/19	<0.02	53	3	<0.004	<3	<0.2	27
W7	26	11/19	<0.02	7	<0.02	<0.004	<3	<0.2	<7
W8	20	11/19	<0.02	68	1	<0.004	<3	110	750
W9	26	11/19	<0.02	14	<0.02	<0.004	<3	<0.2	<7
W10	26	11/19	<0.02	<0.008	<0.02	<0.004	<3	<0.2	<7
W11	26	11/19	<0.02	4	<0.02	<0.004	<3	<0.2	<7
W12	26	11/19	<0.02	64	<0.02	<0.004	<3	<0.2	38
W13	26	11/19	<0.02	60	<0.02	<0.004	<3	<0.2	12
W14	25	11/20	<0.02	20	<0.02	<0.004	<3	<0.2	8
W15	26	11/20	<0.02	69	<0.02	<0.004	<3	<0.2	14
W16	24	11/30	<0.02	62	0.8	0.1	<4	<0.2	9
W18	25	11/30	0.2	33	<0.02	<0.05	<4	<0.2	<9
W19	26	11/30	<0.02	<0.009	<0.02	<0.005	<4	<0.2	<9
W20	26	11/30	<0.03	0.03	<0.02	<0.006	<4	<0.2	<14

All results in parts per billion (ppb).

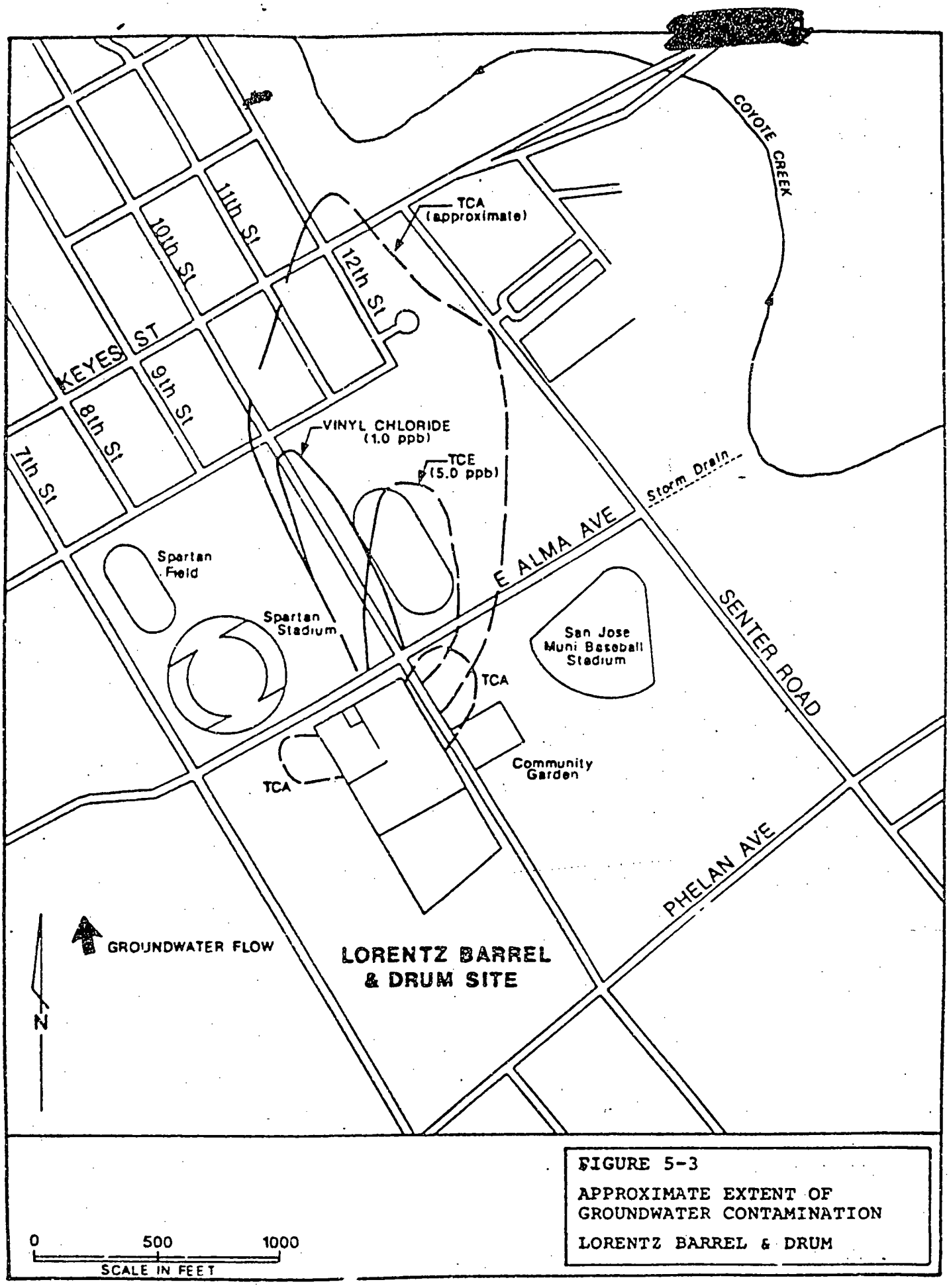


FIGURE 5-3

APPROXIMATE EXTENT OF GROUNDWATER CONTAMINATION

LORENTZ BARREL & DRUM

5.4 HUMAN AND ENVIRONMENTAL EXPOSURE PATHWAYS

Potential exposure pathways for VOCs are ingestion, dermal contact, and inhalation of vapors from contaminated groundwater, as well as accidental dermal exposure or ingestion of Coyote Creek water. Potential exposure pathways for metals are ingestion of contaminated groundwater and dermal contact with Coyote Creek sediments and exposed surface soils. Potential exposure pathways for PCBs consist of ingestion and dermal contact from contaminated groundwater and soil.

6.0 SUMMARY OF SITE RISKS

A screening-level health risk assessment was conducted to evaluate potential health risks related to remediation of the LB&D site by groundwater treatment alternatives described in Engineering Evaluation and Cost Analysis (EE/CA) (Ebasco, May 1988). Since the groundwater treatment system is designed to remediate groundwater contamination only, the scope of this assessment focused on drinking water-related health risks as the primary exposure route. However, since one of the treatment alternatives also involved air emissions of the extracted contaminants, the additional health risks associated with these emissions were also evaluated. Because this is a screening-level assessment, adverse health impacts were quantified only in terms of increased risk of cancer. A much more comprehensive analysis of health risks at the LB&D site, including all relevant exposure pathways and an evaluation of noncarcinogenic health risks, will be included in the Remedial Investigation/Feasibility Study (RI/FS) risk assessment.

6.1 CONTAMINANTS OF CONCERN

Contaminants included in the assessment (i.e., contaminants of concern) consisted of all groundwater contaminants identified at or near the LB&D site for which the United States Environmental Protection Agency (EPA) has developed a cancer potency estimate. All such contaminants were assumed to be carcinogens and were included in the analysis regardless of frequency of detection or magnitude of concentration. Exceptions to this rule included phthalates, dichloromethane, cadmium, and chromium. Analytical data for phthalates and dichloromethane contaminants strongly suggested that detection of these contaminants was due to laboratory contamination, therefore these contaminants were not included in the analysis. Cadmium and chromium were also excluded since these compounds are not considered by EPA to be carcinogenic via the oral route of exposure. A complete list of the contaminants included in the analysis, along with the maximum and average concentrations observed at the LB&D site, is provided in Table 6-1.

6.2 EXPOSURE ASSESSMENT

The potential exposure pathways associated with contamination of the shallow groundwater are illustrated in Figure 6-1. Figure 6-1 includes all pathways of potential significance. However, since this was a screening-level assessment, only the most significant exposure pathways were quantitatively evaluated. These pathways were considered to be drinking water and inhalation (air stripper emissions only). Quantitative evaluation of all other pathways will be included in the RI/FS risk assessment.

TABLE 6-1

CONTAMINANTS OF CONCERN IN THE SHALLOW GROUNDWATER AT LORENTZ BARREL & DRUM

	Maximum Concentrations Found (ug/l)[1]	Estimated Average Concentration In The Plume (ug/l)	Expected NPDES Discharge Limits (ug/l)[2]
1,1 Dichloroethene	160	26	5
1,1,2,2 Tetrachloroethane	106	28	5
1,2 Dichloroethane	270	16	1
Arsenic	4.0	0.2	20
Benzene	26	6.2	0.5
Chlordane	0.2	0.01	0.014
Chloroform	29	8.0	5
PCBs (total)	6.4	0.31	0.065
Tetrachloroethene	140	17	5
Toxaphene	2.0	0.10	0.24
Trichloroethene	2,108	651	5
Vinyl chloride	1,100	155	2

[1] Source: CH2M Hill, February 1987, Preliminary Site Assessment Report, Lorentz Barrel & Drum

[2] Source: California Regional Water Quality Control Board, San Francisco Bay Region, Basin Plan Review, November 1986

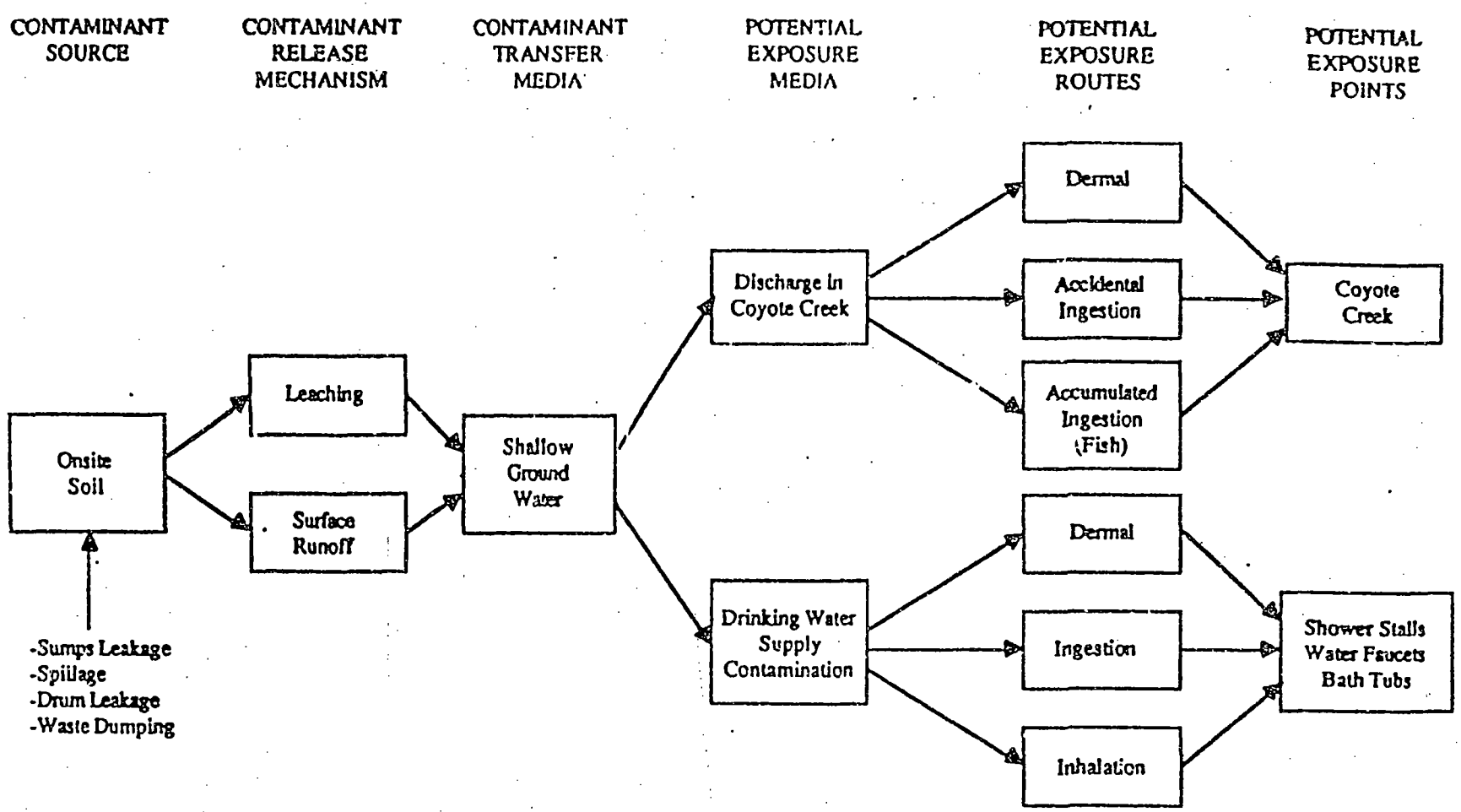


FIGURE 6-1
CONCEPTUAL EXPOSURE MODEL - SHALLOW GROUNDWATER CONTAMINATION
LORENTZ BARREL & DRUM

Although the shallow groundwater is not currently being utilized as a drinking water source, the drinking water pathway was considered important based on the concern that the shallow groundwater may have a hydraulic connection with the deep aquifer. The deep aquifer is currently an important source of drinking water in the region. The significance of this concern will be clarified as a result of extensive RI studies currently being performed.

6.3 RISK CHARACTERIZATION

Daily drinking water doses of carcinogens, EPA cancer potency estimates, and lifetime cancer risk estimates for each of the groundwater carcinogens are listed in Table 6-2. Human daily contaminant doses associated with the consumption of two liters per day of untreated shallow LB&D groundwater for a lifetime were calculated using the maximum groundwater concentrations reported for each of the carcinogens. An average adult human body weight of 70 kg was also assumed in making the dose calculation. Lifetime cancer risk was calculated by multiplying the daily dose of each carcinogen by the cancer potency estimate. The total cancer risk due to consumption of untreated drinking water was calculated to be 8.1×10^{-2}, with most of the cancer risk attributable to vinyl chloride.

One of the groundwater treatment alternatives (Alternative C) discussed in the EE/CA (Ebasco, May 1988) utilizes an air stripping tower to volatilize organic contaminants from the extracted groundwater. Use of the air stripper without a hazardous substance control device for air emissions could result in atmospheric emissions of chlorinated hydrocarbons, the significance of which would be a function of concentration and dispersion. Daily doses of carcinogens associated with the inhalation of air stripper emissions, along with lifetime cancer risk estimates, are listed for all volatile carcinogens in Table 6-3. Inhalation doses were estimated assuming a daily inhalation rate of 20 m^3/day, an inhalation absorption efficiency of 100 percent, and a 70 kg body weight. Annual-average air concentrations of the contaminants were estimated as described in Section 5.4.3 of the EE/CA. The calculated total cancer risk associated with the uncontrolled air stripper emissions is 2.8×10^{-6}. The calculated cancer risk exceeds the allowable 1×10^{-6} value for uncontrolled sources, which is established by the Bay Area Air Quality Management District (BAAQMD). This indicates that BAAQMD would require that a control device be installed to reduce the compound emission rate.

TABLE 6-2

CANCER RISK FROM GROUNDWATER INGESTION: WORST CASE SCENARIO

Compound	Maximum Detected Groundwater Concentration[1] (ug/l)	Estimated Dose* (mg/kg/day)	Cancer Potency (risk/mg/kg/day)	Estimated Risk Level
1,1-Dichloroethene	160	4.58×10^{-3}	5.80×10^{-1}	2.66×10^{-3}
1,1,2,2-Tetrachloroethane	106	4.00×10^{-3}	2.00×10^{-1}	8.00×10^{-4}
1,2-Dichloroethane	270	7.72×10^{-3}	9.10×10^{-2}	7.02×10^{-4}
Arsenic**	4.0	1.14×10^{-4}	1.5×10^{-1}	1.71×10^{-5}
Benzene	26	7.43×10^{-4}	2.90×10^{-2}	2.15×10^{-5}
Chlordane	0.2	5.72×10^{-6}	1.61×10^{0}	9.21×10^{-6}
Chloroform	29	8.29×10^{-4}	8.10×10^{-2}	6.71×10^{-5}
PCBs**	6.4	1.83×10^{-4}	7.7×10^{0}	1.41×10^{-3}
Tetrachloroethene	140	4.00×10^{-3}	5.10×10^{-2}	2.04×10^{-4}
Toxaphene	2.0	5.71×10^{-5}	1.10×10^{0}	6.28×10^{-5}
Trichloroethene	2108	6.03×10^{-2}	1.10×10^{-2}	6.63×10^{-4}
Vinyl Chloride	1100	3.15×10^{-2}	2.30×10^{0}	7.24×10^{-2}
			Total Risk =	8.07×10^{-2}**

1 Based on highest levels detected in site monitoring wells.

* Dose calculation assumes 2 liters of water consumed daily and a 70 kg body weight consistent with standard United States Environmental Protection Agency (EPA) risk assessment assumptions.

** These are different from the Engineering Evaluation and Cost Analysis (EE/CA) (Ebasco, May 1988) Table 5-1 based on recent EPA revisions to cancer potency estimates.

TABLE 6-3

INHALATION DOSES, CANCER POTENCY ESTIMATES, AND LIFETIME CANCER RISK FOR UNCONTROLLED AIR STRIPPER EMISSIONS

Compound	Inhalation Dose (mg/kg/day)	Cancer Potency Estimate (risk/mg/kg/day)	Incremental Lifetime Cancer Risk[a]
Chloroform	5.0×10^{-7}	8.10E-02	4.1×10^{-8}
1,2-Dichloroethane	1.0×10^{-6}	3.50E-02	3.5×10^{-8}
1,1-Dichloroethene	1.6×10^{-6}	1.16E+00	1.9×10^{-6}
Tetrachloroethene	1.1×10^{-7}	1.70E-03	1.8×10^{-9}
1,1,2,2-Tetrachloroethane	1.8×10^{-6}	2.00E-01	3.5×10^{-7}
Trichloroethene	4.1×10^{-5}	2.50E-02	1.9×10^{-7}
Vinyl Chloride	9.7×10^{-6}	2.50E-02	2.4×10^{-7}
Total Inhalation Risk			2.8×10^{-6}

[a] lifetime cancer risk=cancer potency estimate x inhalation dose

7.0 DOCUMENTATION OF SIGNIFICANT CHANGES

There have been no significant changes in the alternatives considered since the release of the Engineering Evaluation/Cost Analysis (EE/CA) (Ebasco, May 1988).

8.0 DESCRIPTION OF SHALLOW AQUIFER TREATMENT AND DISPOSAL ALTERNATIVES

8.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(d) of the Superfund Amendment and Reauthorization Act of 1986 (SARA) requires the consideration of Applicable or Relevant and Appropriate Requirements (ARARs) of environmental laws, ordinances, regulations, and statutes in remedial actions. In addition, SARA requires consideration of other pertinent criteria and advisories that are not yet promulgated. For the Lorentz Barrel & Drum (LB&D) site, ARARs were used to examine the existing situation, possible remedial actions, and potential impacts.

The United States Environmental Protection Agency (EPA) "Interim Guidance on Compliance with ARARs" identifies three separate categories of ARARs:

- ambient or chemical-specific requirements that set health or risk-based concentration limits or ranges for specific chemicals (e.g., Safe Drinking Water Act Maximum Contaminant Levels);
- performance-, design-, or action-specific requirements that regulate particular activities (e.g., the Clean Water Act Pretreatment Standards of Discharge to Publicly-Owned Treatment Works (POTW)); and
- location-specific requirements (e.g., POTW discharge requirements).

Table 8-1 identifies those Federal, State of California, and local regulatory, advisory, and action levels applicable to the groundwater at the LB&D site. The following presents guidelines related to discharge of liquid and gaseous effluents:

- the guidelines on discharge of liquid effluents to surface water bodies are provided in the Basin Plan prepared by the California Regional Water Quality Control Board (CRWQCB). The LB&D discharges to surface waters must satisfy National Pollution Discharge Elimination System (NPDES) discharge requirements. The discharge of water extracted from the shallow aquifer at the LB&D site to the Coyote Creek via a storm drain will require satisfaction of NPDES requirements;

TABLE 5-1

FEDERAL AND STATE OF CALIFORNIA REGULATORY, ADVISORY, AND ACTION LEVELS FOR ANALYTES IN GROUNDWATER

ANALYTE	HIGHEST LEVEL DETECTED IN GROUNDWATER AT THE LBSD SITE ppb (a)	HIGHEST LEVEL DETECTED OFFSITE ppb (b)	EPA MAXIMUM CONTAMINANT LEVEL (c) ppb	EPA MAXIMUM CONTAMINANT LEVEL GOALS (d) ppb	CA DHS DRINKING WATER ACTION LEVELS (e) ppb	NPDES DISCHARGE LIMITS (f) ppb	POTW WASTE DISCHARGE REQUIREMENTS (g) ppb	HEALTH ADVISORIES (h) ACUTE 1 DAY (EXCEPT WHERE NOTED) ppb	HEALTH ADVISORIES (h) CHRONIC NON-CANCER ppb	HEALTH ADVISORIES (h) CHRONIC CANCER ppb/70kg	EPA NAWQC (i) NON-CANCER ppb	EPA NAWQC (i) CANCER ppb
METALS												
Arsenic	4.0		50	50		20	1000	50				0.0022
Barium	160.0		1000	1500			500		1500		2000	
Chromium (total)	10.0		50	120		11	1000	1400 (10 DAY)	120		500	
Cobalt	60.0											
Molybdenum	20.0											
Nickel	130.0					7.1(m)	2600	1000 (10 day)	150		4770	
Vanadium	30.0											
Zinc	20.0					58	2600					
VOLATILE ORGANICS												
Benzene	26.0 (l)		5	0	0.70	5		233	N/A	0.35		0.66
Chloroethane	24.0					5	10.0 (j)					
Chloroform	29.0		100			5	10.0 (j)					[illegible]9
1,1-Dichloroethane	85.0				20	5	10.0 (j)					
1,2-Dichloroethane	270.0		5	0		1	10.0 (j)	740		0.95		0.94
1,1-Dichloroethene	160.0		7	7	6.0	5	10.0 (j)	2000 (k)	7			0.033
Trans-1,2-Dichloroethene	750,0			70		5	10.0 (j)	20,000	70			
1,2-Dichloropropane	170.0			6		5		90 (10 day)		0.56		
Tetrachloroethene	140.0	11.0		0	4.0	5	10.0 (j)	34000 (10 day) (k)	1940 (k)	0.7		0.8

(a) Chemical data from monitoring well sampling on and nearby offsite (see Table 5-4).
(b) Chemical data from Tracer Research mobile lab study offsite.
(c) US EPA Maximum Contaminant Limit (MCL): 50 CFR 46902; November 13, 1985.
(d) US EPA Proposed MCLG: 50 CFR 46936; November 13, 1985.
(e) Drinking water action levels recommended by the California Department of Health Services, October 1987.
(f) Effluent limitations for discharges to surface waters recommended by California Regional Water Quality Control Board in the Basin Plan, November 1986, which is currently being revised. Depending on site-specific factors, best available technology (BAT) may be required to further reduce concentrations in the discharge.
(g) Industrial Waste Discharge Regulations for that Area Tributary to San Jose-Santa Clara Water Pollution Control Plant, November 1986.
(h) Drinking Water Health Advisories from US EPA Office of Drinking Water Quality. Subject to Change.
(i) NAWQC: National Ambient Water Quality Criteria US EPA 440/5-86-001, May 1986.
(j) Publicly-Owned Treatment Works (POTW) Discharge Limit on Total Chlorinated Organics is 10 ppb.
(k) Draft US EPA Health Advisory.
(l) Estimated trace value.
(m) Interim limit only. Final limit to be established based on future bioassays of LBSD treated effluent.
Blank Space: No existing requirement.

NOTE: Phthalates and dichloromethane were omitted from this table due to unreliability of supporting data. (They appear to be laboratory or field contaminants.)

TABLE 8-1

FEDERAL AND STATE OF CALIFORNIA REGULATORY, ADVISORY, AND ACTION LEVELS FOR ANALYTES IN GROUNDWATER (continued)

ANALYTE	HIGHEST LEVEL DETECTED IN GROUNDWATER AT THE LBAD SITE ppb (a)	HIGHEST LEVEL DETECTED OFFSITE ppb (b)	EPA MAXIMUM CONTAMINANT LEVEL (c) ppb	EPA MAXIMUM CONTAMINANT LEVEL GOALS (d) ppb	CA DHS DRINKING WATER ACTION LEVELS (e) ppb	NPDES DISCHARGE LIMITS (f) ppb	POTW WASTE DISCHARGE REQUIREMENTS (g) ppb	HEALTH ADVISORIES (h) ACUTE 1 DAY (EXCEPT WHERE NOTED) ppb	HEALTH ADVISORIES (h) CHRONIC NON-CANCER ppb	HEALTH ADVISORIES (h) CHRONIC CANCER ppb/70kg	EPA NAWQC (i) NON-CANCER ppb	EPA NAWQC (i) CANCER ppb
VOLATILE ORGANICS (continued)												
1,1,2,2-Tetrachloroethane	140.0					5						0.17
1,1,1-Trichloroethane	220.0	90.0	200	200	200	5	10.0 (j)	140000 (k)	200		18400	2.7
Trichloroethene	2108.0	2600.0	5	0	5.00	5	10.0 (j)			2.8		2.7
Vinyl Chloride	1100.0	520.0	2	0	2.00	2	10.0 (j)	2600 (10 day)		0.015		2.0
Freon 113	41.0	22.0			18000	5	10.0 (j)					
PESTICIDES												
Chlordane	0.2			0	0.055	B.D.(m)	10.0 (j)	63		0.0218	0.0043	0.00046
Toxaphene	2.0		5	0		B.D.	10.0 (j)	500		0.031	0.0002	0.00071
POLYCHLORINATED BIPHENYLS												
PCBs	6.4			0		B.D.	10.0 (l)				0.014	0.000079

(a) Chemical data from monitoring well sampling on and nearby offsite (see Table 5-4).
(b) Chemical data from Tracer Research mobile lab study offsite.
(c) US EPA Maximum Contaminant Limit (MCL): 50 CFR 46902; November 13, 1985.
(d) US EPA Proposed MCLG: 50 CFR 46936; November 13, 1985.
(e) Drinking water action levels recommended by the California Department of Health Services, October 1987.
(f) Effluent limitations for discharges to surface waters recommended by California Regional Water Quality Control Board in the Basin Plan, November 1986, which is currently being revised. Depending on site-specific factors, best available technology (BAT) may be required to further reduce concentrations in the discharge.
(g) Industrial Waste Discharge Regulations for that Area Tributary to San Jose-Santa Clara Water Pollution Control Plant, November 1985.
(h) Drinking Water Health Advisories from US EPA Office of Drinking Water Quality. Subject to Change.
(i) NAWQC: National Ambient Water Quality Criteria US EPA 440/5-86-001, May 1986. (10-4 cancer risk levels)
(j) Publicly-Owned Treatment Works (POTW) Discharge Limit on Total Chlorinated Organics is 10 ppb.
(k) Draft US EPA Health Advisory.
(l) Estimated trace value.
(m) Below detection
Blank Space: No existing requirement.

NOTE: Phthalates and dichloromethane were omitted from this table due to unreliability of supporting data. (They appear to be laboratory or field contaminants.)

- reinjection of water into an aquifer is controlled by CRWQCB and the provisions of the Safe Drinking Water Act which require that the quality of water should at least meet the drinking water standards prescribed by EPA and California Department of Health Services (DHS). In addition, the best available technology must be used for treatment of water prior to reinjection;

- the discharge of treated groundwater to POTW from the LB&D site is prohibited by San Jose Municipal Code Ordinance #20710, Title 15, Section 15.12.200; and

- the discharge of volatile organic compounds (VOCs) into the atmosphere is controlled by the Bay Area Air Quality Management District (BAAQMD). The releases from the air stripper at the LB&D site will be subject to toxic risk assessment as required by the Air Pollution Control Officer's proposed Guidelines for Risk Screening and Risk Management. The LB&D air stripper would have to satisfy the BAAQMD licensing requirements.

8.2 TREATMENT TECHNOLOGIES

Four alternatives were evaluated in detail in the Engineering Evaluation and Cost Analysis (EE/CA) (Ebasco, May 1988):

Alternative A: No Action (Periodic Groundwater Monitoring);

Alternative B: Groundwater Extraction; Granular Activated Carbon (GAC) Treatment; Disposal of Groundwater to Storm Sewer;

Alternative C: Groundwater Extraction; GAC Guard Bed for PCB Removal; Air Stripping; Fume Incineration or GAC Vapor Control; GAC Polishing Bed; Disposal of Treated Groundwater to Storm Sewer; and

Alternative D: Groundwater Extraction; Ozone-Ultraviolet (ozone-UV); GAC Polishing Bed; Disposal of Groundwater to Storm Sewer.

The primary treatment technologies were chosen on the basis of removal of organics, to the cleanup objective levels given in Table 8-2. Subsequent to the May 1988 EE/CA, and performance of treatability studies and additional groundwater analyses, it was felt that nickel removal may have to be considered in order to attain present NPDES effluent limitations. Therefore, Ebasco has included an example of the type of treatment which

TABLE 8-2
SHALLOW GROUNDWATER CLEANUP OBJECTIVES

Compound	Estimated Contaminant Concentrations In Extracted Groundwater (ug/l)	Expected NPDES Discharge Limit (ug/l)	Federal MCLs (ug/l)	Desired Treated Effluent Level (ug/l)
1,2 Dichloropropane	25	5	NP	5
Trichloroethane	42	5	NP	5
Chloroform	8.0	5	NP	5
1,2-Dichloroethane	16	1	5	1
1,1-Dichloroethene	26	5	7	5
Tetrachloroethene	17	5	NP	5
1,1,2,2-Tetrachloroethane	28	5	NP	5
Trichloroethene	651	5	NP	5
Vinyl Chloride	155	2	2	1
Benzene	6.2	5	5	5
PCBs (Total)	0.31	0.065	0	0.065(1)
Chlordane	0.01	0.014	NP	0.014
Toxaphene	0.1	0.24	5	0.24
Arsenic	0.2	20	50	0.23
Barium	120	NP	1000	N/A
Chromium (Total)	3.0	11	50 (Cr +6)	N/A
Zinc	5.0	58	NP	N/A
Cobalt	13	NP	NP	N/A
Nickel	36	7.1*	NP	7.1*
<u>Minerals (ppm)</u>:				
Calcium		97		
Magnesium		140		
Potassium		1		
Sodium		210		
Bicarbonate		1,293		
Chloride		79		
Sulfate		84		
Silica		26		
pH		7.0		

* = Interim limit only. Final limit to be established based on future bioassays of LB&D treated effluent.
NP = No limit has been promulgated for this compound.
(1) = 0.065 ug/l is the method detection limit for aroclor 1242 only. The number 0.065 used in this table is meant to represent the detection limits of all the PCB aroclors combined.

could be utilized for nickel treatment, in conjunction with Alternatives B, C, and D. The need to actually utilize such technology however is pending final determination of an appropriate NPDES Permit effluent limitation for nickel. Determination of this effluent limitation will include: an evaluation of whether the source is controlled to the maximum extent feasible; an analysis of the costs and benefits of reducing (treating) nickel concentrations to (as low as) 7.1 ppb; and an assessment of effluent toxicity to fish and/or invertebrates using bioassay procedures to be prescribed by the Regional Water Quality Control Board in conjunction with EPA.

In this section, conceptual designs and order-of-magnitude (-30%, +50%) cost estimates are given for each alternative. For purposes of comparison, cost estimates include potential removal of nickel by the candidate treatment technologies described. Further, they are based on an assumed groundwater flow rate of 100 gallons per minute (gpm). Results of EPA's ongoing RI, which includes aquifer pump tests, will provide the data needed to make an accurate and precise determination of extraction rates prior to final design of the system.

8.2.1 Alternative A: No Action (Periodic Groundwater Monitoring)

The "no action" alternative would require that no remedial or removal actions take place at this time. Adoption of this alternative will require monitoring of plume migration.

Based on the calculations shown in Table 6-2, the "No Action" Alternative would fail to reduce the existing public health risks. However, the ongoing monitoring programs that are included in the "No Action" Alternative would provide an early warning if the drinking water aquifer became contaminated.

8.2.2 Groundwater Extraction System

As discussed in Section 5.0, the level of current information precludes a detailed design for the groundwater extraction system at this time. The design of the system will be provided in more detail after the field activities associated with the RI are performed in October and November 1988. Final design of the entire system will await the initial installation of several of the extraction wells. Nevertheless, for the purposes of the EE/CA, a conceptual design had to be selected to establish a baseline and estimate costs. The extraction well system conceptualized for such purposes is shown on Figure 8-1.

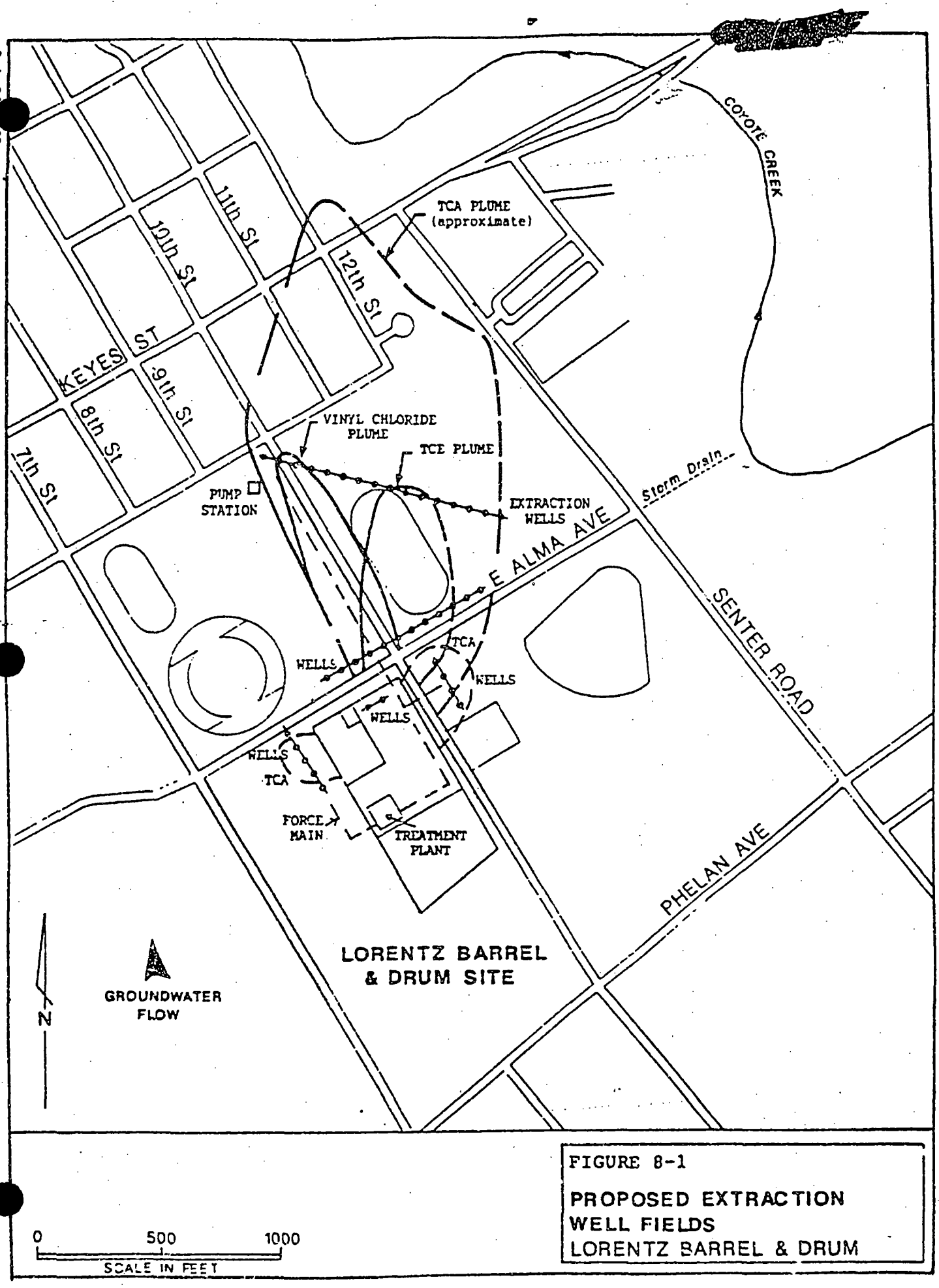


FIGURE 8-1

PROPOSED EXTRACTION
WELL FIELDS
LORENTZ BARREL & DRUM

The system is designed to prevent the existing plumes from migrating further, and to remove the existing contaminated groundwater so it can be treated. To accomplish this, lines of wells were considered: a pair of wells at the northeast corner of the site, where groundwater contamination is known to be the highest; two principal lines of wells, one at the northern end of the TCE/vinyl chloride plume, and the other along East Alma Avenue; and two 200-foot-wide lines of wells at the downgradient ends of the two smaller side plumes. The treatment facility will be located on the LB&D site itself.

Order-of-magnitude (-30%, +50%) capital costs for the groundwater extraction system have been estimated at $803,000.

8.2.3 Alternative B: Groundwater Removal, GAC Treatment, Nickel Removal, Disposal to Storm Sewer

As shown in Figure 8-2, this treatment alternative consists of the following series of processes:

- a groundwater interception system identical to that described in Section 8.2.2;
- ion exchange water softening to prevent scale formation. The spent resin is regenerated daily using dilute brine. The spent brine is not a RCRA waste, but will be disposed of appropriately;
- a GAC guard bed to remove PCBs and pesticides. The spent GAC from the guard bed is shipped to offsite incineration facilities;
- a GAC main bed for VOC removal. The spent GAC from the main bed is shipped offsite for regeneration once per year; and
- if necessary, an ion-exchange column for nickel removal. The spent resin is regenerated onsite using dilute acid. The spent regenerant solution is shipped offsite for recycling and disposal at a licensed hazardous waste disposal facility.

For this analysis, the influent flow rate is assumed to be 100 gpm. Approximately fifty-two million gallons per year of groundwater would be treated.

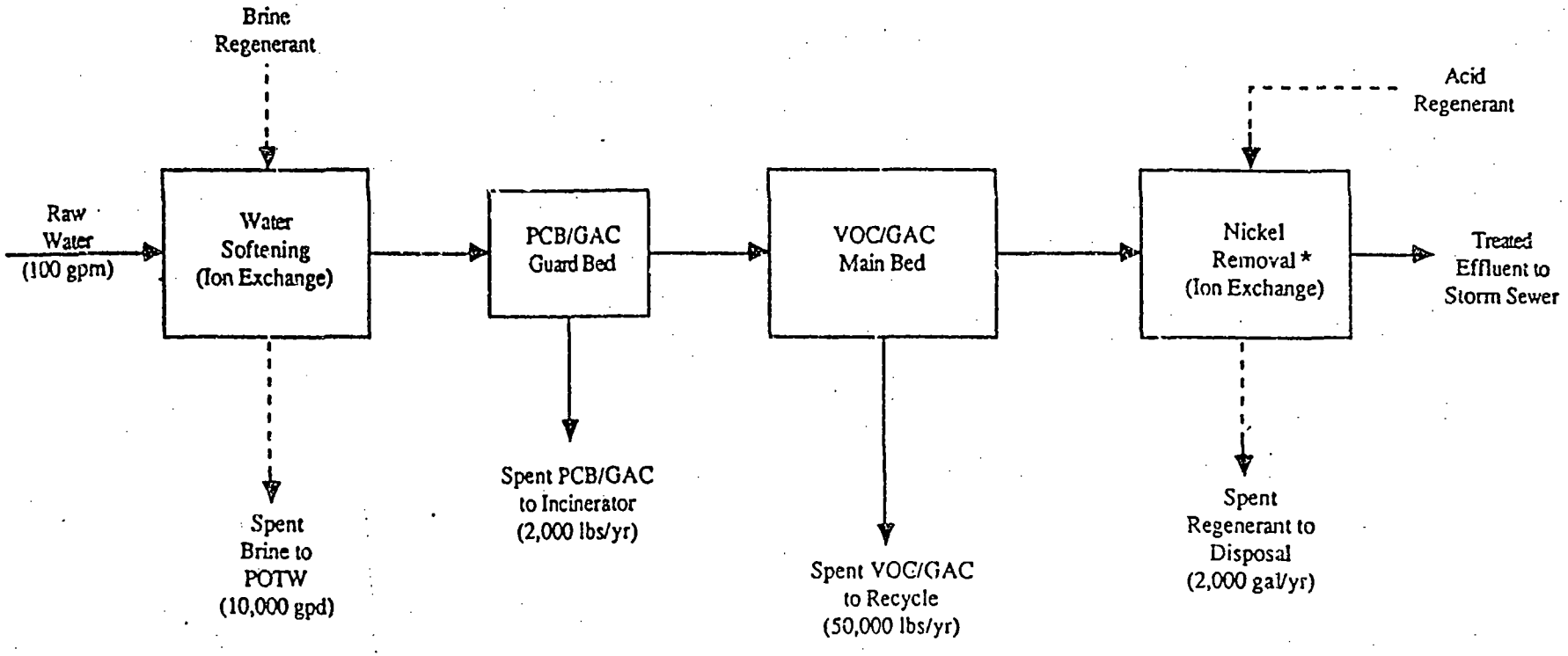
The total estimated order of magnitude capital cost (-30%; +50%) for this system is $1,902,000. The estimated first year costs are $255,000. Based on an assumed 10 year project life and a 10 percent discount rate, the present worth for the Alternative B system is $3,469,000. Costs for all of the alternatives are summarized on Table 8-3.

TABLE 8-3

SUMMARY OF COSTS (-30% +50%) FOR TREATMENT ALTERNATIVES*

	Alternative		
	B GAC	C GAC/Air Stripping	D Ozone-UV/GAC
Capital Costs	1,902,000	1,964,000	2,022,000
First Year Operation and Maintenance	255,000	243,000	198,000
Present Worth	3,469,000	3,457,000	3,238,000

* The estimated capital and O&M costs of treating the effluent for removal of nickel are $200,000 and $54,000/year, respectively. These are assumed constant among alternatives.



* If necessary

Figure 8-2
Flow Diagram for Liquid-Phase GAC Treatment

8.2.4 Alternative C: Groundwater Removal, Air Stripping/GAC Treatment, Nickel Removal, Disposal to Storm Sewer

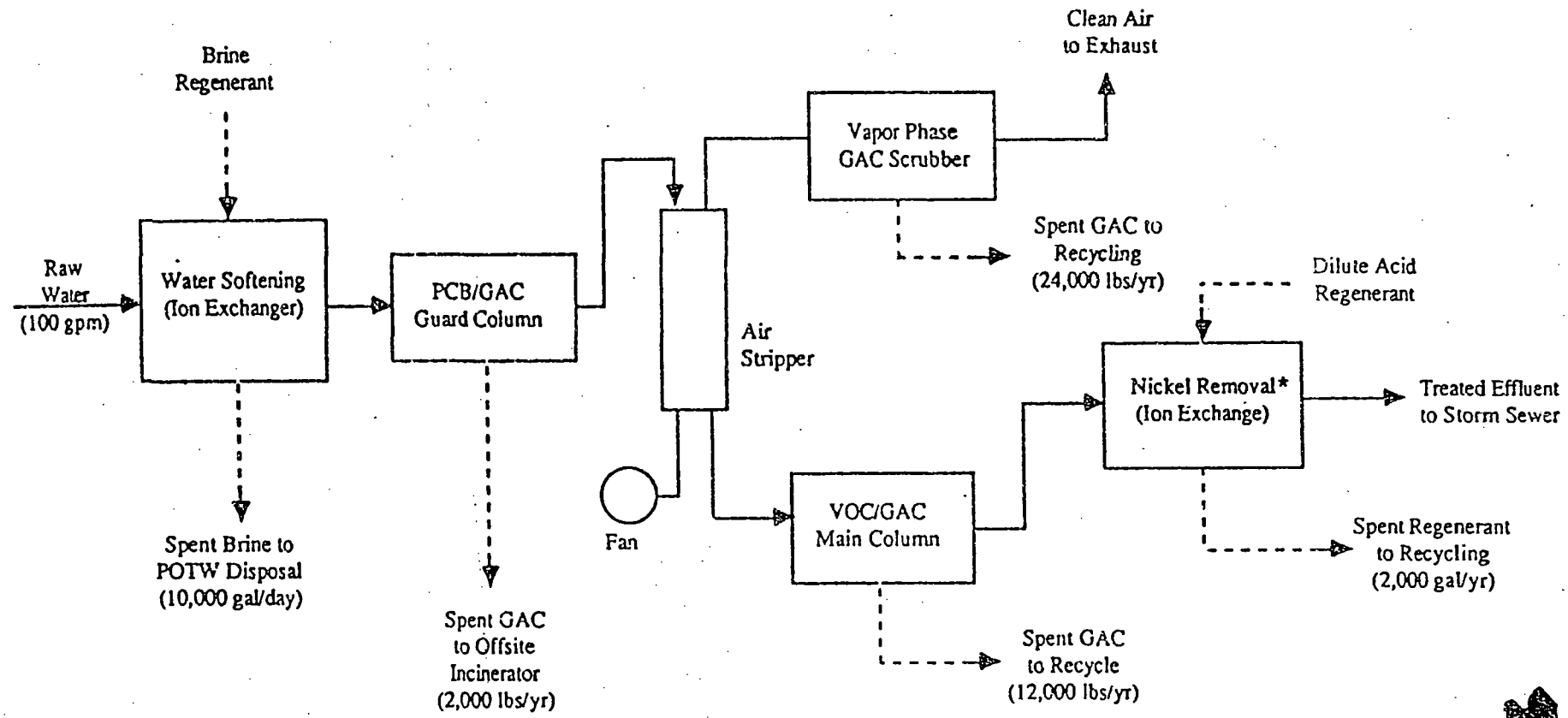
This alternative includes the following operations:

- a groundwater interception system identical to that described in Section 8.2.2;
- ion exchange water softening to prevent scale formation (as discussed in Alternative B, above);
- a GAC guard bed adsorption system to remove PCBs and pesticides;
- an air stripper with a vapor phase GAC scrubber to remove most of the VOCs;
- a liquid phase GAC system to remove unstripped VOCs;
- ion exchange nickel removal; and
- disposal of treated effluent to a local storm sewer.

The flow diagram for this treatment system is shown in Figure 8-3. Following water softening, a combination of three systems will be used to remove PCBs/Pesticides and VOCs. A GAC guard column is first used to remove PCBs/pesticides. Next, a packed tower air stripper with a vapor-phase GAC scrubber is used to remove the most easily stripped VOCs from the groundwater. Finally, VOCs that are not removed by the air stripper are removed by a downstream GAC polishing column. Although the May 1988 EE/CA identified fume incineration as a possible component of this alternative, recently completed treatability studies showed that a fume incinerator was not necessary, and that a vapor phase GAC unit would be adequate. Finally, an ion exchange column can be used to remove nickel if necessary.

The hydrocarbon exhaust rate from the air stripper/GAC scrubber will be less than the 15 lbs/day limit specified by the BAAQMD for total emissions of smog inducing substances in the atmosphere. These emissions will concurrently comply with the 10^{-6} cancer risk limit imposed by the Toxic Risk Screening Policy of the BAAQMD.

As shown in Table 8-3, the estimated capital cost for this alternative is $1,964,000. First year operation and maintenance costs are estimated at $243,000. The present worth of this alternative is $3,457,000 using a 10-year life and a 10 percent discount rate.



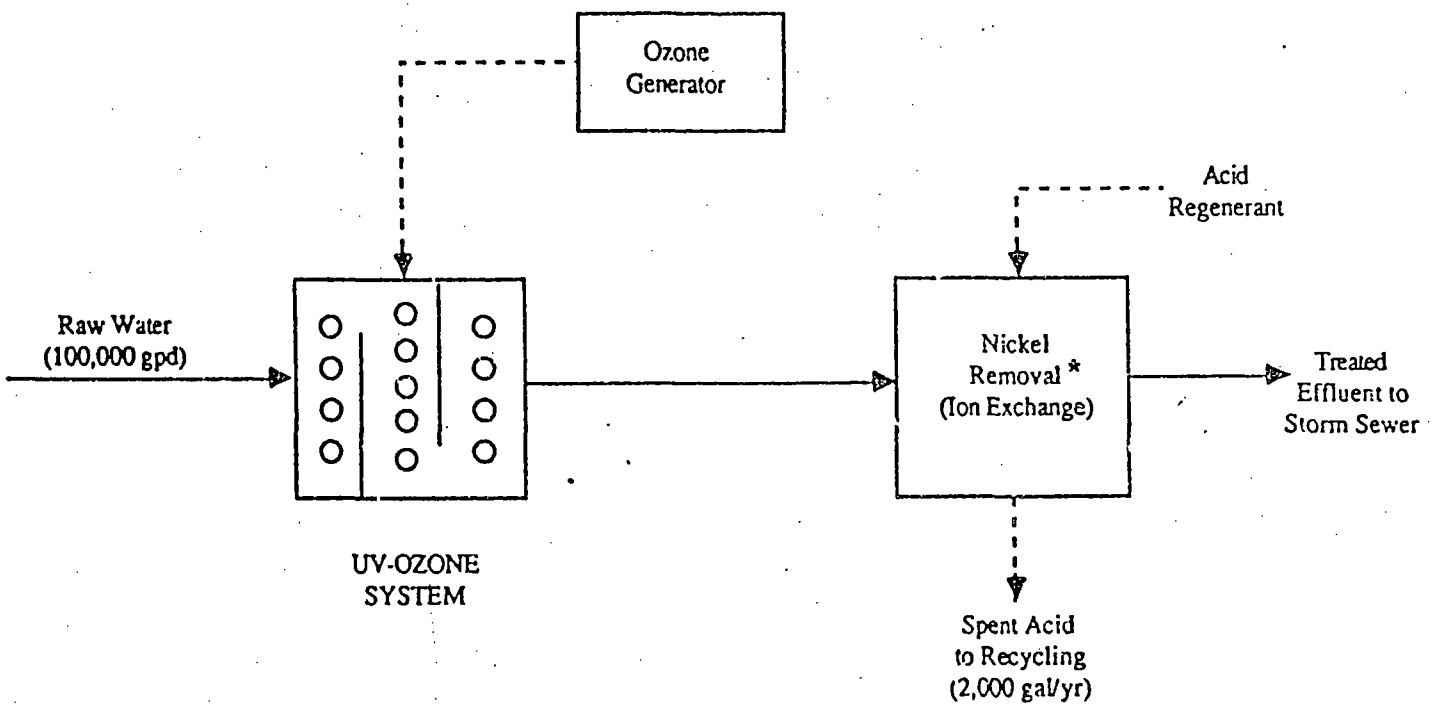
* If necessary

Figure 8-3
Flow Diagram for GAC/Air Stripping Treatment

8.2.5 Alternative D: Groundwater Removal, Ozone-UV/GAC Treatment, Nickel Removal, Disposal to Storm Sewer

The flow diagram for this treatment alternative is shown in Figure 8-4. A combination of two technologies would be used: first, a commercially available packaged ozone-UV system to destroy VOCs and PCBs/pesticides; and second (if necessary), an ion exchange column to remove nickel. Ozone-UV treatment has been shown to be effective for destruction of PCBs/pesticides and VOCs such as 1,1,1-TCA, TCE, and vinyl chloride. Also, treatability studies conducted in August 1988 determined that GAC polishing was not necessary. Based on discussions with equipment manufacturers, it is assumed that pretreatment for water softening should not be needed.

Estimated capital cost for this alternative is $2,022,000 (Table 8-3). First year operation and maintenance costs are estimated at $198,000. Assuming a 10-year life and a 10 percent discount rate, the present worth of this alternative is $3,238,000.



* If necessary

Figure 8-4
Flow Diagram for Ozone/UV Treatment System

9.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

9.1 COMPARISON OF ENGINEERING EVALUATION/COST ANALYSIS AND FEASIBILITY STUDY GUIDANCE CRITERIA

The United States Environmental Protection Agency (EPA) guidance criteria for evaluating remedial alternatives for Engineering Evaluation and Cost Analysis (EE/CA) and Feasibility Studies (FS) are presented below for comparison.

FS Guidance Criteria	EE/CA Criteria (non-time-critical)
o Short-term effectiveness	o Technical feasibility
o Long-term effectiveness and permanence	- Effectiveness
o Reduction of toxicity, mobility, or volume	- Demonstrated performance
o Implementability	- Operation and maintenance requirements
o Cost	- Useful life
o Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	- Environmental effects upon operations
o Overall protection of human health and environment	- Constructability
o State acceptance	o Reasonable cost
o Community acceptance	o Institutional considerations
	- Permitting and other factors affecting startup
	- Time to complete
	- Safety
	o Environmental impacts

The major differences between the EE/CA guidance and the FS guidance are that there are no requirements to meet ARARs or to perform a Risk Assessment in the EE/CA. As shown above, the evaluation criteria are otherwise very similar. Since the Lorentz Barrel & Drum (LB&D) EE/CA included consideration of ARARs and provided preliminary risk assessments, the alternative actions have been evaluated by all of the FS criteria.

9.2 COMPARISON EVALUATION METHODOLOGY

The evaluation method used is based on the method under development by United States Environmental Protection Agency (EPA) as EE/CA guidance for non-time-critical removal actions. This method uses a set of criteria based on technical feasibility, cost reasonableness, institutional considerations, and environmental impacts. Table 9-1 presents the criteria and associated ratings.

TABLE 9-1

TECHNOLOGY SELECTION CRITERIA*

Criteria	Rating Points
1. TECHNICAL FEASIBILITY	
A. Effectiveness	
. Destroys hazardous substances	4
. Prevents release of hazardous substances; contaminants are isolated but not eliminated	3
. Minimizes the release of hazardous materials; adequately protects public health and environment	2
. Allows or promotes release of hazardous substances; ineffective.	1
B. Demonstrated Performance	
. Proven reliable in the field under similar conditions on the same waste materials; widely demonstrated to be effective	4
. Proven reliable in the field under similar conditions on similar waste materials	3
. Proven reliable, but under different conditions and materials; limited experience and reliability	2
C. Useful Life	
. Permanent; irreversible	4
. Long-term, potentially reversible; effectiveness decreases in time with a low probability of release	3
. Long-term, potentially reversible with a high probability for release	2
. Short-term solution; difficult to repair or replace upon failure; temporarily mitigates hazards; long term abilities questionable	1
D. . Environmental Effects Upon Operations	
. Performs well under all environmental conditions	4
. Performs well under most environmental conditions	3
. Performs adequately under most conditions	2
. Susceptible to adverse weather conditions	1

TABLE 9-1 (Continued)

TECHNOLOGY SELECTION CRITERIA*

Criteria	Rating Points
2. REASONABLE COST	
This item is discussed but not scored	
3. INSTITUTIONAL CONSIDERATIONS	
A. Permitting and Other Factors Affecting Start-up	
. No permitting or significant lead time required	4
. Minimal lead time required (3 months)	3
. Moderate lead time required (6 months)	2
. Significant lead time required (1 year)	1
B. Time to Complete	
. Can be completed within the 12-month statutory limit	4
. Site is expected to qualify for an exemption to the 12-month limit and an alternative can be completed within a reasonable time thereafter	3
. Site is expected to qualify for an exemption, but requires significant time beyond the 12-month limit to complete	2
. Cannot be completed within the 12-month statutory limit and the site is not expected to qualify for an exemption	1
C. Safety	
1) During Installation/Operation	
. Very safe; requires no more than normal safety procedures required for workers at hazardous waste sites; no threat to surroundings at any time	4
. Safe; requires few safety procedures other than those normally required at hazardous waste sites; minor threat to adjoining residential areas may occur	3
. Hazardous; requires stringent safety procedures to ensure worker safety; may	2

TABLE 9-1 (Continued)

TECHNOLOGY SELECTION CRITERIA*

Criteria	Rating Points
require evacuation of homes near the site	
. Very hazardous; requires remote operation and evacuation of area homes	1
2) Effects of Failure	
. Very safe; redundant controls prevent hazardous substance release	4
. Failure results in hazard that is less than that presented by the site prior to the removal action	3
. Failure results in hazard that is approximately equal to that presented by the site prior the removal action	2
. Failure results in hazard greater than that presented by the site prior to the removal action	1
D. Other relevant institutional considerations may be added	
4. ENVIRONMENTAL IMPACTS	
. Positive environmental impact	4
. No detrimental environmental impact	3
. Minimal adverse environmental impact	2
. Extreme adverse environmental impact	1

* Based on guidance from EPA for the EE/CA

9.3 COMPARISON OF ALTERNATIVES

Staff from EPA and Ebasco met on August 30, 1988 to discuss the alternatives and select one for implementation. During that meeting, GAC and ozone/UV treatability test results of July and August 1988 were presented by the respective vendors. The results of those tests indicate that action levels can be achieved by either technology. Consequently, none of the alternatives was eliminated based solely on ability to treat groundwater to desired levels.

An evaluation similar to that presented in section 6 of the EE/CA was performed. This evaluation assessed each alternative in light of the EE/CA evaluation criteria. The results are presented in Table 9-2. All of the treatment alternatives were scored essentially equal. Present worth estimates are also approximately the same, within the accuracy of the estimates that were prepared.

Three primary distinctions can be made among the alternatives however. These are:

- GAC systems have been proven reliable over a longer time period than the ozone/UV system;
- the ozone/UV system provides onsite destruction of contaminants, as opposed to transporting wastes for offsite destruction of contaminants through regeneration of the carbon; and
- GAC/air stripping could require additional air emission controls in order to comply with BAAQMD standards.

Two other water treatment considerations were identified during the treatability testing. One involved influent treatment; the other involved possible effluent treatment. The GAC testing revealed a carbonate precipitate in the test column. As a result, it was recommended that a water softening step be included prior to the GAC options. The ozone/UV system did not experience scaling during the treatability testing. Both processes require further consideration of effluent concentrations of nickel as well. This issue will be examined through additional groundwater sampling and analyses, and bioassays of treated effluent. If results of these studies show that nickel removal is necessary, a treatment system such as that described in Section 8.2.3 will be included in the process prior to discharge of the effluent.

In consideration of all of the factors, EPA has decided that the best course of action is to demonstrate the ozone/UV

TABLE 9-2
COMPARISON OF ALTERNATIVES

	Alternative A No Action	Alternative B Liquid Phase GAC	Alternative C GAC/Air Stripping/ Vapor Control	Alternative D Ozone-UV
Technical Feasibility				
. Effectiveness	1	3	3	4
. Demonstrated Performance	1	4	4	3
. Useful Life	1	3	3	3
. Environmental Effects on Performance	1	4	4	4
Subtotal Score	4	14	14	14
Institutional Considerations				
. Permitting and Startup	2	4	3	4
. Time to Complete	2	4	4	4
. Safety	2	4	4	4
Subtotal Score	6	12	11	12
Environmental Impacts	1	4	4	4
TOTAL SCORE	11	30	29	30
Estimated Costs				
. Capital Cost	*	1,902,000	1,964,000	2,022,000
. First Year Operation and Maintenance	*	255,000	243,000	198,000
. Present Worth Costs	$170,000	3,469,000	3,457,000	3,238,000

*These costs will depend on:

- the number of monitoring wells;
- the frequency of monitoring; and
- which chemical analyses are chosen.

technology through the Superfund Innovative Technologies Evaluation (SITE) program. This selection was made for the following reasons:

- the technology provides onsite destruction of contaminants;
- a several week(s) demonstration will allow EPA to determine the reliability of the ozone/UV system;
- it appears that ozone/UV may not require water softening. However, the demonstration will allow EPA to determine whether an eventual carbonate scaling problem can be dealt with through pH adjustment rather than water softening;
- there will be no long-term commitment of taxpayer dollars until the testing program conclusively demonstrates the success of the technology; and
- should ozone/UV not prove adequate based on further testing, Alternative B (Liquid Phase GAC) provides an adequate backup remedy.

EPA's selected remedy is described in detail in Section 10.0.

9.4 TREATED EFFLUENT DISPOSAL

Of the four treated effluent disposal options, only two are technically and administratively feasible: discharge to the storm sewer and Coyote Creek; and groundwater recharge by reinjection wells. Each of the four options are described below.

Storm Sewer/Coyote Creek - This is the least expensive and most reliable option. It would only require that a force main be constructed to the nearest storm drain. The California Regional Water Quality Control Board (CRWQCB) discharge requirements for surface water disposal would have to be satisfied.

Groundwater Reinjection - This option is feasible. Effluent disposal would be performed by pumping the treated effluent back into the shallow aquifer, using a series of reinjection wells. Because of the need for extra wells and pumps, this option would be expensive and more subject to mechanical problems than would the "storm sewer" option. The pretreatment standards established by the CRWQCB would have to be satisfied. As an alternative to using reinjection wells, there are currently several large municipal groundwater recharge basins within a few miles of the LB&D site. The LB&D effluent could conceivably be pumped off site to one of those

facilities. However, this would be impractical because it would require construction of miles of force main through residential areas.

Publicly Owned Treatment Works (POTW) Sanitary Sewer - This option is not feasible. Discharge of any groundwater, pretreated or not, to the POTW sanitary sewer is forbidden by the San Jose Municipal Code Ordinance #20710, Title 15, Section 15.12.200.

Industrial Reuse - This option is technically feasible but it would be expensive and impractical. The treated effluent could conceivably be stored and used by local industries for process water. However, it would require construction of large storage tanks and complex water distribution piping systems. This option would not be practical, since there are no industries near the LB&D site that require a large, steady volume of process water. The disposal of the LB&D effluent would therefore be limited by the fluctuating water needs of many small businesses.

In summary, the most practical and least expensive alternative for treated effluent disposal during the Expedited Response Action (ERA)/Operable Unit is disposal to the storm sewer/Coyote Creek. Industrial reuse and groundwater injection will be studied in more detail during the Feasibility Study. Any of these options could be selected as a long-term solution to the disposal question.

10.0 THE SELECTED REMEDY

The selected remedy consists of the following items: a groundwater extraction system; an above-ground treatment system (ozone/UV plus nickel removal); and treated effluent disposal to the storm sewer. As mentioned in Section 8.2, until a final decision is reached between EPA and CRWQCB concerning appropriate effluent limitations for nickel, it is assumed that NPDES discharge limits will require nickel removal. Each of these items are described in the following sections.

The selected remedy was chosen for the following reasons:

- the contaminated shallow groundwater will be contained and removed, thereby minimizing the potential for future contamination of deeper drinking water aquifers;
- the ozone/UV treatment system will treat all VOCs to below the MCLs and NPDES discharge limits, and will treat PCBs/pesticides to below detectable levels;
- as discussed in Chapter 9.0, the ozone/UV treatment system received the highest overall rating among the alternatives, and has the lowest estimated present worth cost; and
- the ozone/UV treatment system can be field tested for reliability under EPA's Superfund Innovative Technology Evaluation (SITE) program.

As discussed in Section 8.2.2, the groundwater plume will be intercepted and collected using the extraction system shown in Figure 8-1.

As shown in Figure 8-4, a combination of two technologies would be used: First, a commercially available packaged ozone/UV system to destroy VOCs and PCBs/pesticides; and second, an ion exchange treatment system to remove nickel. Ozone/UV treatment has been shown to be effective for destruction of PCBs/pesticides and halogenated hydrocarbons such as 1,1,1-TCA, TCE, and vinyl chloride.

EPA and other agencies have supported a variety of tests, which have shown that ozone/UV treatment is effective for permanent destruction of VOCs and PCBs/pesticides in wastewater and groundwater. Treatability tests using LB&D groundwater were performed in July and August 1988. These tests showed that VOCs could be destroyed to below the NPDES discharge limits. In 1980, at a General Electric plant in Hudson Falls, New York, a commercial ozone/UV treatment plant was installed and successfully operated to destroy PCBs in groundwater to below detection levels.

The contaminated groundwater will initially be pumped to an equalization tank. This tank will provide roughly 30 minutes of storage and will dampen any short-term variations in flow rates or contaminant concentrations. A commercially-available packaged ozone/UV treatment system will be used to destroy PCBs/pesticides and other organic compounds. The ozone/UV treatment method utilizes ozone's strong oxidizing capacity with UV light's additional energy to provide considerable amounts of free radicals and excited-state species capable of effectively destroying the contaminants present.

Ozone is provided by an onsite generator and bubbled through the wastewater. The ozonated wastewater is then subjected to high intensity UV light in a packaged treatment vessel. The UV light originates from an array of quartz-enclosed low-pressure mercury lamps. It is assumed that ozone/UV treatment will destroy the PCBs/pesticides, vinyl chloride, 1,1,1-TCA, and TCE in the influents. The residence time of the water in the ozone/UV unit is 40 minutes. The wastewater is treated using an oxidant dosage of 75 mg/l of ozone plus 25 mg/l of hydrogen peroxide. Contaminant destruction occurs inside the treatment vessel.

EPA will be working with CRWQCB to determine NPDES limits for nickel. If necessary, nickel can be removed using a packaged, commercially available ion exchange system. Additional treatability studies will be required to select the best ion exchange resin. Based on discussions with resin manufacturers, the resin will be contained in conventional columns. The spent resin will be regenerated several times each year, using dilute acid as the regenerant solution, and will consist of a neutralized nickel sulfate solution. The spent solutions will be shipped to an offsite recycling firm if further data suggest that economical recovery of the nickel sulfate is possible. If not, the waste will be disposed of in accordance with existing solid and hazardous waste legislation.

The ozone/UV system will be delivered prepackaged and installed skid-mounted. The ozone/UV treatment system, the nickel removal columns, and all required pumps and controls will be housed in a prefabricated building. The treatment plant site will be fenced to prevent public access.

The estimated capital and operating costs for the extraction and treatment systems are listed in Table 10-1. The capital costs for the groundwater extraction system are based on Ebasco engineering estimates. The capital and operating costs for the treatment system are based on manufacturers' estimates.

TABLE 10-1

ESTIMATED (-30%, +50%) COSTS FOR OZONE/UV TREATMENT ALTERNATIVE

Capital Costs

1/Direct	Site preparation	$10,000
	Groundwater extraction system	803,000
	Flow equalization	5,000
	Ozone/UV equipment	300,000
	Nickel removal system	200,000
	Levels, controls (etc.)	20,000
	Building	80,000
	Disposal force main	5,000
		$1,423,000
2/Indirect	NPDES Permit application	30,000
	Engineering Construction Management (15% Direct costs)	213,000
	Contingency (25% Direct Costs)	356,000
		$599,000
	Total estimated Capital Costs	$2,022,000

O&M Costs (Annual)

Operating labor (2 days/week @ $300/day)	$31,000
Ozone power/year ($0.263/1000 gals)	14,000
Hydrogen Peroxide/year ($0.125/1000 gals)	7,000
Ultraviolet power/year ($0.266/1000 gals)	14,000
Ultraviolet maintenance (including lamp replacement and labor)	16,610
Replacement of Nickel removal resin ($100,000/2 years)	50,000

TABLE 10-1 (Continued)

ESTIMATED (-30%, +50%) COSTS FOR OZONE/UV TREATMENT ALTERNATIVE

O&M Costs (Annual) (Continued)

Processing of spent resin reactivation solution ($2/gal, 2000 gals/year)	4,000
Treated effluents analysis (1/week @$300)	16,000
Groundwater sampling (40 wells/year $2,500/well)	20,000
System maintenance (5% O_3/UV and Nickel removal equipment Capital Costs)	25,000
	$198,000
Present Worth (i = 10%, 10 yrs)	$3,238,000

The estimated capital cost for the selected remedy is $2,022,000. The estimated first year operating cost is $198,000. The estimated present worth cost (assuming a 10 year project life and a 10 percent discount) is $3,238,000.

Treated effluent will be disposed of by pumping directly to the nearest storm sewer. The treated effluent will satisfy all of the required NPDES discharge standards. It is assumed that periodic monitoring will be required to document compliance with the pretreatment standards.

11.0 STATUTORY DETERMINATIONS

The statutory requirements of Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) state that the selected remedy must:

- be protective of human health and the environment;
- attain Applicable or Relevant and Appropriate Requirements (ARARs);
- be cost-effective;
- utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent possible; and
- address whether the preference for treatment that reduces toxicity, mobility, or volume as a principal element is satisfied.

11.1 PROTECTIVENESS OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy is protective of human health and the environment by preventing further vertical or horizontal migration of contaminants in the shallow aquifer and treating the extracted groundwater prior to disposal. It also prevents migration of contamination into the deeper drinking water aquifer and Coyote Creek. By stopping the migration of contaminants and treating the extracted groundwater, the selected remedy reduces the potential threats posed by contamination of Coyote Creek and the drinking water aquifer.

11.2 ATTAINMENT OF ARARS

The selected remedy will meet all substantive ARARs for the shallow groundwater, as discussed in Section 8.1.

The numerical limits that apply to the shallow groundwater are specified on Table 8-2. The results of the treatability study will demonstrate that this remedy achieves those action limits.

11.3 COST EFFECTIVENESS

All of the treatment alternatives are essentially equal with respect to total present worth costs. No distinction can be made among these alternatives from the cost point of view within the accuracy of the estimates that were prepared. All treatment alternatives are therefore equally cost effective.

The selected approach, which is to perform a demonstration of ozone/UV through the SITE program, is especially cost effective. It defers capital expenditures until the technology is demonstrated over a reasonably long term. Such an approach reduces the ultimate risk borne by the taxpayer by increasing the level of knowledge about this technology at the LB&D site.

11.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The selected remedy meets the Superfund Amendment and Reauthorization Act of 1986 (SARA) preference for permanent solutions to the maximum extent practicable. It is expected to remove the contaminants from the groundwater and to effectively destroy them or convert them into harmless substances posing no threat to human health and the environment.

11.5 PREFERENCE FOR TREATMENT THAT REDUCES TOXICITY, MOBILITY, AND VOLUME AS A PRINCIPAL ELEMENT

The selected remedy focuses on treatment of the contaminated shallow groundwater to specified action levels. This treatment technology is expected to reduce the toxicity of the contaminants by rendering them harmless. Mobility is reduced by use of the selected groundwater extraction system, preventing the further spread of the plumes. Also, by extracting and treating the shallow groundwater, it is likely that the volumes of the plumes will be reduced.

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LORENTZ BARREL & DRUM
ENGINEERING EVALUATION/COST ANALYSIS
RECORD OF DECISION

PART 3

RESPONSIVENESS SUMMARY

1.0 INTRODUCTION

From June 1, 1988 through June 30, 1988, the United States Environmental Protection Agency (EPA) sponsored a public comment period on EPA's Draft Engineering Evaluation and Cost Analysis (EE/CA) for the shallow groundwater contamination at the Lorentz Barrel & Drum (LB&D) Superfund site in San Jose, California. Region IX has determined that the EE/CA is substantively equivalent to a fast track operable unit feasibility study. The EE/CA evaluates four alternatives for addressing shallow groundwater contamination at the LB&D site. Each alternative contains a component for the removal and treatment of the contaminated groundwater, which lies approximately 40 feet below the ground surface, and the disposal of the treated water. The purpose of the public comment period was to give interested parties the opportunity to comment on the EE/CA.

The EE/CA is a study that examines various ways that the contamination problem in the shallow aquifer can be addressed while a remedy for the remainder of the site is being developed. The purpose of the EE/CA is to select a remedy for the shallow groundwater contamination that is protective of human health and the environment, attains Federal and state Applicable or Relevant and Appropriate Requirements (ARARs), and is cost-effective. Because the full extent of the contamination at the LB&D site is not yet known, EPA has chosen to accelerate the remediation process by addressing the shallow groundwater contamination as a separate unit. Remedial alternatives for the other contaminated media at the site will be examined in a separate site Feasibility Study (FS) Report, which will be issued in late 1989.

A Responsiveness Summary is required under EPA Superfund regulations for the purpose of providing both EPA and the interested public with a review and summary of community concerns about the site and comments on the EE/CA. In addition to summarizing citizen concerns and questions, the Responsiveness Summary presents EPA's responses to those concerns.

The Responsiveness Summary for the EE/CA conducted at the LB&D site is divided into three sections:

Background on Community Involvement and Concerns. This section provides a brief history of community interest in and concerns about the LB&D site.

Overview of the LB&D EE/CA. This section provides a brief history of the LB&D site, summarizes the contents of the Draft EE/CA, and identifies EPAs preferred alternatives.

Summary of Comments Received and EPA Responses. This section categorizes and summarizes written and oral comments received during the public comment period and provides EPA's responses to these comments.

Appendix A contains an index and copies of the pages from the public hearing transcript that contain the specific comments made.

2.0 BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The Lorentz Barrel & Drum (LB&D) site, one of the many sites in the South San Francisco Bay area affected by groundwater contamination, has been highly visible in the local press and among citizens living in the vicinity of the site since a contamination problem was identified in 1980. Concerns have been registered with the California Regional Water Quality Control Board (CRWQCB), City Council representatives and other local agencies on a regular basis, and indicate that the community has been concerned primarily with the potential effects of the shallow groundwater contamination on its drinking water.

Moreover, residents of the area for the most part have not distinguished between the shallow and deeper aquifers. They believe that contamination at any level would affect the safety of their drinking water supply. Agency representatives have sought to assure residents that the deeper aquifer supplies residents with their drinking water and that, to date, there is no evidence to indicate contamination in the deeper aquifers.

Between 1980, when California Division of Occupational Safety and Health (OSHA) informed the California Department of Health Services (DHS) of potential hazardous material problems at the LB&D site, and 1987, when technical progress initiated more contact between the agencies and community members, few community relations activities were conducted at the site. However, investigations, sampling efforts, and remedial actions were conducted jointly by DHS, the CRWQCB, and the United States Environmental Protection Agency (EPA) when the responsible party refused to comply with cleanup regulations. As a result of the multi-agency participation during this time, some community members raised the concern that the responsibility for problems at the site had been shifted among the agencies so much that no one agency had been exercising adequate leadership.

In 1987, community involvement increased significantly when DHS released a Preliminary Site Assessment for public review, held an agency briefing to present a status report on the LB&D site investigations, published a series of fact sheets and updates detailing technical progress at the site, and drafted a Community Relations Plan (CRP) for the site. The CRP is based on interviews conducted by the DHS with community members, elected officials, and agency representatives. It summarizes past community concerns and discusses current and potential issues in the community related to the site.

In June 1987, DHS held a public meeting to provide the community with information regarding the site investigation and Preliminary Site Assessment Report. Over 100 community members attended the meeting. Several attendees expressed dissatisfaction with the length of time that the agency was taking to investigate and cleanup the site. They also expressed their concerns about the status of the drinking water in the area and the effects that water might have on fruit and vegetable gardens near the site. On September 3, 1987, DHS held another public meeting (with roughly 100 attendees) to discuss the proposed actions for drum and sump removal. The public expressed dissatisfaction with the format of the meeting, claiming that it did not provide an appropriate forum for public involvement. In response to this concern, DHS hosted an informal community open house on November 18, 1987 to answer community questions, especially those related to health issues.

On December 1, 1987, EPA was designated as the lead agency responsible for site investigation and cleanup. DHS and EPA distributed a joint fact sheet in February informing the public that responsibility for the site had been transferred. On February 25, 1988, a public meeting was held to discuss the changes in responsibility for the site cleanup. Approximately 25 people attended this meeting.

Since EPA became involved at the site, it has conducted a Limited Sampling Program, taking soil and water samples from private fruit gardens, community gardens, a local grocery store, and nearby Coyote Creek. EPA prepared and distributed a fact sheet in June 1988 explaining the Engineering Evaluation and Cost Analysis (EE/CA) and detailing the remedial alternatives proposed for the shallow groundwater contamination problem. A public meeting, attended by roughly 30 people, was held on June 15, 1988 to discuss the proposed remedial alternatives and to give community members an opportunity to comment formally on these alternatives. Results from the produce and creek sampling and a presentation of opportunities for community involvement also were presented. A few community members at the meeting stated that they were generally pleased with EPA's approach to community relations activities at the site.

The following list summarizes concerns raised during interviews conducted in DHS's preparation of the April 1987 CRP and in community meetings.

- <u>Groundwater Quality</u> - The primary concern at the LB&D site is the quality of the groundwater supply and the potential for contamination to move to the deeper aquifers, which supply residents with a portion of their drinking water. Many residents fear the potential short- and long-term health effects from

contamination. Some community members fear the possibility of contamination spreading to food products, because some of the active wells serve food processing facilities. Other residents living near the site have expressed concern about the potential for contamination to affect private fruit and vegetable gardens, as well as public gardens. Residents also have expressed concern that inactive wells could allow contaminants to leach into the deeper aquifer. Some community members affiliated with San Jose State University are concerned about the effects of the contamination on a University recreational area. Drinking water for the recreational facility is provided by a university owned well which is screened in the deeper drinking water aquifer below 200 feet and located within 1 mile of the site.

- Need for Frequent Monitoring - Some community members believe that frequent groundwater monitoring is necessary to characterize the extent of contamination at the site accurately. These individuals believe that frequent monitoring would enable EPA to identify the spread of the contamination plume in a timely manner.

- Duration of Investigation - Some citizens criticized the government agencies for spending too much time and money on investigations without achieving any tangible results.

- Inefficiency of Agency Involvement - Prior to the increase in community relations efforts in 1987, some community members expressed frustration that their concerns regarding the safety of drinking water near the site had not been adequately addressed by the agencies involved. Local media attention emphasized the extent of the problem and minimized discussion about agency activity.

The San Jose Mercury News and the Spartan Daily, the San Jose State University newspaper, have presented most of the coverage on the shallow groundwater contamination at the LB&D site. Generally, the level of media coverage has corresponded to technical progress made at the site and the occurrence of public meetings and agency briefings. Media coverage concerning the site was particularly active during August 1987, as a result of the death of Mr. Ernest Lorentz, owner of LB&D, who had been placed in custody by the Santa Clara County District Attorney for his refusal to comply with cleanup requirements of the site.

The following is a list of community relations activities conducted to date by DHS and EPA at the LB&D Superfund site.

February 10, 1987	DHS presents status report on site investigation at an agency briefing. Those present included representatives from: EPA, DHS, Santa Clara County Health Department, Santa Clara County Executive's Office, Santa Clara Valley Water District, Bay Area Air Quality Management District (BAAQMD), San Jose City Manager's Office, San Jose Attorney's Office, San Jose Planning Department, San Jose Office of Environmental Management, and the San Jose Fire Department.
April 1987	DHS drafts CRP based on interviews that DHS conducted with community members and agency representatives regarding activities at the site.
June 1987	DHS distributes the first fact sheet explaining technical progress and the February 1987 release of the Preliminary Site Assessment Report.
June 24, 1987	DHS holds a public meeting to explain the Preliminary Site Assessment Report and technical progress made at the site to date.
August 1987	DHS distributes an update explaining the planned removal actions at the site.
September 3, 1987	DHS holds a public meeting to discuss the proposed removal actions.
October 1987	DHS distributes an update on the proposed transportation route for the removal actions.
November 1987	DHS distributes an update informing the public that EPA will be taking the lead as the agency responsible for further investigation and cleanup.
November 18, 1987	DHS holds an open house/public forum for community members to question or comment on activities at the site.
December 1, 1987	EPA becomes the lead agency responsible for site investigation and cleanup.

February 1988	EPA and DHS publish a joint fact sheet that explains the transfer of agency responsibility. The fact sheet also explains EPA's plan to pave most of the site to prevent surface water runoff and leaching.
February 25, 1988	EPA and DHS hold a public meeting to explain the transfer of lead agency, EPA's role in the Superfund process, recent paving activities, and EPA's plans for further activities.
March 1988	EPA distributes letters to some residents requesting permission to sample private fruit and vegetable gardens.
May 1988	EPA conducts Limited Sampling Program testing water and soil samples from private gardens, community gardens, and Coyote Creek.
June 1988	EPA distributes a fact sheet summarizing the EE/CA for shallow groundwater contamination.
June 15, 1988	EPA holds a community meeting to discuss the EE/CA and EPA's proposed cleanup solution, and to accept public comments on the proposed alternatives.
June 30, 1988	EPA conducts municipal well sampling program testing water from area drinking water wells.

3.0 OVERVIEW OF THE LORENTZ BARREL & DRUM ENGINEERING EVALUATION AND COST ANALYSIS

The contemplated Expedited Response Action (ERA)/Operable Unit is a shallow groundwater collection and treatment system. The objective of the Engineering Evaluation and Cost Analysis (EE/CA) was to consider various potential removal action options for this system, screen them, evaluate specific options in greater detail, and compare those that appear to offer the greatest benefits. Figure 3-1 diagrams the general EE/CA process.

In the EE/CA, the potential technologies under consideration were judged on their ability to achieve compliance with identified clean-up standards. The San Jose publicly-owned treatment works (POTW) acceptance criteria were also included in the action-specific review. The situation-specific nature of the threat was reviewed to evaluate whether the need to protect public health and the environment required more stringent requirements than the ARAR's.

The EE/CA first reviewed the site characterization. After formulation of removal action objectives which arose from review of the site characterization, various technologies were considered and initially screened against the prescribed ERA evaluation criteria. The screened technologies that survived were used to develop various ERA alternatives as combinations of technologies. These alternatives were evaluated, additional data requirements were identified, and a limited sensitivity analysis was performed as part of the comparison of implementation costs for the alternatives.

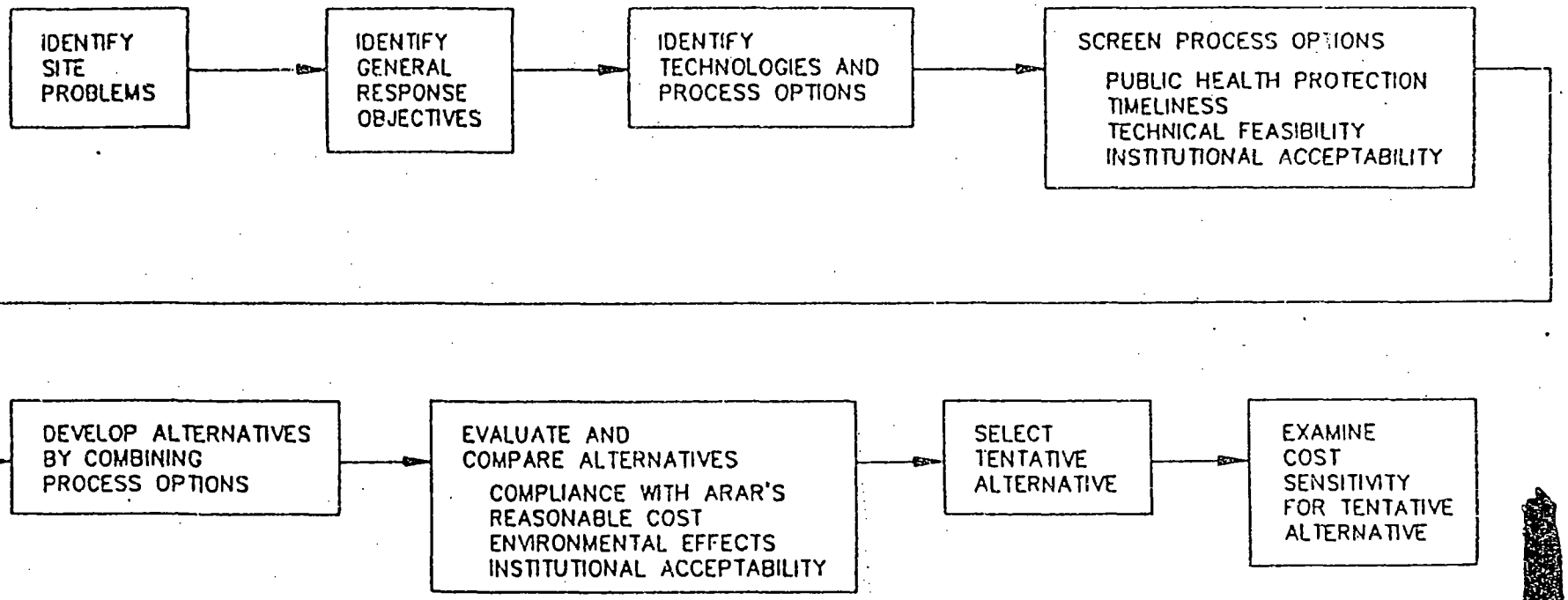

FIGURE 3-1
ENGINEERING EVALUATION/COST ANALYSIS PROCESS

LORENTZ BARREL & DRUM

4.0 SUMMARY OF COMMENTS RECEIVED AND THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY RESPONSES

4.1 COMMENTS FROM THE JUNE 15, 1988 PUBLIC MEETING

1. Comment:

One community member asked whether, after the water is treated, and assuming that the flow rates are sufficiently low, evaporation could be considered as a disposal alternative. [10]

United States Environmental Protection Agency (EPA) Response:

The assumed flows for the Expedited Response Action (ERA)/Operable Unit (100 gallons per minute (gpm)) are too large for effective use of an evaporation pond. The required amounts of land are not available in the site vicinity. As a result, evaporation ponds were not considered viable for the ERA. During the Remedial Investigation (RI) and the operation of the ERA groundwater extraction system, more information on groundwater flows and potential pumping rates will be developed. Evaporation ponds will be considered in the Feasibility Study (FS) as a long-term disposal option.

2. Comment:

Another community member, referring to the potentially large-scale plumbing effort necessary to transport contaminated water from the wells to the treatment plant, asked whether the construction activity could be kept to a level that would be tolerable to the neighborhood. [11]

EPA Response:

The piping associated with the extraction well system will be similar to that for a local water supply system. Construction of the required pipelines will involve digging 5-foot trenches at appropriate locations. As with any public works construction project, it will be planned to minimize disturbance in the residential areas. After this temporary disturbance, the water transmission system will be hidden from view.

3. Comment:

A representative of the Silicon Valley Toxics Coalition asked what cleanup goals EPA was following in its evaluation of cleanup technologies, and urged EPA to consider an approach that combines the California Regional Water Quality Control Board's (CRWQCB) policy of "nondegradation" with the "best available technology" approach. He also asked that, if EPA does a comparative cost estimate on these approaches the community be allowed to comment on those results. [12]

EPA Response:

Prior to discharge, the groundwater will be treated to meet the most stringent of any of the applicable regulations. The treatment system incorporates the "best available technology" for removal of organic compounds and trace metals. The CRWQCB requires that the treated effluent contain no detectable pesticides or PCBs. The CRWQCB discharge limits are designed to ensure that the treated effluent will cause no degradation of Coyote Creek.

4. Comment:

That same commenter, referring to the air stripping/ fume incinerator alternative, asked that EPA use the best available technology guidelines to treat the air emissions from the fume incinerator. He also suggested that the level of treatment attained by incineration should exceed the guidelines set by the Air Board. [13]

EPA Response:

As described in Section 6.0 of the Decision Summary, the risk presented by the air emissions from the air stripper is the result of the volatile organic hydrocarbons (VOCs) stripped from the groundwater. There are two ways to remove these compounds from the air: fume incineration; or granular activated carbon (GAC). However, EPA is concerned about GAC's effectiveness in removing vinyl chloride. As a result, gas-fired incineration was tentatively selected as the Best Available Technology for reducing these emissions. As stated in Section 6.0 (and presented in more detail in Section 5.4.3 of the

EE/CA), the Bay Area Air Quality Management District (BAAQMD) has set a criterion of an allowable cancer risk of 1×10^{-6}. The calculated risk from the uncontrolled emissions (before use of the fume incinerator) is 2.8×10^{-6}, which is only slightly above the BAAQMD limit of 1.0×10^{-6}. The destruction efficiency of a fume incinerator could reduce the cancer risk well below the BAAQMD guidelines. However since the EE/CA was written, the effectiveness of GAC for removal of VOC vapors has been evaluated by treatability tests during the summer of 1988. Results of these studies indicated that GAC would effectively remove VOC vapors to below BAAQMD limits, thus rendering use of a fume incinerator unnecessary.

5. Comment:

The community group representative also asked whether EPA could consider reinjection of the water into the shallow aquifer as an alternative to disposal. [14]

EPA Response:

A discussion of the groundwater reinjection option, as it compares with other disposal options, is presented in Section 9.4 of the Decision Summary. There are several different ways to reinject the treated effluents. For example, it could be reinjected either upstream or downstream of the contaminated zone. Each different method has its own advantages and disadvantages. Groundwater reinjection, as well as the effects of extraction on the shallow aquifer, will be evaluated in detail during the RI/FS process. Based on the current level of knowledge and cost considerations, it was not selected for the ERA. It may or may not be selected for the long-term remedial action chosen as a result of the RI/FS.

6. Comment:

One community member asked if tests had been conducted to determine whether contaminated groundwater is rising to the surface and evaporating off, which, she said, would be potentially harmful to people who use the track and tennis courts on a regular basis. She also asked what kind of tests had been conducted west of the designated plume. [15]

EPA Response:

Soil gas sampling has been performed on site in a westerly direction, and was used to define the boundary of the small western TCA plume. (See Figure 5-3 of the Decision Summary.) Additionally, the health risk assessment to be performed during the RI/FS process will evaluate the vapor inhalation pathway for exposure to humans. This assessment will model volatilization from the plume and diffusion through the soil and into the atmosphere. It will then evaluate the predicted ambient concentrations of chemicals in light of known or expected vapor inhalation risks. The objective of this study is to estimate risks associated with this potential pathway before and during implementation of remedial actions. Results of this evaluation will be made available to the public during the RI/FS.

7. Comment:

One community member asked which government body is responsible for recovering costs from those potentially responsible parties who sent drums to the Lorentz Barrel & Drum (LB&D) site. [16] He asked whether EPA knew the names of these companies and whether, if they were contacted, the companies had been willing to inform EPA of the contents of the barrels. [16] He also asked whether the tags attached to the barrels provided any information on the barrels' contents. [17]

EPA Response:

Both EPA and DHS plan to cost recover. EPA has a list of approximately 800 potential responsible parties who utilized the LB&D recycling plant. EPA is in the process of refining and prioritizing this list and plans to contact companies, in a phased approach. There is very little information on barrel contents on the tags.

8. Comment:

One community member asked why the "no-action" alternative cost $170,000.

EPA Response:

The no-action alternative requires continuing monitoring of plume migration. The cost is associated with the installation of several monitoring wells, and periodic sampling and analytical work related to long-term monitoring requirements.

9. Comment:

One community member said he feared that test wells and borings could potentially contribute to the spread of aquifer contamination. [18]

EPA Response:

Properly designed and constructed wells will not cause cross-aquifer contamination. When a well is constructed, a casing is placed outside the well pipe. After the well pipe is installed, the space between the well pipe and the casing is filled with grout. The casing is then removed. The well is screened (i.e., where the water flows into the well) only 10 to 20 feet in one of the aquifers. With a properly constructed and installed well, no cross-contamination occurs.

10. Comment:

One community member, asserting that neighboring businesses use chemicals similar to those found at the LB&D site, asked why the LB&D property has been targeted for cleanup over other areas in the City. He recommended that EPA simply pave over the site as a parking lot, with a gravel base and a top layer of concrete. [19]

EPA Response:

Lorentz Barrel & Drum was targeted for cleanup because of noncompliance with hazardous waste management regulations. There are several Superfund sites in the South Bay, as well as sites under state orders requiring cleanup actions. If additional information is gathered indicating other sources of potential chemical contamination in areas near the Lorentz site, those sources will be investigated. Investigations of this sort may result in a site being added to the federal or state Superfund list. Paving over the Lorentz site will not result in cleaning up the groundwater contamination plume which has migrated

offsite. The potential threat that exists to public health and the environment would not be alleviated by this alternative.

11. Comment:

One community member questioned why spent carbon solids could not be incinerated at a location on the LB&D site rather than at an incineration facility in Texas.[20]

EPA Response:

It would be very difficult and expensive to obtain a licensed mobile hazardous waste incinerator to come to the site to incinerate such a small amount of GAC. Mobilization costs are a major component of overall mobile incineration costs. On a per-ton basis, the resulting costs would be prohibitive.

12. Comment:

That same commenter, referring to the proposed treatment alternatives, asked that EPA consider more closely: the pollution caused by natural gas during incineration; the number of British thermal units (Btu) per hour dispersed into the air following incineration; Bay Area standards set for pollution in the air; and the possibility of simply using evaporation treatment on the water. [22]

EPA Response:

From AP-42 (an EPA compilation of air pollutant emission factors), the following pollutant emissions can be expected from a natural gas incinerator.

	Emissions in $lb/10^6$ cu ft	Emissions in $lb/10^6$ Btu
Particulate	1 to 5	0.001 to 0.005
Sulfur dioxide	0.6	0.0006
Nitrogen oxides	100 to 140	0.1 to 0.14
Carbon monoxide	20 to 40	0.02 to 0.04
VOCs - methane	2.7 to 3	0.0027 to 0.003
- nonmethane	2.8 to 5.3	0.0028 to 0.0053

At a rate of 32,000 Btu/min, or 1.92 x 10^{-6} Btu/hr, the AP-42 estimated emissions from the burning of natural gas are:

	Estimated Emissions in lb/hr
Particulate	0.0019 to 0.0096
Sulfur dioxide	0.0012
Nitrogen oxides	0.192 to 0.269
Carbon monoxide	0.038 to 0.077
VOCs - methane	0.0052 to 0.0058
- nonmethane	0.0054 to 0.0102

- All of the energy consumed in the incinerator would be released to the atmosphere, either through the flue gas or radiant heat loss from the incinerator and its peripherals.

- Bay area standards for carcinogenic emissions are addressed in the risk assessment (Section 6.0 of the Decision Summary). None of the pollutant emissions listed in the table would exceed the BAAQMD limit of 15 lb/day.

- The use of evaporation for treated groundwater is addressed in the answer to question 1 in this section.

- Results of treatability studies have shown that the incinerator should not be necessary.

13. Comment:

One community member said that the "No action" alternative should be considered more seriously as being in the public's best interest at this time. [22a]

EPA Response:

The "no action" alternative was not selected for this ERA because it would do nothing to alleviate threat that the shallow groundwater poses to the deeper drinking water aquifer. The "no action" alternative will be considered during the RI/FS.

14. Comment:

One representative of a community organization wanted to know the nature of the emissions coming out of the old incinerator that operated on the site. He also wanted to know the composition of the ash that is still on the ground. Finally, he wanted to know if

EPA is going to take shallow soil samples downwind of the site to determine if there is any metals contamination. [23]

EPA Response:

Based on current knowledge, EPA does not know what the emissions from the onsite incinerator were. EPA has already sampled ash from the incinerator. The samples contained minimal organic contaminants, at concentrations far below EPA's cleanup limits. However, the samples contained high concentrations of lead and zinc. As part of the RI, additional samples of the ash will be taken and analyzed to determine its composition. Shallow soil samples will also be taken around the incinerator's location and analyzed to determine if there is metals contamination present. If the results of these analyses are positive, additional samples will be taken (concentrically from the source) in order to assure that the area of contamination is fully defined. A detailed description of planned RI sampling activities is contained in the RI Field Sampling and Analysis Plan (FSAP), which was published in June 1988.

15. Comment:

One community member, referring to the Fort Detrick, Maryland studies on the epidemiological effects of airborne bacteria, asked what contaminants might be released from an onsite air stripper. [24]

EPA Response:

The contaminated groundwater at the site is not expected to contain any harmful bacteria. This, in conjunction with adequate equipment maintenance, suggests that release of airborne bacteria from an air stripper operation would be very unprobable if this alternative had been chosen. As pointed out in Sections 9 and 10 of the ROD, however, this alternative was not selected by EPA following treatability studies.

16. Comment:

That same commenter, referring to the ozone-ultraviolet (ozone-UV) and GAC treatment alternative, suggested that "reactive ion etching" would be a more effective treatment technology because this technology utilizes more radicals and, therefore, has a faster

reaction time and is not dependent on an ultraviolet light source. This commenter also questioned how the natural gas and electrical facilities would be impacted if the ozone/UV treatment alternative were chosen. Specifically, he expressed concern about potential power shortages affecting the local community and industries. [25]

EPA Response:

EPA is not familiar with the term "reactive ion etching." The commentor is possibly referring to ozone-peroxide oxidation, which uses free radicals to decompose organic compounds. EPA has investigated ozone-UV treatment, which is known to be more effective than ozone-peroxide treatment. The treatability studies will determine whether ozone-UV is the best technology. If it is, the vendor of the treatment system will be responsible for generating the ozone on site.

Remedial activities will not use enough natural gas or electric energy to have any adverse affects on service to the community.

17. Comment:

One commenter, referring to EPA's plan to conduct well surveys, suggested instead that the site be isolated from the existing aquifers using a dolomite pump to isolate the clay soil from the sandy soil -- much like a slurry wall. [26]

EPA Response:

At the time the Engineering Evaluation and Cost Analysis (EE/CA) was finalized, there was not enough information available to determine whether or not slurry walls, or any other containment technology, would be effective. As a result, containment was not considered viable for the ERA. Additionally, the Superfund Amendment and Reauthorization Act of 1986 (SARA) favors the implementation of remedies that permanently treat the contamination, as opposed to remedies that merely contain it. However, a significant amount of new information will be generated during the RI. That new information will allow containment technologies to be considered during the FS.

5.0 RESPONSES TO COMMENTS FROM SILICON VALLEY TOXICS COALITION LETTER OF JUNE 30, 1988

The Silicon Valley Toxics Coalition (SVTC) letter of June 30, 1988 is reproduced as Exhibit 1. The questions have been numbered and the responses in this section relate to those numbers.

1. As part of the Phase I Field Investigation of the Remedial Investigation (RI), a well survey will be performed. After these wells have been identified, an assessment will be made regarding whether they could serve as vertical conduits between the shallow and deeper aquifers. Appropriate action to prevent cross aquifer contamination will be taken. Section 4.1.3.5 of the Final Work Plan provides more details on this survey.

2. The concern of vertical cross contamination between aquifers is addressed in question 9 (pg III-4-4) of the previous section.

3. The Field Sampling and Analysis Plan (FSAP) for the RI, finalized in August of 1988, presents a detailed explanation of all sampling and analytical work that will be performed during the RI. Sample locations are shown on Figures 3-10 through 3-15 of the FSAP. The monitoring wells will include several locations similar to those proposed by the SVTC.

4. The groundwater extraction system is presented in Section 8.2.2 of the Decision Summary. As stated in that section, the conceptual design prepared for the Engineering Evaluation and Cost Analysis (EE/CA) was based on limited information. The final design will be based on information gathered during the field investigation of the RI, through October 1988. The final number of wells will be determined at that time.

5. Several points should be made in responding to this question. First, if the treated water was reinjected into the same aquifer (i.e., shallow aquifer) from which it was drawn, it would probably not be used as drinking water. (Potable water supply wells utilize the deep aquifer.) However, if water was reinjected at all, it would need to be of a quality which is in compliance with state and federal regulations. Bench-scale treatability studies performed in July/August, 1988 indicated that treated effluent can meet Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act, as well as DHS drinking water action levels. Further studies will be performed, however, to ensure attainment of these levels. Specifically, an onsite pilot-scale demonstration of

the treatment alternative recommended in the ROD is being planned by EPA Region IX in conjunction with EPA's Superfund Innovative Technologies Evaluation (SITE) program. Results will confirm whether the treatment technology can attain stipulated water quality standards.

6. As stated in the answer to question 5 (pg III-4-3) in the previous section, the available information indicates that reinjection of the treated effluent would be less reliable and more expensive than discharge to the storm sewer and Coyote Creek. The effluent will be treated to below all regulatory limits. Each of the treatment alternatives investigated in the EE/CA incorporate backup systems to ensure that no untreated water is accidently discharged to the creek.

7. As stated above, reinjection will be considered in the RI/FS. The SVTC's "Percolation Ditch Plan" will be considered as one of the reinjection options.

Silicon Valley Toxics Coalition

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Environmental Studies, San Jose State University

EXHIBIT 1

30 June 1988

Mary Masters
Remedial Project Manager
U.S. Environmental Protection Agency
215 Fremont Street (T-4-5)
San Francisco, CA 94105

Dear Mary,

I would first like to express my appreciation for the chance to comment on the cleanup processes of the Lorentz Barrel and Drum Superfund site. Releasing a report and offering a public comment period, and then having a community meeting, is a very positive move.

Given the opportunity to comment on the cleanup alternatives of the site, I am aware that there are more tests to be made and new results found. In this letter of comment, I will list concerns and questions, and give a suggestion for the placement of treated water.

I. Concerning wells drilled and the effects on the shallow and deep aquifers:

-- I suggest that the abandoned wells be sealed to prevent seepage to the lower aquifer.

-- In monitoring the lower aquifer, precautions should be taken to prevent vertical seepage.

-- Would monitoring wells drilled into the deep aquifer around the perimeter of the defined plume area help to identify deep groundwater contamination? (see illustration)

-- Would the planned 80 wells drilled for the pumping of contaminants be enough, or are more pumping wells needed to catch water flowing in the obvious direction of plume movement?

-- If treated water were to be recharged into the same aquifer, would it be safe to drink?

Comments:

I think it is necessary to keep the treated water as close to the site as possible and not have possible contamination in other areas of the valley. The alternative to placing treated water into Coyote Creek seems to be a means of giving the water to people downstream.

Attached is an idea I hope can be useful in the cleanup procedure.

II. Percolation ditch plan

Treating the pollution as close to the site as possible after pumping the water out, and then letting it percolate back into the ground, will hopefully flush the contaminants out of the soil.

The positive aspects of this plan are that the water is recycled and kept near the site.

Drilling monitoring wells beyond the pumping wells will aid in keeping track of any escaping contaminants into the deep aquifter.

The percolation ditch is "V" shaped and perforated for strength and faster percolation, respectively.

Thanks for your consideration.

Sincerely,

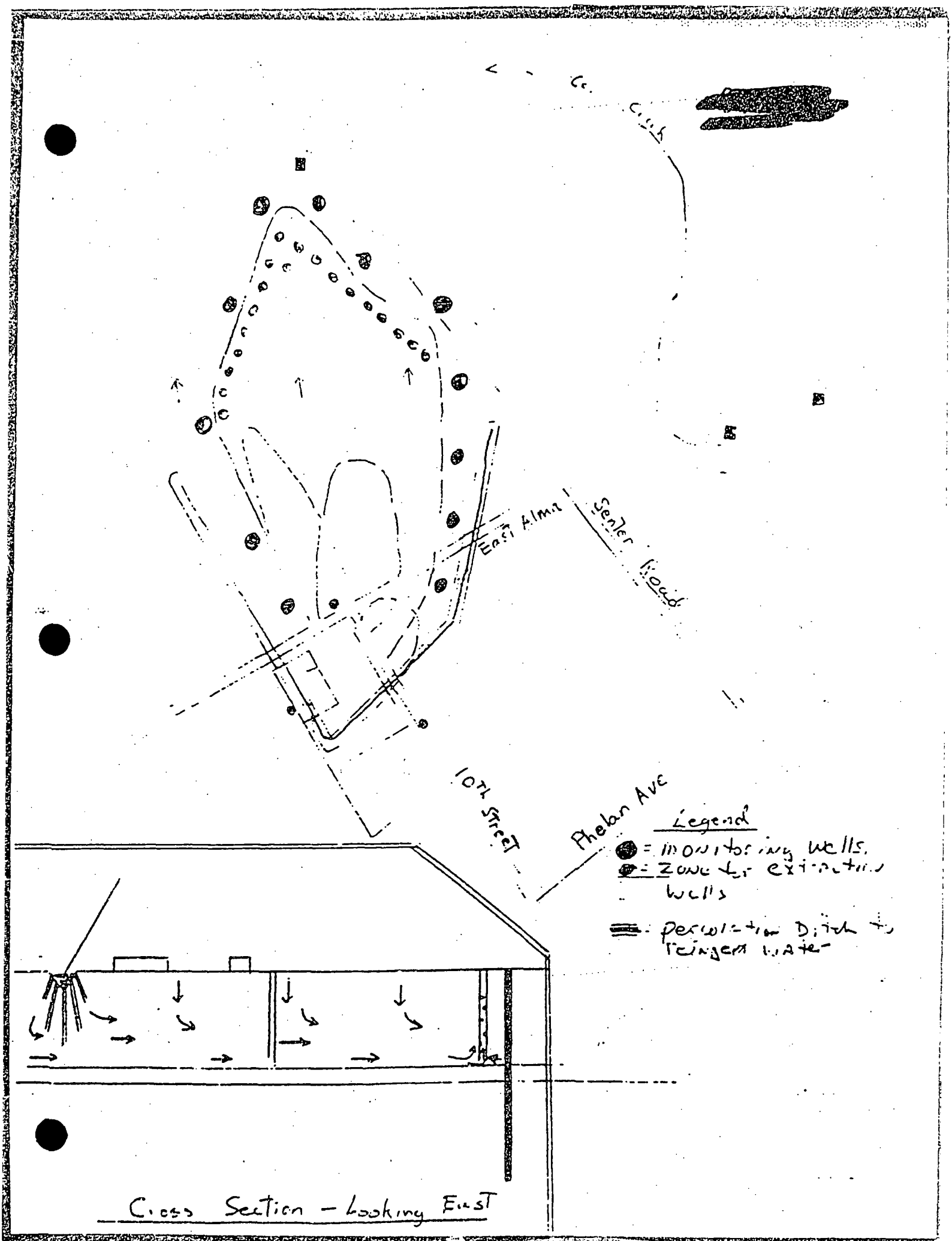
Bruce Beale

Bruce Beale

Ted Smith

Ted Smith

BBonp
Enc.


Co. Canal
East Alma
Senter Road
10th Street
Phelan Ave
Legend
= monitoring wells.
= zone for extraction wells
= percolation Ditch to recharge water
Cross Section - Looking East

6.0 RESPONSES TO COMMENTS FROM REED CORPORATION LETTER OF JUNE 30, 1988

The Reed Corporation letter of June 30, 1988 is reproduced as Exhibit 2. The questions are numbered, and the responses in this section refer to those numbers.

1. The shallow aquifer is not in use as a drinking water (or bathing) source at the current time. However, the Superfund Public Health Evaluation Manual, which provides guidance in assessing risks, requires the United States Environmental Protection Agency (EPA) to consider the ingestion, dermal, and inhalation pathways anyway. It is possible that some development may occur in the future, and this development could expose the public to risks from contaminated groundwater through the stated pathways.

2. The desired cleanup level for arsenic for use during the Expedited Response Action (ERA) is 0.23 parts per billion (ppb) (230 parts per trillion (ppt)) (see Table 8-2 of the Decision Summary). This represents an estimated cancer risk of 10^{-4}. Since the treated groundwater will be discharged to a surface water body during the ERA, the cleanup requirements were derived by comparing National Pollution Discharge Elimination System (NPDES) limits with the 10^{-4} cancer risk level. The more stringent level was then selected.

3. The levels reported on in Table 2-3 of the Engineering Evaluation and Cost Analysis (EE/CA) (Table 5-3 of the Decision Summary) are merely summaries of older data published by other contractors. In the case of barium, Table 8-2 of the Decision Summary shows that there is no desired cleanup level.

4. Please see the response to question 1 in this section.

5. 6.4 ppb represents the total of all types of polychlorinated biphenyls (PCBs) (1221, 1242, etc.) from well MW-4B in Table 2-3 of the EE/CA (Table 5-3 of the Decision Summary). While it is true that several of the more highly chlorinated PCB compounds have solubilities less than 6.4 ppb, the Handbook of Environmental Data on Organic Chemicals (2nd Edition, Van Nostrand Reinhold Company, New York, 1983) provides the following solubilities for the specific PCB compounds found at the Lorentz Barrel & Drum (LB&D) site:

Compound	Solubility at 24°C (ppb)
PCB 1221	590
PCB 1242	100
PCB 1254	57
PCB 1260	80

6. Superfund contractors are required in many cases by EPA to use certain methods to monitor quality control (QC) available only at EPA specified contract labs. In determining groundwater quality to identify contaminant plumes, for example, EPA would not allow the use of 2 to 3-year-old data taken by private contractors and analyzed outside the contract lab program. The statement in the EE/CA does not indicate that the work was poorly done; it merely indicates that it can only be used to a certain extent (i.e., to show the presence of contamination) and that more monitoring is required.

7. The purpose of the EE/CA is to establish the need for the ERA. It did not include a detailed investigation into the presence of upgradient sources. Such an investigation will be part of the Remedial Investigation (RI).

8. The purpose of the order of magnitude cost estimates was to assess feasibility only. The estimates incorporated the assumptions stated in the EE/CA. The RI will define the location of the plume in more detail.

9. The concern is based on the current level of information about the aquitard. The writer seems to agree in the second paragraph of his letter, that "the relationship between the upper and lower aquifer is not well known." Since this is the case, EPA did not want to risk the lower aquifer because of a lack of information.

10. According to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendment and Reauthorization Act of 1986 (SARA), the source of the vinyl chloride in the groundwater is only important as it relates to the potential to cleanup a source area and the potential for the government to recover cost from a potentially responsible party. If the groundwater is contaminated, it must be addressed. The RI field program will locate whatever sources remain on site. With regard to the other comment on health risks, please see the answer to question 1 of this section.

11. The risk levels shown on Table 5-1 of the EE/CA are based on a preliminary risk assessment. A more detailed and complete risk assessment will be prepared as part of the RI/Feasibility Study (FS). Also, see the answer to question 1 of this section.

12. Please see the discussion in Section 8.2.2 of the Decision Summary. A significant amount of additional work will be performed before the groundwater extraction system is finally designed. Please see the answer to question 5 in Section 4.0 of this Responsiveness Summary for a discussion of groundwater reinjection. As stated in the EE/CA, these costs are based on Ebasco Services, Incorporated experience and related RI/FS work in the region.

13. Please see the discussion in Section 5.4.3 of the EE/CA which shows that Bay Area Air Quality Management District (BAAQMD) requirements lead to the conclusion that the fume incinerator is necessary. As stated on page 5-24 of the EE/CA (May, 1988), a granular activated carbon (GAC) system for the off gas was not selected because of some concern that it might not be effective in absorbing vinyl chloride. However, as a result of treatability studies undertaken in July/August 1988, the capability of a vapor phase GAC to cost-effectively remove vinyl chloride has been established. In view of this finding, fume incineration is no longer considered to be a necessary component of the vapor control system.

14. The LB&D site has been proposed for inclusion on the National Priorities List (NPL). The question of the relative risk of LB&D as compared with other Silicon Valley sites was addressed when the site was proposed in 1984.

EXHIBIT 2

REED CORPORATION

Environmental Engineering

2140 Shattuck Avenue, Suite 504
Berkeley, CA 94704
(415) 524-0450
Mobile (415) 860-1125
Telecopy (415) 232-3706

June 30,1988

U.S.E.P.A.
215 Fremont Street (t-1-3)
San Francisco, CA 94105

CONFIRMING COPY
ORIGINAL SENT BY
TELECOPY ON 6/30/88

ATTN: Ms. Gail Louis
Community Relations Coordinator

Subject: Comments on the EE/CA for the Lorentz Superfund Site

Dear Ms. Louis:

The following comments have been developed based on my review of the REM III Program Final Engineering Evaluation and Cost Analysis for a Shallow Ground Water Collection and Treatment System Lorentz Barrel and Drum Site San Jose, CA dated May 1988 and prepared by EBASCO. For your information, I was the most recent environmental consultant for the Lorentz Barrel and Drum Company. Besides being very familiar with the area and the site, my qualifications for preparation of these comments, includes the management and review of over two dozen similar ground water and soil clean-ups at Superfund sites in California and other areas of the United States. I have organized my comments in the same order as the report.

P. 2-6 2.3.1 Regional Hydrogeology of the Santa Clara Valley
P.2-8 2.3.2 Site-Specific Hydrogeology

As shown on Figure 2-3, the 500 foot deep wells clearly show that there is an 60 feet thick (and likely impermeable) clay layer below the site, which should retard ground water movement and contaminant transport. Additionally as shown on Figure 2-3 and as noted on p. 2-12 there does not appear to be ground water below this clay layer. Also on p. 2-12 it is indicated that the relationship between the upper and lower aquifer is not well defined at this time.

p. 2-14 2.4.1 Contaminants of Concern

The generalized description of the potential volatile organic contaminants indicates that the ...potential exposure pathways consist of ingestion, dermal contact, and inhalation of vapors from contaminated ground water...; however, the hydrogeology indicates that the aquifer of concern is likely perched and is not in use as a drinking water (and likely would not come into use due to high total dissolved solids), and these pathways do

1

not appear to be realistic concerns with respect to public health.

Specific concerns of regarding other contaminants are as follows:

- o Arsenic - while the Department of Health Service (DOHS) has an action level of 2.0 parts per trillion in the California Administrative Code Title 22 drinking water standards (64435 Table 2) show that the maximum contaminant level (MCL) is 0.05 ppm or 50,000 parts per trillion. The MCL would appear to be a more realistic goal for discharge to non-potable water such as would occur in the Lorentz matter. (2)

- o Barium - The reported levels of 160 ppb of barium from the CH2MHill reports appear to be above the solubility of barium in this ground water. Equilibrium would be approximately 100 ppb or less in the presence of sulfates. Additionally, the Title 22 standard for barium is 1000 ppb, which would appear to be a more realistic human health concern level. (3)

- o Vinyl Chloride - The EBASCO report states that the MCL for Vinyl Chloride is 1 ppb; USEPA MCL is 2 ppb effective 12/31/88. In any case the concerns over actual health hazards from the reported levels of vinyl chloride appear to be overstated due to the fact that the ground water is not used for drinking and the highly volatile nature of vinyl chloride which would cause it to be readily out-gassed during any normal usage of the water. (4)

- o PCB - The level of 6.4 ppb of PCB does not appear in Table 2-3 of the EBASCO report. The highest level shown is 4.0 ppb. These results appear to be higher than would normally be anticipated for PCB solubility in water. (5)

p. 2-24 2.4.2 Analytical Data Review

Monitoring Well Analyses

I take strong exception to the statements that "The quality of the ground water analyses from investigations prior to the CH2M HIll study is poorly known, because sampling activities were minimally documented. Original lab reports for the work done by Associated Laboratories and Brown and Caldwell are not available at this time, and the results were transcribed from handwritten notes and faded photocopies." I personally transmitted via facsimile copies of information requested by Ms. Robin Scott of EBASCO in January 1988. At that time I informed her that copies of all lab data sheets were available at the DOHS or RWQCB files, and that I assumed that she had ready access to this information. I never heard back from Ms. Scott, and therefore assumed that she got what she wanted. Additionally, all appropriate documentation of sampling was submitted to the RWQCB and all information was available from the files of the Lorentz consultants with minimal additional effort from EBASCO. (6)

p. 2-27 2.4.3 Extent of Shallow Aquifer Ground Water Contamination

Reference is made to Figures 2-6a and 2-6e show contamination VOC starting substantially to the south of the Lorentz site near the area of the bus (private) maintenance facility (see Figures 2-6d and 2-6e specifically). No mention of upgradient contamination is made, why is that and to what source is this likely due to? (7)

p. 2-33 2.4.4 Contaminant Extent Data Gaps

It is indicated that the extent of the plume must be determined before a final treatment system design can be completed. How can a meaningful cost estimate be developed without knowledge of the extent of the plume? How does one assume the length of the plume (i.e. the distance of pipelines to return to the site) or the number of wells without this information, and why hasn't this information been determined in the work completed over the last two years by DOHS and EPA? (8)

p. 2-33 2.5.2 Potential Impacts

The premise that the contaminated plume will reach potable drinking water is weak and quite implausible given the local hydrogeological conditions. To assume that there is sufficient VOC material present in the ground water where the highest concentration of total VOCs is less that 4 ppm (MW-4 TMA 7/86) is frankly ludicrous. There are dozens of sites in the Silicon Valley where 50 times this levels of VOC materials are present in the ground water. Additionally, in the 40 years of Lorentz operation there has never been any indication of any potential or actual deep aquifer contamination. (9)

p. 5-3 5.2 Alternative A: No Action (Periodic Ground Water Monitoring)

Reference is made to Table 5-1 regarding relative risk, however, closer review of Table 5-1 would indicate that essentially all of the risk is related to Vinyl Chloride which most likely being produced naturally by biological processes in the soil from materials released to the ground water by someone in the area. Vinyl Chloride accounts for 7.24*10-2 of 7.85*10-2 (or 92 percent of the estimated risk). Clearly, this conditions dramatically overstates the relative health risk of the non-potable ground water in this area. (10)

I strongly disagree with the assumptions made in this section. First, no single sample was utilized for this comparison. It appears to make little sense to add up the highest data from unrelated samples (spatial and time variations in all samples).

Second, the assumption that the very deep drinking water would be contaminated to the same degree as the shallow aquifer is silly. Clearly, by simple dispersion dilution of the water would occur and substantial adsorption of these materials would occur during the vertical movement of these materials in the unsaturated zone between the shallow and deep aquifer. (11)

Third, because the water has nearly 2000 ppm of TDS it is not logical that one would ever drink any of this shallow ground water or that anyone would ever drink the estimate 51,100 liters per life time used in this estimate (nearly 14,000 gallons).

Fourth, no existing public health risks have been identified or a pathway quantified even though a comment is made to this effect in the text.

p. 5-5 5.3 Alternative B: Ground Water Removal; GAC Treatment Disposal to Storm Sewer

It is indicated that no pumping tests have been completed and that this would be required prior to final design. Why hasn't this been done to date? Our analysis indicates that 50 gpm or so is likely to be the maximum flow available from the site with a reasonable number of wells (less than 10). How was the number of 80 wells derived without the pump test data?

It does not appear that the data support the requirement for the 80 wells shown on Figure 5-1 nor does hydrogeological or chemical data support the relative spacing of the wells with the exception of the approximate location of the plume in the northerly direction (recall that EBASCO previously stated that the extent of the plume was unknown). It is very unlikely that the wells will produce anything near to the five gpm assumed.

On p. 4-9 the concept of ground water reinjection was discarded; however, closer review may indeed indicate that this is the only effective alternative from the hydrogeolgical standpoint. (12)

Several costs in Table 5-3 appear to be quite high. The cost of well installation per foot is approximately $125 (based on summing $55,500+126,000+107,000+163,000 and dividing by 80*45 feet = 3,600 feet). No well diameter information is given in the report. Assuming that four inch wells were constructed a cost of one half of this amount would be more typical.

Additionally, the cost of $252,000 for 80 wells results in a cost of over $3,000 for a pump and installation. My experience indicates that $2,000 is more typical. No cost is shown for electrical installation and no information is presented on the cost per foot of pipe trench.

The parameters for the design of the GAC units appear to be within standard ranges.

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IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA

UNITED STATES OF AMERICA, Plaintiff, v. E.I. duPONT deNEMOURS & CO., UNION OIL CO. OF CALIFORNIA, GREAT WESTERN CHEMICAL CO., KTI CHEMICALS INC., ASHLAND OIL, INC., INTERNATIONAL BUSINESS MACHINES CORP., ROMIC CHEMICAL CORP., VI-TEX PACKAGING, INC., ESSELTE PENDAFLEX CORP., H.H. ROBERTSON CO., and A.J. DAW PRINTING INK CO., INC., Defendants.	CIVIL NO. APPENDIX B TO PARTIAL CONSENT DECREE

1042-00308

WORKPLAN
SHALLOW GROUND-WATER TREATMENT
REMEDIAL DESIGN
LORENTZ BARREL & DRUM
SAN JOSE, CALIFORNIA

Prepared for

E.I. DU PONT DE NEMOURS & CO.,
UNION OIL COMPANY OF CALIFORNIA,
GREAT WESTERN COMPANY,
KTI CHEMICALS, INC.,
ASHLAND CHEMICAL COMPANY,
ROMIC CHEMICAL CORPORATION
IBM CORPORATION
ESSELTE PENDAFLEX CORPORATION
VI-TEX PACKAGING, INC.
H.H. ROBERTSON CO.
A.J. DAW PRINTING INK CO.

December 1989

Prepared by

EMCON Associates
1921 Ringwood Avenue
San Jose, California 95131

Project 787-03.01

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LIST OF ACRONYMS USED IN THIS DOCUMENT

ARARs	Applicable or Relevant and Appropriate Requirements
BAAQMD	Bay Area Air Quality Management District
BNAs	Base-Neutral and Acid Extractables
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
CPT	Cone penetration testing
CSI	Construction Specification Institute
DHS	California Department of Health Services
DWR	Department of Water Resources
E&D	Engineering and design
EE/CA	Engineering Evaluation and Cost Analysis
EPA	United States Environmental Protection Agency
ERA	Expedited Response Action
FOP	Field Operations Plan
FSAP	Field Sampling and Analysis Plan
GAC	Granular activated carbon
gpd	gallons per day
HSO	Health and Safety Officer
HSP	Health and Safety Plan
I&C	Instrumentation and Control
LB&D	Lorentz Barrel & Drum
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance

OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
PCBs	Polychlorinated Biphenyls
PD	Project Director
PE	Project Engineer
PFD	Process Flow Diagram
PG&E	Pacific Gas and Electric
P&I	Process and Instrumentation
PM	Project Manager
ppb	parts per billion
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
RM	Regional Manager
RO	Resident Observer
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
S&A	Supervision and administration
SCVWD	Santa Clara Valley Water District
SDC	Services during construction
SITE	Superfund Innovative Technology Evaluation
SPT	Standard Penetration Test
TSD	Treatment, Storage, and Disposal
TTLC	Total Threshold Limit Concentration

UV	Ultraviolet
VE	Value Engineering
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This workplan is for the shallow ground-water Remedial Design (RD) of the Expedited Response Action (ERA)/Operable Unit at the Lorentz Barrel & Drum (LB&D) Superfund site in San Jose, California. The workplan is prepared for E.I. du Pont de Nemours and Co.; Union Oil Company of California, d.b.a. Unocal/Ansco; Great Western Chemical Company; KTI Chemicals, Inc.; Ashland Chemical Company; ROMIC Chemical Corporation, IBM Corporation, Esselte Pendaflex Corporation, and Vi-Tex Packaging, Inc. (hereafter the "Parties"). This workplan supercedes the May 1989 *Final Workplan, Shallow Ground-Water Treatment Remedial Design, LB&D*, prepared by Ebasco Services Incorporated for EPA (Ebasco, 1989).

1.1 WORKPLAN SCOPE

The scope of this workplan is to describe the tasks that will be performed to further evaluate and optimize ground-water extraction and treatment alternatives; develop design details, drawings, specifications, and bid documents; provide design support and construction oversight services for construction of the shallow ground-water extraction system, the associated ground-water conveyance system, and ground-water treatment facilities; and provide assistance during the startup of the ground-water remediation facilities. These facilities will be designed to meet or exceed the air and water discharge objectives identified in the EPA *Lorentz Barrel & Drum Engineering Evaluation/Cost Analysis (EE/CA) Record of Decision (ROD)*, (Ebasco, September 1988).

As discussed in the ROD, until a final decision is reached between EPA and the California Regional Water Quality Control Board (RWQCB) concerning appropriate effluent limitations for nickel, it is assumed that National Pollutant Discharge Elimination System (NPDES) discharge limits require nickel removal.

The remedial design objectives and approaches will be defined along with the design basis and assumptions and limitations.

Applicable or Relevant and Appropriate Requirements (ARARs) and standards used in the design will be identified.

This document also provides a schedule for completing the design and construction oversight of the extraction and treatment facility.

1.2 WORKPLAN FORMAT

This Workplan consists of four sections. Section 1.0 is the introduction. Section 2.0 presents a summary of existing information about the LB&D site and provides an overview of the site history, topography, and known contaminants. Section 3.0 discusses the water and air quality objectives of the ROD and the general RD criteria for the RD work assignment. Section 4.0 discusses the RD approach using tasks similar to those presented in the May 1989 Final Work Plan (Ebasco, 1989); each task has been divided into various subtasks to reflect all items of work required to fulfill the RD. Section 5.0 discusses the narrative schedule presenting deadlines for deliverables and other activities. A list of referenced documents is provided following Section 5.0. All tables and figures follow the reference list.

2.0 SUMMARY OF EXISTING INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The LB&D site is located at 1515 South 10th Street, on the southwest corner of the intersection of East Alma Avenue and South 10th Street in the southern portion of the City of San Jose, Santa Clara County, California (Figure 2-1).

A land use map of the site and vicinity is shown in Figure 2-2. The site is zoned for manufacturing (zoning ordinance, City of San Jose). The residential district to the north and east of the LB&D site includes Spartan Field (San Jose State University football stadium), San Jose Municipal Stadium (City of San Jose), and San Jose State University recreation fields. The housing closest to the site consists of San Jose State University student housing, approximately 1/4 mile north of the site.

The site's topography is nearly level, with a slight slope from the southwest corner to the northeast corner. The highest elevation at the southwest corner is 107 feet and the lowest point at the northeast corner is 102 feet above mean sea level.

The climate of the San Jose area is characterized by warm, dry summers and cool, wet winters. The City of San Jose is in the Santa Clara Valley, bordered by the Santa Cruz Mountains and the Diablo Range. These mountains inhibit ocean influences, resulting in more extreme temperature ranges than are generally experienced in coastal areas. Normal January and July daily average temperatures are 49.5°F and 68.8°F, respectively. Annual minimum temperatures are generally a few degrees below freezing, while maximum temperatures exceeding 100° are common.

Winds during the summer generally blow from the north-northwest; winds during the winter generally blow from the southwest. Records from Moffet Field Naval Air Station, approximately 12 miles northwest of the site, show that annually, winds come from the north-northwest approximately 36 percent of the time and from the southwest 23 percent of the time. Winds from the south and southeast

occur about 19 percent of the time and from the northeast about 6 percent of the time. Winds are calm approximately 16 percent of the time. The highest average annual wind velocity of approximately 9 miles per hour comes from the north-northwest.

Normal annual rainfall is 13.9 inches, most of which falls during November through April.

The mountains surrounding the Santa Clara Valley form an extensive air-holding basin. Air pollution levels generally increase in this basin during late summer and early autumn as prevailing northerly winds add pollutants from the northern San Francisco Bay area to those generated locally.

The site is in the southeastern corner of the San Jose subarea as defined by the California Department of Water Resources (DWR, August 1967). This subarea is an important natural source of ground water in the south San Francisco Bay area (South Bay). The deep aquifer (250 to 400 feet below ground surface) is a major source of potable ground water, from which Santa Clara Valley extracts an estimated 107,000 acre-feet per year. Three public water supply well fields (owned by San Jose Water Company), at the 12th Street, Cottage Grove, and Needles Stations, are within 1 mile of the site. San Jose State University wells are at the Spartan Stadium and on the main campus. Water from these wells is used for irrigation, public consumption, and bathing.

The major surface water stream in the vicinity is Coyote Creek. It is approximately 1/2 mile from the site, toward the northeast. Coyote Creek perennial flows are regulated by Coyote and Anderson reservoirs, which are controlled by the Santa Clara Valley Water District (SCVWD).

At the time drum processing operations started in 1947, the site encompassed 10.5 acres of land. Parts of the original site were subsequently sold. The current site is L-shaped and covers 5.25 acres of which approximately 4.5 acres are capped with tar and gravel. The area that is now sealed was used for drum storage and covers sections of soil that were discolored and possibly contaminated.

On the remaining 0.75 acre are five buildings that housed the drum reconditioning facilities. Two sumps and one open storage bin adjacent to the facilities have held liquid and sludge. The facilities show signs of extended use with minimal upkeep, as evidenced by eroded concrete, rusted metal structures, and conduits in various stages of disrepair. Figure 2-3 shows the locations of the on-site facilities.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 History of Site Activities

The Lorentz family started recycling drums at the site in 1947. During the early years, portions of the site were also rented or leased to other companies. Several facilities were in operation around 1954, including an autowrecker, a junkyard, a roofing company, a construction company, and sandblasting services.

Drums for recycling were received from both private and public sources throughout California and Nevada. Private sources included over 800 different companies, representing chemical, food, health care, electronics, paint, ink, and paper industries. Public sources included military bases, research laboratories, and county agencies. Drums arrived at the site containing residual aqueous wastes, organic solvents, acids, oxidizers, and oils. (Under current RCRA regulations, drums sent to a recycling facility can contain no more than 1 inch of residual material.) LB&D also received polyethylene carboys or drums containing caustic residues.

From the 1950s until some time between 1976 and 1978, a drainage ditch (which probably drained processing waste) existed north of the processing structure (Buildings 1 and 2 in Figure 2-3). The northeastern corner of the site had a large sump (30 feet by 80 feet) from the 1950s through the late 1970s. Aerial photographs of the area revealed the presence of liquids in the sump, drainage ditch, and various ponded areas during this period of time. The sump appeared to have been filled with soil before 1980.

San Jose City records have shown that, before 1968, the waste stream from the drum recycling processes flowed from the processing structure, through the drainage ditch, to the large sump in the northeast corner of the site. It was then discharged to the storm drain system. Between 1968 and 1971, the discharge was diverted to the sanitary sewer. Previous investigations have indicated that discharge to the sanitary sewer ceased in 1983 or 1984. After 1984, liquid wastes were reportedly reduced in volume by evaporation, drummed, and disposed of as hazardous waste along with incinerator ash, residual liquids, and sludge. Surface runoff was reportedly collected and recycled in the hot caustic wash cycle of the drum recycling process.

2.2.2 History of Site Investigations

Since 1981, several environmental sampling studies have been conducted at the LB&D site aimed at investigating the extent and nature of contamination. The California Department of Health Services (DHS), their consultants, and various consultants to LB&D have collected soil and ground-water samples from on-site and off-site borings and monitoring wells. On six occasions before 1988, ground-water or soil samples were taken from the site. Numerous metals and organics were found above DHS Total Threshold Limit Concentrations (TTLC). Polychlorinated biphenyls (PCBs) were reported only once in two well samples. Ebasco, under contract to the EPA, is currently conducting the second phase of a remedial investigation to characterize the contamination at LB&D. The completed report on the second phase of remedial investigation findings is expected to be issued by EPA in March 1990.

2.2.3 History of Enforcement Actions

Since 1968, there have been many regulatory actions at the LB&D site. A complete chronological list of enforcement events is given in Appendix B of *An Engineering Evaluation and Cost Analysis for a Shallow Ground-Water Collection and Treatment, System, LB&D* (EE/CA) (Ebasco, May 1988).

The major enforcement episodes have been

- 1982 - The DHS investigated soil contamination, resulting in a Remedial Action Order in 1987.
- 1982 - The RWQCB investigated ground-water contamination, resulting in Clean Up and Abatement Order No. 86-001.
- 1984 - The EPA formally proposed LB&D as a candidate for the National Priority List (NPL).
- 1987 - The LB&D facility ceased operation because of a temporary restraining order from DHS. The EPA assumed the lead agency responsibility for the site remediation.
- Since 1984, several parties have excavated known "hot spots" of contaminated soil from the sump areas. These included three contractors hired by LB&D, and a DHS contractor (Canonie Environmental). Excavated areas are shown in Figure 2-4.
- In December 1987, EPA initiated an ERA Operable Unit for the shallow ground-water plume extending northward from the site. The EE/CA recommended extraction of the ground water, followed by treatment and disposal to the storm sewer.
- In October 1989, EPA issued a Draft Consent Decree, Lorentz Barrel and Drum Site, Shallow Ground Water Operable Unit (U.S. EPA 1989) to the Potentially Responsible Parties (PRPs) for implementing a remediation program for clean up of the shallow ground water.
- In October 1989, EPA formally included LB&D on The National Priority List (NPL).

Other agencies that have cited LB&D for some type of violation include

- California Department of Fish & Game (CDFG)
- San Jose/Santa Clara Water Pollution Control Plant
- California Department of Occupational Safety & Health (OSHA)
- San Jose Fire Department
- Santa Clara District Attorney's Office (Civil and Criminal Proceedings)

2.3 SITE CHARACTERISTICS

2.3.1 Previous Investigations

The LB&D site has been the subject of numerous investigations. The following discussion of regional and site-specific hydrogeology is based on (1) EMCON's knowledge of Santa Clara Valley hydrogeology obtained from numerous ground-water investigations near this site, (2) a report entitled *Technical Memorandum - Preliminary Hydrogeologic Assessment, LB&D* (CH2M Hill, November 1987), (3) data obtained in Phase I of the RI/FS performed by Ebasco between June and December 1988, and (4) information presented in the Final Work Plan (Ebasco, May 1989).

2.3.1.1 Regional Hydrogeology of the Santa Clara Valley

The LB&D site is near the center of the Santa Clara Valley between the Santa Cruz Mountains to the west and the Diablo Range to the east. The Santa Clara Valley is a broad alluvial basin trending northwesterly. It is underlain by a thick sequence of unconsolidated sediments, divided into the lower Plio-Pleistocene Santa Clara Formation, which is somewhat consolidated and has been deformed, and the upper Quarternary alluvium, which is poorly consolidated. This sequence overlies bedrock of Tertiary age. The Holocene and Plio-Pleistocene sediments were deposited in alluvial, interfluvial, and estuarine environments, and consist of interbedded gravel, sand, silt, and clay. The maximum thickness of Quarternary sediment beneath the south San Francisco Bay area is 1,000 to 2,000 feet. The coarser alluvial deposits (sands and gravels) are water-bearing units or aquifers and collectively comprise the South Bay Ground-Water Basin. The San Jose subarea, in which LB&D is located, is considered one of the most important parts of the South Bay Ground-Water Basin because of the thickness and permeability of the water-bearing units.

Based on interpretations by the SCVWD, at least two aquifers exist in the LB&D area. These aquifers are separated by a low permeability marine clay layer or aquitard, formed during past incursions of San Francisco Bay (Figure 2-5). The upper shallow aquifer may be perched, or confined, or both. Approximately

250 feet below the surface lies the major deep confined aquifer from which municipal wells extract ground water for public water supply.

2.3.1.2 Site-Specific Hydrogeology

Based on data obtained in Phase I of the Remedial Investigation/Feasibility Study (RI/FS) performed by Ebasco in 1988, the sediments below the site consist of unconsolidated silts, clays, sands, and gravels. A simplified stratigraphic column is shown in Figure 2-6.

The north-south geologic cross section (see Figure 2-7) shows heterogeneous geologic conditions beneath and downgradient from the site, which are typical of the Santa Clara Valley. Coarser alluvial materials form aquifers (where saturated) and interlayered fine-grained deposits act as confining layers or aquitards. The alluvial sequence is characterized by lateral changes in lithology and hence aquifers and aquitards can be laterally discontinuous. Figure 2-8 shows the monitoring well locations.

In the Phase I study of the RI/FS performed by Ebasco, coarser-grained lithologic zones have been denoted by letters. Zone A is a heterogeneous assemblage of silt, sand, and gravel, underlying the site to a depth of about 20 feet. These are considered to be terrestrial deposits. This zone was previously suspected to contain perched water. However, although moist to wet sediments were encountered at the bottom of this zone during drilling operations, no water-yielding formations were encountered. Water-level measurements taken in December 1988 and March 1989 from wells screened in Zone A show that it has remained unsaturated. Ebasco therefore concluded that appreciable amounts of water are not likely to exist in this zone for significant periods.

Underlying Zone A is a 2- to 7-foot-thick clay/silty-clay layer that is considered to act as a semi-confining aquitard. This clay was encountered in all but one of the 85 borings drilled during the RI/FS. The clay is dark grey-green and is considered to be an estuarine deposit.

Zone B is a saturated, perched aquifer that occurs from about 23 to 40 feet below grade. It is comprised of a heterogeneous and discontinuous assemblage of sands, silts, clays, and minor gravel lenses that are considered to be terrestrial deposits. Thirty (30) monitoring wells and seven piezometers were completed in this zone during the RI. Water-level measurements taken by Ebasco in December 1988 indicate a northward ground-water gradient and suggest the aquifer is semi-confined. The results of sampling from these wells indicate the presence of organic and metal contaminants in some downgradient wells. The ground water in this zone may be discharging into Coyote Creek. Slug and recovery tests performed in Zone B have been interpreted by Ebasco to indicate that transmissivities range from about 200 gallons per day per foot (gpd/ft) to more than 10,000 gpd/ft, indicating the heterogeneity of the sediments and thus their hydraulic properties.

Underlying Zone B is an approximately 35-foot-thick aquitard, consisting primarily of very stiff, dry, green clay/silty clay. The aquitard is generally found between 35 and 70 feet below grade. Saturated sand lenses 1 to 3 inches thick exist near the top of this aquitard. The aquitard was found in the 37 borings that were drilled at least 35 feet deep during the RI, suggesting that this aquitard extends regionally. These sediments are considered to be estuarine deposits.

Zone C is unsaturated, and occurs from about 70 to 90 feet below grade. It is composed of coarse sands, gravels, and cobbles, with interbedded silt and clay lenses. This zone was penetrated in three borings during the RI. The unsaturated nature of this zone suggests that the overlying aquitard is an effective barrier to vertical ground-water transport to this zone near the LB&D site.

Zone D is a saturated, deep confined aquifer, encountered at an approximate depth of 230 feet. The deep aquifer is used for municipal drinking water supplies. The ground-water flow direction in the deep aquifer is governed by cones of depression created by municipal well fields. The deep aquifer is routinely monitored by the SCVWD to assess compliance with drinking water standards. During Phase I of the RI, five wells in this aquifer within 1 mile of the LB&D site were sampled for pesticides, PCBs, and Base Neutral and Acid Extractables (BNAs). The three municipal wells (12th Street Well #13; Needles #1; and Cottage

Grove #6) and two wells on San Jose State University (Stadium Well and Main Campus Well) had no detectable levels of contaminants. The 12th Street municipal wells are approximately 3,000 feet north-northeast (downgradient) of the LB&D site. The Needles and Cottage Grove municipal wells are approximately 2,500 feet east and 3,000 feet southwest (both cross-gradient) of the LB&D site, respectively. The 12th Street, Needles, and Cottage Grove municipal wells are outside the ground-water containment plume currently identified at and downgradient from the LB&D site.

This conceptual model of the site hydrogeology will be refined, improved, or amended based on the data that will be presented in the RI/FS Phase II report, expected to be issued by EPA in March 1990.

2.3.1.3 Soil and Ground-Water Impact

RI/FS investigations of soil and ground-water contamination at the LB&D site date back to 1981, as summarized in Table 2-1. Also included in Table 2-1 are the dates and locations of soil excavations performed as partial remedial actions. Table 2-2 summarizes the history of ground-water investigations performed at the site before this RI/FS, in terms of dates, contractors, and parameters measured.

2.3.2 Sources of Chemical Impact

Residues contained in the used barrels and drums accepted for processing at the site, incineration products of those residues, and other chemicals used to handle, store, or recondition the drums are assumed to have impacted site soils and ground water.

2.3.3 Nature and Extent of Impact in the Shallow Aquifer

Based on the analytical data collected from March 1983 through July 1988 (six sampling events), the shallow ground water beneath both on-site and off-site areas appears to be primarily contaminated with chlorinated volatile organic compounds (VOCs) and some metals. PCBs and pesticides were detected in ground-water samples from wells MW-4 and MW-6 on only one occasion

(October 1986). The data have therefore been considered questionable. Phase I RI monitoring well samples, analyzed through the Contract Laboratory Program (CLP) system, had no detectable levels of PCBs. Samples collected for treatability studies (Ultrox International, August 1988 and Calgon Carbon Corporation, August 1988) in the summer of 1988 also did not contain detectable levels of PCBs (see Table 2-1, July 1988 sample). Influent quality results discussed in the draft *Technology Evaluation Report, Superfund Innovative Technology Evaluation (SITE) Program Demonstration of the ULTROX UV/Oxidation Technology* (July 1989) also indicated no PCBs or pesticides were present.

Table 2-3 summarizes the results of ground-water analyses performed through 1988 by various consultants. Table 2-4 provides the maximum ground-water contaminant levels detected before the RI/FS for this site. The results from a soil-gas study performed by Tracer Research Corporation (TRC, November 1987) are shown in Table 2-5. The TRC reported pattern of water contamination is shown in Figure 2-9. Results from Phase I of the ongoing RI/FS will be presented in Ebasco's RI Report expected to be issued in March 1990.

Issues currently being addressed by Ebasco during the RI Phase I and II studies include determination of the

- vertical and horizontal extent of contamination in ground water in the shallow aquifer
- extent of actual or potential migration pathways, such as potential conduits between aquifers
- potential for vertical migration between aquifers, via either natural or man-made discontinuities

2.3.4 Human and Environmental Exposure Pathways

Contaminated soil and ground water at the site present two potential exposure media.

Potential exposure pathways for contaminants in the soil (metals, pesticides, and PCBs) include dermal contact, incidental ingestion, and inhalation of windblown dust during excavation and construction-related activities.

Potential exposure pathways for contaminants in the ground water at the site are ingestion, dermal contact, and inhalation of vapors for VOCs; ingestion for metals; and ingestion and dermal contact for PCBs (if their presence is confirmed).

Coyote Creek water and sediments may provide exposure pathways for VOCs and metals only if ground-water contaminants migrate into the creek water. Dermal contact or ingestion of the Coyote Creek water would be an exposure pathway for VOCs. Ingestion of the creek sediments would be an exposure pathway for metals.

3.0 SCOPING OF THE REMEDIAL DESIGN

3.1 OBJECTIVES OF RESPONSE ACTION

The ERA/Operable Unit will address the three principal hazards posed by the contaminated shallow aquifer. These hazards are further migration of the plume, potential plume discharge into Coyote Creek and potential contamination of the drinking water supply (deep aquifer). The EPA believes that the drinking water supply is potentially at risk.

The objective of the response action is to mitigate the lateral and vertical migration of contaminated ground water and to prevent potential contamination of Coyote Creek and the drinking water supply by designing, installing, and operating an effective, reliable, and durable shallow ground-water remediation system.

3.1.1 Plume Migration

The migration of the contaminant plume will be addressed by installing and operating a ground-water extraction system, the intent of which will be to mitigate the lateral and vertical migration of contaminated ground water. The design of the extraction system will be based on the available RI data and additional hydrogeological information collected during the RD. The system will emphasize long-term effectiveness, durability, low maintenance, and minimal disruption of the local community.

3.1.2 Plume Discharge to Coyote Creek

Existing data suggest that portions of the shallow aquifer are hydraulically connected with (i.e., discharge to) Coyote Creek. Contamination in the shallow aquifer may therefore eventually lead to Coyote Creek contamination, potentially posing some risk to aquatic life and human populations (via fish or shellfish ingestion or dermal contact). The proposed extraction system will attempt to retard north and northeasterly migration of the plumes toward Coyote Creek, thus preempting such potential risk.

3.1.3 Contamination of the Drinking Water Supply

The San Jose Water Company relies on water contained in the deep aquifer underlying the impacted aquifer. The deep aquifer could potentially become impacted through discontinuities in the 50-foot aquitard, either natural or as created around abandoned private supply wells within the plume areas (see Section 2.0 for a more detailed discussion of the area's ground-water regime). In June 1988, five San Jose Water Company municipal wells were sampled. To date, no contamination has been found in the San Jose Water Company municipal wells near the intersection of Coyote Creek and Interstate 280 (Martha and South 12th Street).

The proposed extraction and treatment system will be designed to remove contaminated water from the shallow aquifer and to control continued lateral vertical migration of the plume. These actions will greatly reduce potential impact to potable water supplies.

3.2 RELEVANCE TO SITE REMEDIATION STRATEGY

The remedial actions taken to date have been aimed at reducing or stabilizing further infiltration of contaminants into the shallow aquifer. These actions have included removing contaminated drums from the site, draining the existing storage tanks, removing the heavily contaminated soil (particularly underneath the former northeast sumps), and (in early 1988) paving most of the site to preclude surface water infiltration from being a continued vector of contaminant transport into ground water.

The proposed interim remediation of the site will retard contaminant migration through ground water by removing and treating some of the water presently contaminated. This action is referred to as ERA/Operable Unit 2 and is considered to be consistent with future action expected to be implemented to permanently remediate site contamination. Although the ongoing RI/FS studies by Ebasco will include evaluation of potential source removal (i.e., contaminated soils) the problem is mainly one of ground-water contamination, a principal remedy of which is ground-water pumping and treatment. The remediation concept

presented in the ROD is, in principle, relevant to and consistent with the overall site remediation strategy.

3.3 REMEDIAL DESIGN APPROACH

During the initial phase of the RD, information from previous investigations and the current RI will be reviewed to determine whether collecting supplemental data to assist with hydrogeologic characterization is necessary for designing an effective and reliable ground-water extraction system. Such data are anticipated to include performing additional aquifer pumping tests and or cone penetrometer tests along the proposed extraction system alignment. Supplemental characterization work may be performed concurrent with the ongoing Phase II RI. This hydrogeologic information, and combined data from the RI and previous investigations, will be used to design an effective ground-water extraction system. The design of the extraction system will incorporate an "in-field design-change flexibility" to allow the system to be tailored to the heterogeneous hydraulic character of the shallow aquifer and thereby maximize system efficiency. For example, the well diameter, screened interval, capacity of pump to be installed, and well spacing may be modified during the field investigation based on the geologic logging of extraction well borings to provide the most efficient capture of contaminated ground water. Where a more transmissive zone is identified, a larger pump capacity will typically be specified to obtain a sufficiently large zone of capture. Where a less transmissive zone is identified, a closer well spacing will be required so that adjacent zones of pumping influence will overlap.

The existing bench- and pilot-scale ground-water treatability data generated using ultraviolet (UV)/ozone treatment process will be thoroughly reviewed. As necessary, the UV/ozone process will be optimized by conducting additional treatability studies. Potential contingent treatments will also be reviewed. The treatment system will be designed to achieve the air emissions and water-quality criteria established in the ROD. The system will emphasize effectiveness, durability, and low maintenance, and the ability to permanently reduce the mobility, toxicity, and persistence of the treated wastes.

Design packages will be prepared that will permit the Parties to procure major equipment items and to obtain a general contractor to construct the system. Major equipment bids will be separate from the construction bids and will be issued before the construction bids. Equipment contracts will be awarded several months before the construction contracts. This will facilitate the early ordering and procurement of equipment with long delivery lead times. The contractor will install and test all components of the selected remedial system. He will also procure and install "off-the-shelf" system components. The Parties and their consultant will (1) review equipment vendors' and contractors' bids and, when necessary, review contractors' detailed shop and vendor drawings; (2) provide design support if design modifications are required; (3) oversee construction; (4) produce an Operations and Maintenance (O&M) manual; and (5) provide startup engineers and services for ongoing operation and maintenance. The responsibilities of the Parties, the Parties Consultant (EMCON), EPA, and the general contractor are shown in Table 3-1.

The RD approach will use site-specific design parameters based on

- results from the SITE Program for UV/ozone
- results of the granular activated carbon (GAC) treatability study
- review of potential contingent treatments
- results from UV/ozone treatment optimization studies
- results of aquifer hydraulic and water-quality testing from the current RI process and from EMCON's pump testing and cone penetrometer testing

The design of the selected remedial measure will consist of the following major components:

- A ground-water extraction system will be constructed flush with the ground surface. The extraction system will be located using a combination of (1) hydrogeologic data gathered in the RI and subsequent EMCON work, (2) a predictive ground-water flow model, (3) geotechnical data for soils and aquifer materials, and (4) the location of structures or utilities that potentially may hinder implementation.

- A reliable and cost-effective ground-water treatment system will be designed to treat the contaminated ground water to acceptable discharge limits as required by the NPDES permit.
- The extraction/treatment equipment will be designed to handle the maximum expected flow and organic and inorganic contaminant loading with appropriate system backups for emergencies. Piping and electrical systems will be placed appropriately to reduce excavation and surface disturbance.

The treatment system will be located on the LB&D site to reduce piping and electrical runs while being close to electrical utilities.

Vendor-supplied equipment, programmable logic control equipment, and the security system will be specified by performance data sheets. Specifications will address materials, workmanship standards, and standard codes that equipment must satisfy.

Construction specifications will request standard "off-the-shelf" equipment, where available, and structures when practicable to reduce design and procurement costs.

Design of the facility will be predicated on the assumption that no new source of contamination will increase present levels of contamination in the aquifer beyond the design capacity of the treatment system. Treatment plant design will accommodate additional sources (e.g. soil wash treatment water, Phase II decontamination water, well development water) if compatible with the selected treatment process.

The RD will conform to the criteria contained in *Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-4A Guidance*, June 1986; the EPA *Superfund Remedial Design and Remedial Action Guidance*, February 1985 (RD/RA Guidance); and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) *Compliance with Environmental Statutes*, October 2, 1985 (50 FR 4796, November 20, 1985).

3.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The National Contingency Plan (NCP) Section 300.68(e)(2)(xii) requires that the determination of appropriate remedial actions include an assessment of environmental and public health ARARs. Federal and state permits may not be required for federally funded remedial actions taken pursuant to Section 106 of the CERCLA. The NCP defines *applicable requirements* as those federal regulations that would normally be enforceable at a site if the actions were not being undertaken pursuant to CERCLA; and defines *relevant and appropriate* requirements as those federal regulations that, although not "applicable," are designed to apply to problems sufficiently similar to those encountered at CERCLA sites that their application is appropriate. The Superfund Amendments and Reauthorization Act (SARA), Section 121, also states that remedial actions must attain state requirements more stringent than federal requirements if they are also applicable or relevant and appropriate.

Section 121(d) of SARA requires the consideration of ARARs and environmental laws, ordinances, regulations, and statutes in remedial actions. SARA also requires consideration of other pertinent criteria and advisories that are not yet promulgated. For the LB&D site, ARARs will be used to examine siting, design, and construction of the facility.

The treatment technology will be optimized or contingent treatment recommended based on (1) its ability to achieve the NPDES requirements shown in Table 3-2 and (2) its ability to destroy contaminants of concern.

The need to utilize a nickel removal technology is pending final determination of an appropriate NPDES permit effluent limitation for nickel. Determining this effluent limitation will include (1) evaluating whether the source is controlled to the maximum extent feasible, (2) analyzing the costs and benefits of reducing (treating) nickel concentrations to (as low as) 7.1 parts per billion (ppb), and (3) assessing effluent toxicity to fish, invertebrates, or both using bioassay procedures to be prescribed by the RWQCB in conjunction with the EPA.

Local regulations such as building codes and standards will also be considered in the RD.

4.0 TASK PLAN FOR REMEDIAL DESIGN

The design tasks required to develop plans and specifications for shallow ground-water extraction and treatment facilities at the LB&D site are discussed below. Also discussed are tasks that provide services during construction (SDC) necessary to place the shallow ground-water extraction/treatment facility in operation.

4.1 TASK 1 - PROJECT PLANNING

This task includes the work efforts required to initiate and manage the design process. The following activities are part of this task.

4.1.1 Workplan Preparation

The objective of this Workplan is to define and establish a mechanism to control the technical scope, schedule, and management approach for RD and SDC activities. The Workplan describes tasks and subtasks to be performed for developing design plans, specifications, and bid documents for construction of a treatment facility, and services after a construction contract is awarded. Execution of this process will conform with the project schedule provided in Section 4.1.6.2.

4.1.2 Site Visit

A site reconnaissance will be conducted to familiarize the Parties and the EMCON design team with details of the site layout and surroundings.

4.1.3 Acquisition and Review of Existing Data

EPA will provide all relevant technical documents regarding the LB&D site and data from the ongoing RI to the Parties as soon as possible. This information will be reviewed in detail by the Parties and EMCON to allow them to become familiar with the hydrogeology and contaminants at the site and in the affected area.

Based on the review of these data, additional data collection needs have been identified. Such data collection is anticipated to include additional hydraulic testing (aquifer pumping or slug tests), additional geologic characterization of the shallow aquifer along the proposed extraction system alignment using cone penetration testing (CPT), and additional treatability testing to optimize UV/ozone treatment and to evaluate contingent remedies.

Soil data required for extraction system design, foundation design, and street jacking pits will be obtained from the Phase II RI that address ground-water data gaps and soil parameters needed for soil remediation. Phase II RI laboratory testing will include ASTM No. D2487, D422, D4318, D2216, D2937, and D2436. These data are expected to be made available to EMCON as they are gathered, reviewed, and approved by Ebasco.

4.1.4 Field Operations Plan

A detailed Field Operations Plan (FOP) will be prepared and submitted to EPA for review and approval, and implemented. The Field Operations Plan will consist of four (4) distinct and separate documents:

Document No. 1: Field Sampling and Analysis Plan (Physical Testing)

Document No. 2: Quality Assurance Project Plan (Treatability Testing)

Document No. 3: Field Sampling and Analysis Plan (Treatability Testing)

Document No. 4: Health and Safety Plan

Data needs include off-site shallow hydrogeologic data, with emphasis on defining more precisely the hydrogeologic heterogeneities in the shallow aquifer for an efficient extraction system design and performing additional testing to optimize UV/Oxidation treatment and review contingent treatments. To expeditiously collect the required additional data, the Field Sampling and Analysis Plan (Document No. 1) for the geological and hydrogeological physical testing will be prepared and submitted to the EPA as a separate document.

The FSAPs and QAPP, where applicable, will be prepared in accordance with the current EPA guidance, *Interim Guidelines and Specifications for Preparing Qual-*

ity Assurance Project Plans, QAMS-005180 and U.S. EPA *Region 9 Guidance for Preparing QAPP for Superfund Remedial Projects*, 9QA-03-89.

The following EPA reference documents will be used as guidance to establish protocols for the field sampling and analytical program.

- *National Enforcement Investigations Center Policies and Procedural Manual* (Revised June 1985)
- *National Enforcement Investigations Center Manual for the Evidence Audit* (September 1981)
- *Contract Lab Program Statement of Work for Inorganic Analysis* (July 1985)
- *Contract Lab Program Statement of Work for Organic Analysis* (July 1985)

The *Health and Safety Plan* will conform to the *Occupational Safety and Health Guidance for Hazardous Waste Site Activities*, October 1985 (DHH 5 N10SH publication No. 85-115) and EPA's *Standard Operating Safety Guides* (EPA, OERR, November 1984).

4.1.4.1 Site Access

This project will require access to and long-term use of the property owned by San Jose State University. New facilities, areas of disturbance, or both are anticipated to include parts of the utility playing field west of l0th Street and the playing field north and east of the track and field facilities. The Parties are responsible for obtaining off-site access and long-term agreements. If reasonable efforts on the part of the Parties to secure such agreements fail, the EPA will assist in obtaining the needed access. Various access permits have already been obtained for the RI/FS activities. Such permits will be appropriately transferred to the Parties and EMCON to the extent feasible.

4.1.5 Treatability Studies

EMCON, in cooperation with Ultrox Corporation and The Water Group, will conduct additional treatability testing as needed to optimize the UV/Oxidation treatment process. Potential contingent treatments will be reviewed.

4.1.6 Project Management

4.1.6.1 Project Organization

The project organization is shown in Figure 4-1. The Parties have responsibility for project execution. EMCON will serve as a consultant to the Parties and provide them with professional engineering services. The roles of key EMCON personnel are presented below.

The Project Director (PD), Mr. Douglas A. Liddie, is responsible for the quality of all work performed. He monitors the progress of each work assignment to ensure that adequate resources are available and that major problems are minimized and handled expediently. The PD's review concentrates on the technical quality of all work assignments.

The overall LB&D Project Manager (PM), Mr. Krishna Mayenkar, will retain responsibility for the RD work assignments. The PM is responsible for schedule, budget, liaison with Parties, and overall project coordination within and outside EMCON, and on-site management, if any, for the duration of all activities at the site. The Project Engineer (PE), Mr. Bradford Miller, has primary responsibility to assist the PM in internal and external coordination. Supporting the PM/PE are the lead engineers for the RD and other staff. The lead engineers are responsible for preparation of the RD within their respective disciplines (e.g., hydrogeology, civil, mechanical, electrical, and instrumentation and control [I&C] engineering). Mr. Steven Sontag, who has more than 15 years experience in engineering design will perform value engineering screening. The Resident Observer, (RO) Mr. Ken Albin, will be responsible for the daily coordination and contractor oversight. The RO will be responsible for observing contractor activities and notifying the PM of construction interferences and possible design modifications.

4.1.6.2 Project Schedule

The narrative project schedule for deliverables is presented in Section 5.0.

4.2 TASK 2 - ADDITIONAL FIELD WORK AND/OR TREATABILITY STUDIES

This task normally consists of efforts required for obtaining specific field samples or other information needed during the design effort, if that information was not produced during the RI/FS portion of the project. For this RD, some of the ancillary data are being collected as part of the RI/FS, and additional hydrogeological and treatment data will be collected as discussed below and in Sections 4.1.3 and 4.1.5 (under Task 1).

Additional hydrogeologic testing will consist of aquifer pumping tests, slug tests, and cone penetrometer tests along the proposed extraction system alignment as needed based on the results of Ebasco's Phase II RI data collection.

The objective of additional hydraulic testing and geologic characterization is to optimize the extraction system. As described in Sections 2.3.1.1 and 2.3.1.2, the geology of the shallow aquifer at the site is extremely heterogeneous. The extraction system must therefore be designed and properly installed to efficiently and effectively capture the migrating contaminant plume by selecting proper extraction and pumping techniques. Any deficiencies in the extraction system could lead to inadequate plume capture and extraction, and continued downgradient migration of the plume, nullifying the objective of the ERA.

4.2.1 Site Characterization

Ebasco has conducted a soil boring program as part of the RI Phase II field investigation at the location of the treatment facility building, regulating tank, and the street crossing jacking pits to facilitate foundation design and street crossing details. EMCON understands that borings will be made with a 4-inch continuous-flight auger and are to be encased only if soil collapse becomes a problem. The boring depth will be 30 feet. A continuous field boring log will contain field classifications of all materials encountered, observations of field conditions, and

results of field tests. Standard Penetration Tests (SPT) per ASTM D1586 and laboratory tests will provide foundation design data.

EMCON will review the soil boring data. If necessary, additional soil data will be collected for the final design.

Ebasco will perform ground-water modeling using data from RI Phase II pump tests, contaminant plume concentrations, and other pertinent information. The model is expected to provide information needed to assist in optimizing the ground-water extraction system. EMCON will review the data. Based on CPT data, EMCON may confirm the validity of the Ebasco model output and may perform additional modeling using CPT test data.

4.2.2 Additional Treatability Testing

Additional treatability testing to optimize the UV/ozone treatment process and to review potential contingent treatments will focus on improving the destruction efficiency of the process, primarily for 1,2-dichloroethane, 1,1-dichloroethane, and 1,2-dichloropropane. It will also focus on turbidity increase, high alkalinity, and lower than anticipated ozone absorption efficiency, which were areas of concern observed during the SITE demonstration.

The bench scale testing program will therefore be planned to

- optimize ozone/hydrogen peroxide dosing, contact time, reaction temperature, and quality of feed to the reactor
- evaluate the impact of exhausted ozone recycling and effluent recycling on system performance
- evaluate the impact of alkalinity on system performance
- evaluate the impact of turbidity on system performance

Bioassay tests will be conducted in this task to evaluate effluent toxicity, optimize the full scale RD, and comply with an NPDES permit application. Effluent samples will be prepared in the laboratory using the optimum process conditions identified through treatability testing.

4.3 TASK 3 - DATA EVALUATION

Additional hydrogeological, ground-water chemical, and treatability testing data obtained through Ebasco and EMCON efforts will be thoroughly reviewed to develop and evaluate an optimum extraction and treatment system at the LB&D site. The task will be performed concurrent with Task 2.

4.3.1 Environmental Law Compliance Review

ARARs for siting, design, and construction of the extraction and treatment facilities will be reviewed. This will include RWQCB discharge limitations and Bay Area Air Quality Management District (BAAQMD) monitoring requirements and emission limitations. The potential off-site Resource Conservation and Recovery Act (RCRA) treatment, storage, and disposal (TSD) facilities for disposal of any hazardous materials generated by construction or operation of the extraction and treatment facilities will also be evaluated and a technical memorandum will be submitted to the Parties and EPA documenting results and conclusions of these reviews.

4.4 TASK 4 - 30 PERCENT DESIGN

A site plan will be prepared indicating the location of the proposed extraction system, conveyance pipelines, power distribution centers, street crossings, treatment facility, and discharge line in relation to existing City of San Jose and San Jose State facilities. Physical features of the site (on and above) will be located in relation to such baselines. The site plan will include the location of the extraction system and the Pacific Gas and Electric (PG&E) and City of San Jose above ground utilities. The proposed locations of the remediation facilities will be field-verified. Site plans will be provided as part of the 30 percent design review.

As part of this task, EMCON will prepare equipment procurement specifications for long lead items such as the control panel, the blowers, and the UV/ozone reactor. These specifications will be 90 percent complete.

The 30 percent design will present a complete conceptual definition of the extraction system, conveyance pipelines, and treatment facility. The following deliverables will be submitted to the Parties and EPA for review:

- Preliminary drawings
- Design Basis Memorandum
- Preliminary Construction Specifications
- Specifications for major equipment (90 percent complete)
- Preliminary cost estimate

Details of these deliverables are described in subsequent sections of this workplan.

Following the Parties and EPA review and comment, the major elements of the design will be considered "established," and the remaining details for the project will be developed on that basis in the final design phase.

4.4.1 Drawings

For the 30 percent design phase of this project, drawings illustrating major design components will be prepared. These will include

- Site plan
- Illustration of the general arrangement of system components
- Process and instrumentation diagram
- Electrical single line drawings

Following review and comment by the Parties and EPA, these drawings will be completed so that appurtenances can be designed for the final design.

Additional drawings that may be included in this submittal (at approximately 30 percent completion) include

- Mechanical engineering details

- Electrical engineering details
- Civil engineering details

4.4.2 Specifications

The preliminary design submittal will include a preliminary construction specification package. The specification will qualitatively definite requirements for products, material, and workmanship on which the construction contract will be based. Sections of the specification will be prepared in Construction Specification Institute (CSI) format organized into 16 major divisions. Based on preliminary review, 11 of these divisions will probably be required for this RD. These include

Division 1	General Requirements
Division 2	Sitework
Division 3	Concrete
Division 4	Masonry
Division 8	Doors and Windows
Division 9	Finishes
Division 10	Specialties
Division 11	Equipment
Division 13	Special Construction
Division 15	Mechanical
Division 16	Electrical/Controls

CSI Divisions 5 (Metals), 6 (Wood and Plastics), 7 (Thermal and Moisture Protection), 12 (Furnishings), and 14 (Conveying Systems), are not expected to be included. Some of the standard divisions will be 90 percent complete at this stage. Specifications will also specify the Site Safety and QA/QC responsibilities of the contractor during construction. The construction contractor will develop the required QAPP and HSP as indicated in the specifications.

The specification will be an open proprietary specification. This form of specification defines the project components by manufacturer's name, brand name, model number, type designation, or other unique characteristics. Alternates or substitutes for the specified products will be allowed, however, if they are of equal quality. Whenever a product is specified by a proprietary name or the name of a particular manufacturer or vendor, the specific item mentioned shall be understood as establishing type, function, dimension, appearance, and quality

desired. Other manufacturer or vendor products will be accepted provided sufficient information is submitted to allow the engineer to determine that the proposed products are equivalent to those specified.

Equipment specifications will meet performance data sheet specifications, therefore providing treatment standard requirements rather than mechanical function requirements. Equipment specifications will contain a Process and Instrumentation (P&I) diagram and facility layout drawing. They will be 90 percent complete at this submittal. To allow sufficient time for equipment manufacture, equipment contracts will be awarded 3 months before the construction startup.

4.4.3 Preliminary Cost Estimate

A preliminary cost estimate developed for this submittal will be of +50 to -30 percent accuracy and will show equipment, construction, and annual O&M costs. This estimate will be further refined in the final design phase to +15 to -10 percent as stated in the 1986 *Superfund Remedial Design and Remedial Action Guidance.*

4.5 TASK 5 - FINAL DESIGN

4.5.1 90 Percent Design

This task includes all efforts necessary to prepare final plans and specifications for the complete extraction and conveyance system, and treatment facilities.

Preparation of the design package will be in accordance with CERCLA procedures and the requirements specified in the ROD. All ARARs identified in the ROD and from the environmental law review (Section 4.3.1) will be considered in developing the design. Controlling parameters as required by such standards will be identified.

The 90 percent design documents and technical specifications will incorporate Parties and EPA comments on the 30 percent design. The 90 percent design package will be submitted to Parties and EPA for review.

4.5.2 Final Design

The EPA comments on the 90 percent design will be incorporated into the final design, which will then be considered to be 100 percent complete. The final design submittal will include completed specifications, drawings, estimate summary sheet, and final construction cost estimate. The final design package and the contract bid documents will constitute the bid package from which a general contractor can submit a price to construct the shallow ground-water extraction/treatment system.

4.5.3 Final Drawings

All project drawings will be 90 percent complete for submittal to the Parties and EPA for review and approval and will become final when the Parties' and EPA's comments are incorporated. The drawings will provide sufficient detail so that the bidders will be able to clearly identify the labor, materials, tools, and equipment necessary for the proper execution of the contract. Approximately 30 drawings may be produced for this project; however, the exact number cannot be firmly established until the preliminary design phase has begun. These drawings will include the following general classes of drawings:

- Site Plan
- General Arrangement
- Piping and Instrumentation Diagram
- Mechanical Drawings
- Electrical Drawings
- Civil/Structural Drawings
- Architectural Plans and Elevations

The drawing package, when complete and final, will be signed and sealed by a Professional Engineer registered in the state of California.

4.5.4 Final Specifications

The construction specifications will also be 90 percent complete for submittal to EPA for comments, and will become final when the comments are incorporated.

The technical specification, when complete and final, will also be signed and sealed by a Professional Engineer registered in the state of California.

4.5.3 Final Calculations

Calculations required to finalize the technical designs will be performed during the prefinal phase of the project. All calculations will be kept in the project files for future reference.

4.5.6 Final Cost Estimate

The final engineer's cost estimate will be based on final drawings and specifications of a design more than 90 percent complete. The estimate will refine the preliminary design cost estimate to an accuracy of +15 percent to -10 percent. The estimate will present the costs for equipment, installation, construction, and O&M for the complete facility. The final estimate and its contents will be available only to personnel whose duties require that they have detailed knowledge of the subject.

The final cost estimate will include costs for

- supervision and administrative (S&A) and engineering and design (E&D) costs during construction
- bid contingency to accommodate variability in the bidding climate during the procurement process
- contingency for change orders and claims caused by unforeseen conditions, construction and project delays, and other problems associated with the project

A quantity summary sheet will also be included with the final cost estimate. The quantity summary sheet will include items such as the treatment equipment

package, linear feet of piping by size, linear feet of cable and conduit by type, and concrete quantities, and will be submitted with each estimate.

The final cost estimate will include all work items (mobilization, excavation, transportation, construction, startup, and disposal of hazardous wastes) and will be broken down according to labor, material, and plant. A basis for the unit prices used in the cost estimate will be provided to the Parties. Unit prices, overhead, profit, and other such categories will be shown as separate items. The final cost estimate will be based on final plans and specifications that will be used for the advertised bid process. The final cost estimate will reflect current prices for labor, material, and equipment.

4.5.7 Construction Schedule

An anticipated construction schedule will also be prepared during this task and submitted with the other deliverables to the EPA.

4.6 TASK 6 - DESIGN SUPPORT

This task is comprised of design support efforts as requested by Parties and will be required during one or all phases of the RD. Support activities include the following:

- Basis of Design Report
- Assistance with permits, approvals, and site access agreements
- O&M plan preparation
- Site-specific QAPP and HSP preparation
- Resolving problems during all phases of the project
- Attending meetings with the regulatory agencies

4.6.1 Design Basis Memorandum

The ROD (Ebasco, September 1988) forms the overall design basis for this project. The Design Basis Memorandum will include all design data and criteria

such as flow rates, design concentrations and air impacts, electrical power requirements, a process flow diagram, design calculations for major equipment, and relevant design standards to be used for design. Design criteria will be developed based on review of federal, state, and local codes, fulfilling the objectives of the ROD. The Parties and EPA review and commentary on the design criteria will then be used to size major components of the system, so that specifications for ancillary equipment, such as well pumps and power distribution centers, can be prepared.

Supporting technical information and data from treatability studies, ground-water modeling, and geotechnical soils testing will be included in this memorandum, as required.

4.6.1.1 Process Flow Diagram

The treatment process is the most critical component of the RD. A Process Flow Diagram (PFD) will therefore be developed early in the design so the major components of the process will be fixed and remain constant throughout the remainder of the design. The PFD will show all major components of the process equipment.

4.6.1.2 Design Standards

After developing the PFD and design criteria, relevant industry design standards will be identified and listed for the components. These codes and standards will be specified as the minimum standard to which such items shall be supplied and will also dictate construction, testing, operation, and quality control, as appropriate.

4.6.1.3 Conceptual Design Calculations

Conceptual design calculations will be prepared for all major aspects of the design. Calculations include, but are not limited to, estimates of performance, size, and cost. These calculations are not intended to be incorporated directly into final design documents. Conceptual calculations can be used for final cal-

culations by verifying data, applying more rigorous methods and procedures required for final calculations, or both. Where detailed calculations are not warranted, a calculation sheet will be prepared that will clearly state the basis of design data and references. These data may form the basis of other calculations. All calculations will be independently checked by professional engineers.

Conceptual calculations will be performed for major design components including, but not limited to

- Treatment equipment
- Electrical conductor/breaker sizing
- Foundations
- Pumps, motors, blowers, etc.
- Piping and valve/actuator sizing
- Other ancillary equipment

Also included will be preliminary estimates of O&M costs associated with operation of the system designed.

4.6.2 Permits, Approvals, and Site Access Agreements

The Parties and EMCON will obtain and complete necessary permits, approvals, and site access agreements. Permits and access agreements may include, but are not limited to

- San Jose State University land access agreements
- City of San Jose construction permits
- hazardous waste disposal permits
- air emissions and aqueous effluent discharge permits
- permit to construct and operate the treatment facilities

4.6.3 Operations and Maintenance Manual

The preparation of the O&M manual will be started after sufficient information on the major equipment is available to EMCON and the final design is complete and approved by the EPA. Vendor equipment manuals will be obtained and incorporated in the O&M manual. The O&M Manual will provide details on the O&M activities required after the extraction and treatment facilities are completed. Since the contractor will procure some of the minor equipment after contract award, some O&M activities will be known during the construction phase of the project. A draft O&M Manual will therefore be completed during the construction phase so that it can be used during the startup of the treatment facility. The draft O&M Manual will be submitted to the Parties and EPA for review and approval. After making revisions, EMCON will prepare the final O&M Manual. EMCON will also incorporate in the final O&M Manual experience gained during the facility startup and debugging.

Appropriate elements to be included in a Final O&M Manual are listed below.

Basic Elements of O&M Manual

- Basic Process Description
- Description of O&M Activities Under Normal Conditions
  - description of tasks for operation
  - description of tasks for maintenance
  - description of prescribed treatment or operating conditions
  - schedule showing frequency of each O&M task
- Description of Activities Under Abnormal Conditions
  - description and analysis of potential operating problems
  - sources of information regarding problems
  - common remedies
- Description of Routine Monitoring and Laboratory Testing
  - description of monitoring tasks (Sampling Plan)

- description of required laboratory tests and their interpretation (Analysis Plan)
- required quality assurance/quality control (QA/QC Plan)
- schedule of monitoring frequency and when, if so provided, to discontinue

• Description of Alternate O&M
  - if systems fail, alternate procedures to prevent undue hazard
  - analysis of vulnerability and additional resource requirements if a failure occurs

• Safety Plan
  - description of precautions, necessary equipment, etc., for site personnel
  - safety tasks required if systems fail (may be linked to HSP developed for remedial responses)

• Description of Equipment
  - necessary equipment
  - installation of monitoring components
  - maintenance of site equipment
  - replacement schedule for equipment and installed components

• O&M annual budget that will include but not be limited to the following:
  - cost of personnel
  - costs of preventive and corrective maintenance
  - costs of equipment, supplies, etc.
  - costs of any contractual obligation (e.g., lab expenses)
  - costs of operation (e.g., energy costs)

• Records and Reporting Mechanisms Required
  - daily operating logs
  - laboratory records
  - records for operating costs

- mechanism for reporting emergencies
- personnel and maintenance records
- monthly/annual reports to state agencies

4.7 TASK 7 - VALUE ENGINEERING SCREENING

A value engineering (VE) screening limited to project refinements, which would not significantly change or alter the remedial measure as stated in the ROD, will be performed in this task. The VE screening will consist of analyzing only high cost items that have a potential for cost savings. A VE screening memorandum will be submitted to the Parties.

A formal VE study is not anticipated because of the basic nature of the extraction/treatment system.

4.8 TASK 8 - PREPARATION OF CONSTRUCTION BID PACKAGE AND CONTRACT DOCUMENTS

This task includes efforts required to prepare contract bidding documents, such as printing, advertising, mailing, prebid meetings, preparation of necessary addenda, bid opening, tabulation of bids, and award of contract.

EMCON will prepare a bid package for use in soliciting bids by general contractors to provide the necessary construction and associated services for implementation of the LB&D remedial action.

At a minimum, the bid package will include the following:

- Background information
- Definitions
- Bidding requirements
- Contract forms
- Scope of work
- Technical specifications

- Contract drawings
- Special conditions
- Attachments

As a continuation of the contractor procurement effort, EMCON will provide ancillary services required to support the contract procurement process. These services will include, but not be limited to

- Advertising for invitation to bid
- Mailing bid packages
- Conducting site visits
- Conducting bidders' meeting
- Answering technical questions
- Issuing addenda as required
- Accepting and opening bids
- Evaluating bids and making purchase recommendations

4.9 TASK 9 - CONTRACT NEGOTIATION

The Parties will negotiate a final contract with the Contractor.

4.10 TASK 10 - PROVISION FOR OVERSIGHT SERVICES DURING CONSTRUCTION

This task consists of efforts that will be required after the bid package and contract documents are prepared. Typical subtasks include the following:

- Field oversight services
- Design support
- O&M Manual preparation
- Startup Assistance/Training

4.10.1 Field Oversight Services

Field oversight services include the RO's technical oversight of construction. The RO is responsible for processing any design changes or other field requests for overseeing contractor construction daily.

A Health and Safety Officer (HSO) will be at the site during intrusive activities for the protection of EMCON personnel only. The contractor will be responsible for the protection of all other workers and the general public.

The RO's responsibilities include

- Advising the contractor on engineering interpretation of plans and specifications
- Assisting in interpreting impact on the final design regarding possible proposed changes and assisting in preparing construction contract modifications
- Documenting design field changes that occur during construction

4.10.2 Design Support During Construction

Field changes during construction can result in design changes. EMCON will document design changes, design and supply plans for modifications, and revise drawings, if required.

4.10.3 Startup Assistance/Training

EMCON will provide a startup engineer to assist the general contractor in proper startup testing and shakedown of the facility for 2 weeks.

4.11 TASK 11 - COMMUNITY RELATIONS SUPPORT

The Community Relations Plan is being revised by the EPA to incorporate changes in the level of concern or information needs of the community during the design and construction activities. Technical support at public meetings and in

preparing fact sheets or other public documents will be provided by the Parties at the EPA's request.

4.12 TASK 12 - ADDITIONAL WORK

EMCON will perform additional tasks as required. These tasks include, but are not limited to, the following:

- Attendance at meetings, conferences, and site visits as deemed necessary to complete the extraction and treatment facilities

5.0 SCHEDULE FOR REMEDIAL DESIGN

The following narrative schedule, including estimated review times provided by the agencies, is summarized on a bar-chart in Figure 5-1 to illustrate how the various tasks are integrated into the overall schedule.

The purpose of this narrative schedule is to indicate project flow; all schedules other than those indicated as milestones, are approximate and presented solely to indicate the interrelationships of project subtasks. Refer to Sections 4.1 through 4.12 of this workplan for detailed discussions of project tasks.

5.1 TASK 1 - PROJECT PLANNING

The Remedial Design Workplan is intended to be an integral part of the Consent Decree. A site visit and acquisition and review of existing data have been conducted prior to the Consent Decree being entered.

Acquiring permits and access agreements and treatability study arrangements will be started prior to or immediately after the Consent Decree is entered and will be completed as quickly as is feasible.

5.2 TASK 2 - ADDITIONAL FIELD WORK AND/OR TREATABILITY STUDIES

On or before the date the consent decree is lodged or January 31, 1990, whichever date is later, the following four draft documents, comprising the Field Operations Plan, will be submitted to the EPA:

Document No. 1: Field Sampling and Analysis Plan (FSAP) (Physical Testing)

Document No. 2: Quality Assurance Project Plan (QAPP) (Treatability Testing)

Document No. 3: Field Sampling and Analysis Plan (FSAP) (Treatability Testing)

Document No. 4: Health and Safety Plan (HSP)

Fifteen (15) days after all EPA review comments on the above Field Operations Plan draft documents are received, the final draft documents will be submitted to the EPA. The final QAPP and FSAP for chemical testing and

treatability/optimization studies will be submitted fifteen (15) days after the EPA comments on the final draft QAPP and FSAP are received by the PRPs.

Various preparatory activities will be performed prior to actual treatability testing. These activities include the Field Operations Plan preparation, discussions with treatability study vendors, and treatability study ground-water sampling. The actual treatability testing will commence immediately after transport of the ground-water samples to the treatability testing facilities. The Treatability/Optimization Report will be submitted to the EPA eighty five (85) days after EPA approval of the Final Draft QAPP and FSAP's is received, or eighty five (85) days after the consent decree is entered, whichever is later.

Negotiations for access agreements to enter off-site areas for CPT drilling and installing additional pumping test wells will proceed in a timely manner, and will begin no later than the date on which the Consent Decree is entered. After access is obtained, the CPT studies and CPT correlation borings will begin. The drilling of pumping test well(s) is anticipated to begin after receiving permit approval. The aquifer pumping tests and associated data analysis will begin soon after installation and development of pumping test wells.

5.3 TASK 3 - DATA EVALUATION

All data obtained in Task 2 and from the ground-water models will be thoroughly reviewed for the development of an optimum extraction and treatment system. The evaluation will include an environmental law compliance review. This overall evaluation process is anticipated to be completed approximately thirty five (35) days after the Treatability/Optimization Report is submitted.

5.4 TASK 4 - PRELIMINARY DESIGN

The draft Preliminary Design (30 percent Design), including drawings, equipment specifications, and a preliminary cost estimate, will be submitted ninety (90) days after the EPA Notice to Proceed on the Preliminary Design is received by the PRPs. EPA has indicated that the treatbility optimization report will be reviewed and such notice issued in a timely manner. This schedule anticipates such timely

notice. The final Preliminary Design will be submitted fifteen (15) days after all EPA comments on the draft Preliminary Design are received.

5.5 TASK 5 - FINAL DESIGN

The draft Final Design (90 percent Design) will be submitted forty five (45) days after EPA approval of the final Preliminary Design is received or sixty (60) days after all EPA comments on the draft Preliminary Design are received, whichever is later. The Final Design (100 percent Design), including final drawings, specifications, calculations, cost estimate, and construction schedule, will be submitted fifteen (15) days after all EPA comments on the draft Final Design are received.

5.6 TASK 6 - DESIGN SUPPORT

Design support activities including development of a process flow diagram, specification of design standards, and conceptual design calculations, will occur throughout the Remedial Design process.

Permits and access agreements for construction, operation and maintenance of the extraction and treatment facility will be obtained as quickly as possible after the EPA approves the Final Design.

The draft Operations and Maintenance Plan will be submitted ninety (90) days after the start of on-site construction. The Operations and Maintenance Plan shall be accompanied by a QAPP, FSAP, and HSP that address specific needs of the O&M period, including quarterly monitoring of the contaminant plume. These three documents shall be submitted separately as drafts at the same time as the draft Operations and Maintenance Plan is submitted. The final Operations and Maintenance Plan, QAPP, FSAP, and HSP will be submitted forty five (45) days after treatment system startup.

5.7 TASK 7 - VALUE ENGINEERING SCREENING

Value Engineering Screening will begin after the PRPs receive approval of the final Preliminary Design.

5.8 TASK 8 - BID AND BID EVALUATION

Equipment Bid Documents will be issued fifteen (15) days after the PRPs receive EPA approval of the final Preliminary Design. Evaluation of the Equipment Bid Documents is anticipated to be completed approximately seventy five (75) days after EPA approval of the final Preliminary Design is received.

Construction Bid Documents will be issued fifteen (15) days after the EPA approves the Final Design. Evaluation of the Construction Bid Documents is anticipated to be completed approximately seventy five (75) days after the EPA approves the Final Design.

5.9 TASK 9 - CONTRACT NEGOTIATION

Contract Negotiation will be completed as quickly as possible after completion of the Construction Bid Document evaluation, anticipated to be approximately thirty days (30).

5.10 TASK 10 - CONSTRUCTION AND CONSTRUCTION OVERSIGHT

Equipment construction and manufacture is anticipated to begin approximately sixty (60) days after Equipment Bid Documents are issued.

On-site construction will begin one hundred five (105) days after EPA approval of the final design is received (predicated upon receipt of all necessary permits). Treatment system startup will begin one hundred fifty (150) days after on-site construction is started or thirty (30) days after the PRPs receive all EPA comments on the first draft Operations and Maintenance Plan documents, whichever is later.

5.11 TASK 11 - COMMUNITY RELATIONS SUPPORT

The EPA will revise the existing Community Relations Plan; the PRPs will conduct community relations support activities as needed.

5.12 TASK 12 - ADDITIONAL WORK

Any additional activities deemed necessary to complete the extraction and treatment facilities will be performed as needed throughout the duration of the project.

REFERENCES

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TABLE 2-1
SUMMARY OF SAMPLING ACTIVITIES AT THE LB&D SITE
(August 1981 through December 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
8-81	DHS	DHS	DHS	25 surface soil samples around site	Metals, Purgeables (EPA 624) Organophosphorus Pesticides (EPA 614) Chlorinated Pesticides/ PCBs (EPA 608)	Cd, Cr, Pb PCBs, DDE	N/A	Toluene, Xylenes, Ethylbenzene, Diazinon, Malathion, Ethion, etc. g-BHC, Heptachlor, Heptachlor Epoxide
9-82 10-82	LB&D	Associated Labs	Associated Labs	35 subsurface soils (A few sediment/liquids from around site)	Metals, Chlorinated Pesticides/PCBs (EPA 608)	Pb, Ni PCBs, DDD, DDE	N/A	Cr DDT
10-83	LB&D	Feuerstein	B&C	18 surface soils along drainage ditch	Chlorinated Pesticides/ PCBs (EPA 608)	PCBs, chlordane, DDD, DDE	N/A	DDT
11-83	LB&D	Geotechnical Consultants for Feuerstein	B&C	Monitoring wells 1 & 2 installed - soils sampled in borewells at 10' depth - groundwater from wells 1 & 2 sampled	Metals, CN^-, Phenols Purgeables (EPA 625) Chlorinated Pesticides/ PCBs (EPA 608) Extractables (EPA 625)	None	As, benzene, chloroform, PCE, TCE, 1,1-DCE	Soil: Various VOCs (TCE, Xylenes, etc.) Various VOCx and semi-VOCs
11-83	LB&D	Feuerstein	N/A	Excavation of soil in & around drainage ditch	Excavation only; no samples taken	N/A	N/A	N/A
1-84	LB&D	Feuerstein	B&C	12 soil samples taken at base of excavation	Chlorinated Pesticides/ PCBs (EPA 608)	PCBs, chlordane, DDD, DDE, DDT	N/A	None
1-84	LB&D	Feuerstein		Further excavation of soil in and around drainage ditch	Excavation only; no samples taken	N/A	N/A	N/A
1-84	LB&D	Feuerstein	B&C	1 soil sample at base of excavation	Chlorinated Pesticides/ PCBs (EPA 608)	None	N/A	None
1-84	LB&D	Geotechnical Consultants for Feuerstein	B&C	Monitoring Well 3 Installed - soil sampled in borehole at 10' depth - groundwater sampled MW-3	Chlorinated Pesticides/ PCBs (EPA 608) Purgeable Halocarbons (EPA 601)	None	PCBs, TCE PCE, 1,1-DCE	Soil: PCBs, PCE Groundwater: 1,1,1-TCA

(After Ebasco, 1989)

TABLE 2-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES AT THE LB&D SITE
(August 1981 through December 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
1-84	LB&D	Feuerstein	B&C	Monitoring wells 1, 2, 3 sampled	Purgeable Halocarbons (EPA 601)	N/A	1,1-DCE, 1, 2-DCE, Dichloro-propane, PCE, TCE	Freon 113, 1,1,1-TCA, 1-DCA
3-85	DHS	DHS	DHS & McKesson	4 surface soils on & offsite	Metals Purgeables Chlorinated Pesticides/ PCBs (EPA 608) Semi-volatiles (EPA 625) Total Hydrocarbons	DDD, DDE, DDT	N/A	PCBs, PCE, Toluene, Ethylbenzene, Xylenes
3-85	LB&D	Feuerstein	N/A	Excavation of soil at 6 locations around	Excavation only; no samples taken	N/A	N/A	N/A
3-85	LB&D	Conservtech	Associated	5 soils at base of excavation	Metals Purgeables (EPA-624) Chlorinated Pesticides/ PCBs (EPA 608)	PCBs	N/A	DDD, DDE, Pb, TCE, PCE
4-85	LB&D	Geotechnical Cons.	Associates Labs	Monitoring wells 4 & 5 installed and sampled	Purgeable Halocarbons (EPA 601) Chlorinated Pesticides/ PCBs (EPA 608) Semi-volatiles (EPA 625)	N/A	1,2-DCE, 1,2-DCA, PCE, TCE	None
4-85	LB&D	Reed	B&C	Monitoring wells 1 & 5 sampled	Purgeables (EPA 624)	N/A	None	Freon 113
5-85	DHS LB&D	DHS Reed	DHS B&C	18 soil samples taken at base of excavation Splits sent to different labs	Pb PCBs	PCBs	N/A	Pb
6-85	LB&D	Reed	N/A	Excavation of soil in Area 3	N/A	N/A	N/A	N/A
6-85	DHS LB&D		DHS B&C	15 soil samples taken around the site, splits sent to different labs	Metals Chlorinated Pesticides/ PCBs (EPA 608) Organophosphorus Pesticides (EPA 614)	Cd, Pb, PCBs, DDE	N/A	Dieldrin, disulfoton, methyl parathion, ethion, azinphos-methyl

(After Ebasco, 1989)

TABLE 2-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES AT THE LB&D SITE
(August 1981 through December 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
6-85	DHS LB&D	DHS Reed	DHS B&C	32 soil samples from area near processing facility; Splits sent to different labs	Chlorinated Pesticides/ PCBs (EPA 608) Extractables (EPA 625) Organophosphorus pesticides (EPA 614) VOA's (EPA 5020-GC/MS)	PCBs	N/A	Parathion
7-85	DHS	DHS	DHS	1 soil sample east of main building	Metals PCBs	PCBs	N/A	None
6-86	LB&D	Reed	TMA (EAL)	Monitoring wells 6 & 7 installed and samples taken from monitoring wells 1, 2, 3, 4, 6, and 7	Purgeable Halocarbons (EPA 601)	N/A	1,2-Dichloropropane, chlorform, TCE, vinyl chloride, 1,1,1-TCA, 1,1-DCE, 1,2-DCE, PCE, 1,2-DCA, PCE, 1,2-DCA	Chloroethane, 1,1-DCA, Bromodichloromethane
10-86	DHS	CH2M Hill	CH2M Hill	Monitoring wells 4 and 6 sampled	Metals Purgeables (EPA 624) Chlorinated Pesticides/ PCBs	N/A	Ba Benzene, vinyl chloride, 1,1-DCE 1,2-DCE 1,2-Dichloropropane, TCE, 1,1,2,2-PCA chlordane, PCBs	Toxaphene, phthalates
8-87 11-87	DHS	CH2M Hill	TRC	Soil-gas and groundwater study offsite	Volatile organic compounds (TRC, November 1987	N/A	N/A	Offsite plume; TCE, TCA, Freon 113, Vinyl chloride
Mid-87	DHS	Canonie	Canonie & Acurex	Soil sampled in Perimeter & "Hot Spot" areas in northern part of site	Metals VOCs (EPA 624) Semi-VOCs (EPA 625) Organochlorine Pesticides/PCBs (EPA 614)	Cd, Cr, Pb, Ni, PCBs, DDD, DDT, Xylenes, Benzene, Ethybenzene, Toluene	N/A	None
Late 87	DHS	Canonie	N/A	Excavation of soil Drum removal etc.	Excavation only; no samples taken	N/A	N/A	N/A

(After Ebasco, 1989)

TABLE 2-1 (Continued)
SUMMARY OF SAMPLING ACTIVITIES AT THE LB&D SITE
(August 1981 through December 1988)

DATE SAMPLED	CLIENT	SAMPLED OR PERFORMED BY	ANALYZED BY	ACTIVITY	ANALYTE, METHOD	RESULTS ABOVE TTLC (Soil)	RESULTS ABOVE ACTION CRITERIA (Groundwater)	ALSO DETECTED (Above Background)
Early 88	DHS EPA	IT E&E	Curtis & Tomkins	Post excavation soil sampling	Metals, Semi-volatile Organics (EPA 8270) Organochlorine Pesticides/PCBs (EPA 8080) Volatiles (EPA 8240)	PCBs (some samples)	N/A	None
Early 88	EPA Emergency Response Division	EPA/E&E	Curtis & Tomkins	Incinerator ash from barrel on site sampled; more facility cleanup etc. CHIP and SEAL installed on drum storage area.	Metals Dioxins and Furans (EPA 8280)	Pb	N/A	High Cr, Ni, Zn Low concentrations of heptachlorodibenzo-p-dioxin, octachlorodibenzo-p-dioxin, octachlorodibenzo furan
6-88	EPA	EBASCO	CLP	Municipal Well sampling (RI/FS)	Semi-Volatile organics (CLP RAS) Pesticide/PCBs (CLP RAS)	N/A	None	None
7-88	EPA	EBASCO	Hittman-Ebasco	Groundwater characterization sampling for treatability study (RI/FS)	Metals Semi-volatile organics (EPA 601/602, 624) Organochlorine pesticides/PCBs (EPA 605/608) Phenols (EPA 606) Phthalate esters (EPA 604) Chemical & Physical Properties (EPA) Dioxins (EPA 8280) modified)	N/A	Vinyl chloride 1,1-DCA; 1,2-DCP; TCE; Benzene; PCE*	Acetone 1,1-DCA; trans-1,2-DCE; 1,1,1-TCA; Toluene; Chlorobenzene; Ethylbenzene*
Late 88	EPA	Ebasco	CLP	Phase I RI	Full TCL (various)	TBD**	TBD	TBD

ABBREVIATIONS:

B&C - Brown and Caldwell
Canonie - Canonie Environmental
CLP - Contract Laboratory Program
DHS - California Department of Health Services
E&E - Ecology & Environment
EBASCO - Ebasco Services, Incorporated
EPA - Environmental Protection Agency
Feuerstein - Feuerstein Associates Consulting Engineers
N/A - Not Applicable
IT - IT Corporation
LB&D - Lorentz Barrel & Drum
McKesson - McKesson Environmental
RAS - Routine Analytical Services
Reed - Reed Corporation
RI/FS - Remedial Investigation/Feasibility Study
TMA - Thermo Analytical, Inc.
TRC - Tracer Research Corporation
* - Results preliminary awaiting validation (Ebasco 1988)
** - Results will be presented in Phase I RI report (in preparation)

(After Ebasco, 1989)

TABLE 2-2

GROUNDWATER ANALYSES

Date Sampled	Client	Sampled By	Analyzed By	Analytical Method	Analyte/Method
11-23-83	LB&D	Feuerstein & Associates	Brown & Caldwell Laboratory	Unknown	Metals, CN, Phenols
				EPA 624	Purgeables/Gas Chromatography-Mass Spectrometry (GC-MS)
				EPA 625	Extractables/GC-MS
01-20-84	LB&D	Feuerstein & Associates	Brown & Caldwell Laboratory	EPA 601	Purgeable Halocarbons/GC
				EPA 608	Chlorinated Pesticides and PCBs/GC
03-02-84	LB&D	Feuerstein & Associates	Brown & Caldwell Laboratory	EPA 601	Purgeable Halocarbons/GC
04-04-85	LB&D	Geotechnical Consultants, Inc.	Associated Laboratories	EPA 601	Purgeables/GC
				EPA 624	Semivolatile Organics/GC-MS
				EPA 608	Chlorinated Pesticides and PCBs/GC
04-29-85	LB&D	Reed Corporation	Brown & Caldwell Laboratory	EPA 624	Purgeables
07-86	LB&D	Reed Corporation	Thermo Analytical, Inc./ Environmental Research Group	EPA 601	Purgeable Halocarbons/GC
10-02-86	DHS	CH2M Hill, Inc.	CH2M Hill Environmental Laboratory	Unknown	Metals
				EPA 624	Purgeables/GC-MS
				EPA 608	Organochlorine Pesticides and PCBs/GC
				EPA 625	Semivolatiles Organics/GC-MS
				Unknown	Minerals
06-30-88	EPA	Ebasco Services, Inc.	Contract Laboratory Program	CLP RAS	Semivolatile organics/GC-MS
				CLP RAS	Chlorinated Pesticides and PCBs/GC
07-16-88	EPA	Ebasco Services, Inc.	Hittman-Ebasco	EPA 608	Pesticides/PCB
				EPA 604	Phenols
				EPA 606	Phthalate Esters
				EPA 601/ 602 & 624	Volatile organics
				EPA 625	Semivolatiles
				EPA 200 Series	Metals
				EPA Various	Chemical & Physical Properties

(After Ebasco, 1989)

TABLE 2-3
SUMMARY OF MONITORING WELL DATA AS OF JULY 1988
(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-1				MW-2			MW-3			MW-4		MW-4A (a)	MW-4B (a)
	B & C (b) 11/83	3/84	4/85	TMA (c) 7/86	B & C (b) 11/83	3/84	TMA (c) 7/86	B & C (b) 1/84	3/84	TMA (c) 7/86	Associated 4/85	TMA (c) 7/86	CH2M Hill 10/86	CH2M Hill 10/86
METALS (ppb)														
Arsenic	3.0				4.0								---	---
Barium													160.0	160.0
Chromium (total)	0.3				0.1								---	---
Cobalt													60.0	50.0
Molybdenum													---	20.0
Nickel	43.0				33.0								130.0	120.0
Vanadium													30.0	30.0
Zinc	---				---								20.0	20.0
VOLATILE ORGANICS (ppb)														
Benzene	1.0				---								26.0 (d)	26.0 (d)
Chloroethane	---			---	---		---			---	---	24.0	---	---
Chloroform	---			11.0	2.0		1.4			29.0	---	---	---	---
1,1-Dichloroethane	10.0	51.0		11.0	---	---	---		46.0	40.0	---	85.0	38.0 (d)	41.0 (d)
1,2-Dichloroethane	---			---	---		---			18.0	---	58.0	---	---
1,1-Dichloroethene	12.0	9.0		9.0	---	---	---	29.0	47.0	22.0	---	160.0	90.0	97.0
Trans-1,2-Dichloroethene	9.0	10.0		8.4	---	---	---		105.0	91.0	240.0	750.0	430.0	488.0
Methylene Chloride	---			---	---		---			---	---	---	26.0 (d)	---
1,2-Dichloropropane	4.0	3.0		1.7	---	---	---		45.0	60.0	---	170.0	89.0	92.0
Tetrachloroethene	5.0	2.0		(e)	---	---	(e)	17.0	38.0	(e)	---	(e)	---	---
1,1,2,2-Tetrachloroethane	---			3.0(e)	---		---(e)			65.0(e)	---	140.0(e)	91.0	106.0
1,1,1-Trichloroethane	30.0	33.0		34.0	2.0	---	0.36	26.0	34.0	60.0	---	220.0	75.0	83.0
Trichloroethene	59.0	54.0		61.0	---	---	---	640.0	1000.0	950.0	510.0	1100.0	1766.0	2108.0
Vinyl Chloride	---			---	---		---			62.0	---	1100.0	455.0	553.0
Freon 113	30.0	26.0	4.0		7.0	6.0			41.0					
Carbon Disulfide	---				3.0								---	---
Bromodichloromethane	---			---	---		---			1.5	---	---	---	---
Dichlorotrifluoroethane	50.0				6.0									
C6H12 Cyclic Hydrocarbon	5.0													
SEMI-VOLATILE ORGANICS (ppb)														
Di-n-Butyl Phthalate (f)													31.0	24.0
Butylbenzyl Phthalate (f)													---	17.0
Bis(2-Ethyl Hexyl)Phthalate (f)											5100.0		73.0	680.0
Di-n-Octyl Phthalate (f)													---	60.0

(a) Splits of sample collected from MW-4 (10-86)
(b) Brown & Caldwell
(c) Thermo Analytical, Inc.
(d) Indicates an Estimated Trace Value
(e) Co-Eluting Compounds
(f) Phthalates are most probably laboratory contaminants
--- Not Detected
(blank) Not Analyzed

(After Ebasco, 1989)

TABLE 2-3 (continued)
SUMMARY OF MONITORING WELL DATA AS OF JULY 1988
(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-5		MW-6		MW-7	MW-16	MW-16 (field duplicate)	MW-20
	Associated 4/85	B & C (b) 4/85	TMA (c) 7/86	CH2M Hill 10/86	TMA (c) 7/86	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88
METALS (ppb)								
Arsenic				---		---	---	---
Barium				110.0		141	128	99
Chromium (total)				10.0		1.9	2.4	2.3
Cobalt				20.0		13	15	11
Molybdenum				20.0				
Nickel				60.0		72	71	---
Vanadium				30.0		25	32	25
Zinc				---				
VOLATILE ORGANICS (ppb)								
Benzene				---		8	8	3
Chloroethane	---		---	---	---	---	---	---
Chloroform	---		9.9	---	---	---	0.5	---
1,1-Dichloroethane	---		35.0	18.0 (d)	1.0	14	16	3
1,2-Dichloroethane	4.8		8.5	---	270.0	---	20	---
1,1-Dichloroethene	---		49.0	33.0	1.7	27	29	86
Trans-1,2-Dichloroethene	---		120.0	61.0	---	52	56	14
Methylene Chloride	---		---	---	---	---	---	---
1,2-Dichloropropane	---		23.0	---	---	18	19	1
Tetrachloroethene	23.0		(e)	---	(e)	18	19	---
1,1,2,2-Tetrachloroethane	---		60.0(e)	22.0 (d)	---(e)	---	---	---
1,1,1-Trichloroethane			32.0	14.0 (d)	5.2	11	12	34
Trichloroethene	45.0		770.0	413.0	0.5	300	11	2
Vinyl Chloride	---		510.0	60.0	---	66	72	8
Freon 113		---						
Carbon Disulfide				---		---	---	---
Bromodichloromethane	---		---	---	---	---	---	---
Dichlorotrifluoroethane								
C6H12 Cyclic Hydrocarbon								
SEMI-VOLATILE ORGANICS (ppb)								
Di-n-Butyl Phthalate (f)				113.0		---	---	---
Butylbenzyl Phthalate (f)				32.0		---	---	---
Bis(2-Ethyl Hexyl)Phthalate (f)	---			39.0		---	---	---
Di-n-Octyl Phthalate (f)				---		---	---	---

(a) Splits of sample collected from MW-4 (10-86)
(b) Brown & Caldwell
(c) Thermo Analytical, Inc.
(d) Indicates an Estimated Trace Value
(e) Co-Eluting Compounds
(f) Phthalates are most probably laboratory contaminants
--- Not Detected
(blank) Not Analyzed

(After Ebasco, 1989)

TABLE 2-3 (continued)
SUMMARY OF MONITORING WELL DATA AS OF JULY 1988
(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-1		MW-2		MW-3		MW-4		MW-4A (a)	MW-4B (a)
	B & C (b) 11/83 3/84 4/85	TMA (c) 7/86	B & C (b) 11/83 3/84	TMA (c) 7/86	B & C (b) 1/84 3/84	TMA (c) 7/86	Associated 4/85	TMA (c) 7/86	CH2M Hill 10/86	CH2M Hill 10/86
EXTRACTABLES (ppb)										
Isophorone	2.0									
Dimethylethoxyethanol	2.0									
>C9 Aldehyde	2.0									
Docosanoic Acid	2.0									
Hexadecanoic Acid	4.0									
C4 Benzoic Acid	2.0									
>C10 Fatty Acid			1.0							
MINERALS (ppm)										
Calcium									97.0	96.0
Magnesium									140.0	140.0
Potassium									0.92	1.0
Sodium									200.0	210.0
Bicarbonate									1293.0	1220.0
Carbonate									---	---
Chloride									79.0	78.0
Nitrate										
Phosphate										
Sulfate									83.8	82.0
Silica									24.0	26.0
CaCO3									24.0	26.0
PESTICIDES (ppb)										
Chlordane	---		---		---		---		0.2	0.1
Toxaphene	---		---		---		---		1.0	2.0
POLYCHLORINATED BYPHENYLS (ppb)										
PCB 1221									2.0	3.0
PCB 1242									1.0	---
PCB 1254									0.4	0.4
PCB 1260					0.36					

(a) Splits of sample collected from MW-4 (10-86)
(b) Brown & Caldwell
(c) Thermo Analytical, Inc.
(d) Indicates an Estimated Trace Value
(e) Co-Eluting Compounds
(f) Phthalates are most probably laboratory contaminants
--- Not Detected
(blank) Not Analyzed

(After Ebasco, 1989)

TABLE 2-3 (continued)
SUMMARY OF MONITORING WELL DATA AS OF JULY 1988
(units for analysis are specified for each category of analyte in Column 1.)

Analyte	MW-5		MW-6		MW-7	MW-16	MW-16 (field duplicate)	MW-20
	Associated 4/85	B & C (b) 4/85	TMA (c) 7/86	CH2M Hill 10/86	TMA (c) 7/86	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88	HITTMAN EBASCO 7/88
EXTRACTABLES (ppb)								
Isophorone								
Dimethylethoxyethanol								
>C9 Aldehyde								
Docosanoic Acid								
Hexadecanoic Acid								
C4 Benzoic Acid								
>C10 Fatty Acid								
MINERALS (ppm)								
Calcium				73.0		70	67	123
Magnesium				110.0		123	118	15
Potassium				1.12		---	---	1.8
Sodium				290.0		297	285	659
Bicarbonate				1250.0				
Carbonate				---				
Chloride				55.0				
Nitrate								
Phosphate								
Sulfate				95.0		83	73	253
Silica				24.0				
CaCO3				24.0		613	601	870
PESTICIDES (ppb)								
Chlordane	---			---		---	---	---
Toxaphene	---			---		---	---	---
POLYCHLORINATED BYPHENYLS (ppb)								
PCB 1221				4.0		---	---	---
PCB 1242				---		---	---	---
PCB 1254				0.2		---	---	---
PCB 1260						---	---	---

(a) Splits of sample collected from MW-4 (10-86)
(b) Brown & Caldwell
(c) Thermo Analytical, Inc.
(d) Indicates an Estimated Trace Value
(e) Co-Eluting Compounds
(f) Phthalates are most probably laboratory contaminants
--- Not Detected
(blank) Not Analyzed

(After Ebasco, 1989)

TABLE 2-4
MAXIMUM GROUNDWATER CONTAMINATION LEVELS
DETECTED AT LORENTZ BARREL & DRUM SITE[a]
(Prior to 1988)

Analyte	DHS Action Criteria References[a,b] (ppb)	Highest Level Detected[a] (ppb)	Date
METALS			
Arsenic	0.002 (2)	4.00*	11/83
Barium	10.00 (3)	160.00*	10/86
Chromium (total)	51.00 (3)	10.00	10/86
Cobalt		60.00	10/86
Molybdenum		20.00	10/86
Nickel	150.00 (1)	130.00	10/86
Vanadium		30.00	10/86
Zinc	7,400 (3)	20.00	10/86
VOLATILE ORGANICS			
Benzene	0.70 (1,4)	26.00*	10/86
Chloroethane		24.00	07/86
Chloroform	0.50 (3)	29.00*	07/86
1,1-Dichloroethane	4,000.00 (3)	85.00	07/86
1,2-Dichloroethane	0.51 (3)	270.00*	07/86
1,1-Dichloroethene	LOQ (4)	160.00*	07/86
trans-1,2-Dichloroethene	70.00 (1)	750.00*	07/86
Dichloromethane	10.00 (4)	26.00*	10/86
1,2-Dichloropropane	10.00 (4)	170.00*	07/86
Tetrachloroethene	0.87 (3)	140.00*[c]	07/86
1,1,2,2-tetrachloroethane	0.17 (3)	106.00*	10/86
1,1,1-Trichloroethane	200.00 (4)	220.00*	07/86
Trichloroethene	1.80 (3)	2,108.00*	10/86
Vinyl Chloride	0.015 (3)	1,100.00*	07/86
Freon 113		41.00	03/84
PESTICIDES			
Chlordane	0.05 (4)	0.20*	10/86
Toxaphene	35.00 (2)	2.00	10/86
POLYCHLORINATED BIPHENYLS			
PCBs	0.008 (3)	6.40*	10/86

a Concentrations are shown in parts per billion (ppb) unless otherwise indicated.

b DHS Action Criteria are as defined in a March 17, 1986, memorandum from David J. Lew, Ph.D., DHS's Chief of Alternative Technology and Policy Development Section, Toxic Substances Control Division, to all Section Chiefs in DHS's Toxic Substance Control Division. Reference numbers are shown in parentheses and indicate the source of each criterion. These sources are listed in the Reference section following this table.

c 140.00 ppb is the sum of PCE and 1,1,2,2-tetrachloroethane concentrations.

NOTES: DHS = Department of Health Services
LOQ = Limit of Quantification
* = exceeds DHS Action Criterion

1. Draft Health Advisories. Office of Drinking Water. U.S. Environmental Protection Agency. Washington, D.C. September 30, 1985

2. Ambient Water Quality Criteria Documents. Office of Water Regulations and Standards. U.S. Environmental Protection Agency, Washington, D.C. October 1980. (Values adjusted for drinking water.)

3. Draft Health Effects Assessment Documents Office of Emergency and Remedial Response Office of Environmental Criteria and Assessment U.S. Environmental Protection Agency Cincinnati, Ohio. September 1984.

4. Sanitary Engineering Branch California Department of Health Services Berkeley, California. 1985

+ CH2M Hill. February 1987. Preliminary Site Assessment Report. Lorentz Barrel & Drum (LB&D). Prepared for California Department of Health Services (DHS).

(After Ebasco, 1989)

TABLE 2-5

ANALYTICAL RESULTS OF GROUNDWATER
(Tracer Research Corporation, Groundwater Investigation at Lorentz Barrel & Drum, November 1987)

SAMPLE	DEPTH (feet)	DATE	FREON 113	TRICHLOROETHANE	TRICHLOROETHENE	PERCHLOROETHENE	CIS-1,2-DICHLOROETHENE	VINYL CHLORIDE	TOTAL HYDROCARBONS (w/out Methane)
W2	27	11/18	22	90	2600	11	<3	520	560
W3	27	11/18	3	5	54	0.2	<3	<0.2	8
W4	20	11/19	<0.3	28	30	0.1	<17	<0.2	14
W5	20	11/19	<0.02	60	<0.02	<0.004	<3	<0.2	66
W6	26	11/19	<0.02	53	3	<0.004	<3	<0.2	27
W7	26	11/19	<0.02	7	<0.02	<0.004	<3	<0.2	<7
W8	20	11/19	<0.02	68	1	<0.004	<3	110	750
W9	26	11/19	<0.02	14	<0.02	<0.004	<3	<0.2	<7
W10	26	11/19	<0.02	<0.008	<0.02	<0.004	<3	<0.2	<7
W11	26	11/19	<0.02	4	<0.02	<0.004	<3	<0.2	<7
W12	26	11/19	<0.02	64	<0.02	<0.004	<3	<0.2	38
W13	26	11/19	<0.02	60	<0.02	<0.004	<3	<0.2	12
W14	25	11/20	<0.02	20	<0.02	<0.004	<3	<0.2	8
W15	26	11/20	<0.02	69	<0.02	<0.004	<3	<0.2	14
W16	24	11/30	<0.02	62	0.8	0.1	<4	<0.2	9
W18	25	11/30	0.2	33	<0.02	<0.05	<4	<0.2	<9
W19	26	11/30	<0.02	<0.009	<0.02	<0.005	<4	<0.2	<9
W20	26	11/30	<0.03	0.03	<0.02	<0.006	<4	<0.2	<14

All results in parts per billion (ppb).

(After Ebasco, 1989)

Table 3-1

RESPONSIBILITY MATRIX FOR REMEDIAL DESIGN

Activity	PRPs	EPA	EMCON	General Contractor
Review Past Data and Collect Supplemental Information			X	
Design	O	O	X	
Bid Package			X	
Bid Evaluation/Recommendation	X		O	
Contract Award	X		O	
Equipment Procurement	X			X
Permits/Access Agreements	X		O	O
Construction Management	X		O	
Shop Drawings/Construction			O	X
Construction Oversight			X	
Testing/Startup/Training			O	X
O&M Manual Preparation	O	O	X	O
Startup/Training Assistance			X	O

X = Primary Responsibility
O = Supporting Role

Table 3-2

SHALLOW GROUND-WATER CLEANUP OBJECTIVES

(Based on Data Known September 1988)

(EBASCO 1989 Workplan)

Compound	Estimated Contaminant Concentrations In Extracted Ground Water (µg/l)	Currently Targeted NPDES Discharge Limit (µg/l)	Desired Treated Effluent Level[1] (µg/l)
1,2-Dichloropropane	25	5	4
Trichloroethane	42	5	4
Chloroform	8.0	5	4
1,2-Dichloroethane	16	1	0.8
1,1-Dichloroethene	26	5	4
Tetrachloroethene	17	5	4
1,1,2,2-Tetrachloroethane	28	5	4
Trichloroethene	651	5	4
Vinyl Chloride	155	2	1.6
Benzene	6.2	5	4
PCBs (Total)	0.31	0.065[2]	0.052
Chlordane	0.01	0.014	0.011
Toxaphene	0.1	0.24	0.19
Arsenic	0.2	20	16
Barium	120	NP	NA
Chromium (Total)	3.0	11	9
Zinc	5.0	58	46
Cobalt	13	NP	NA
Nickel	36	7.1 *	5.7 *

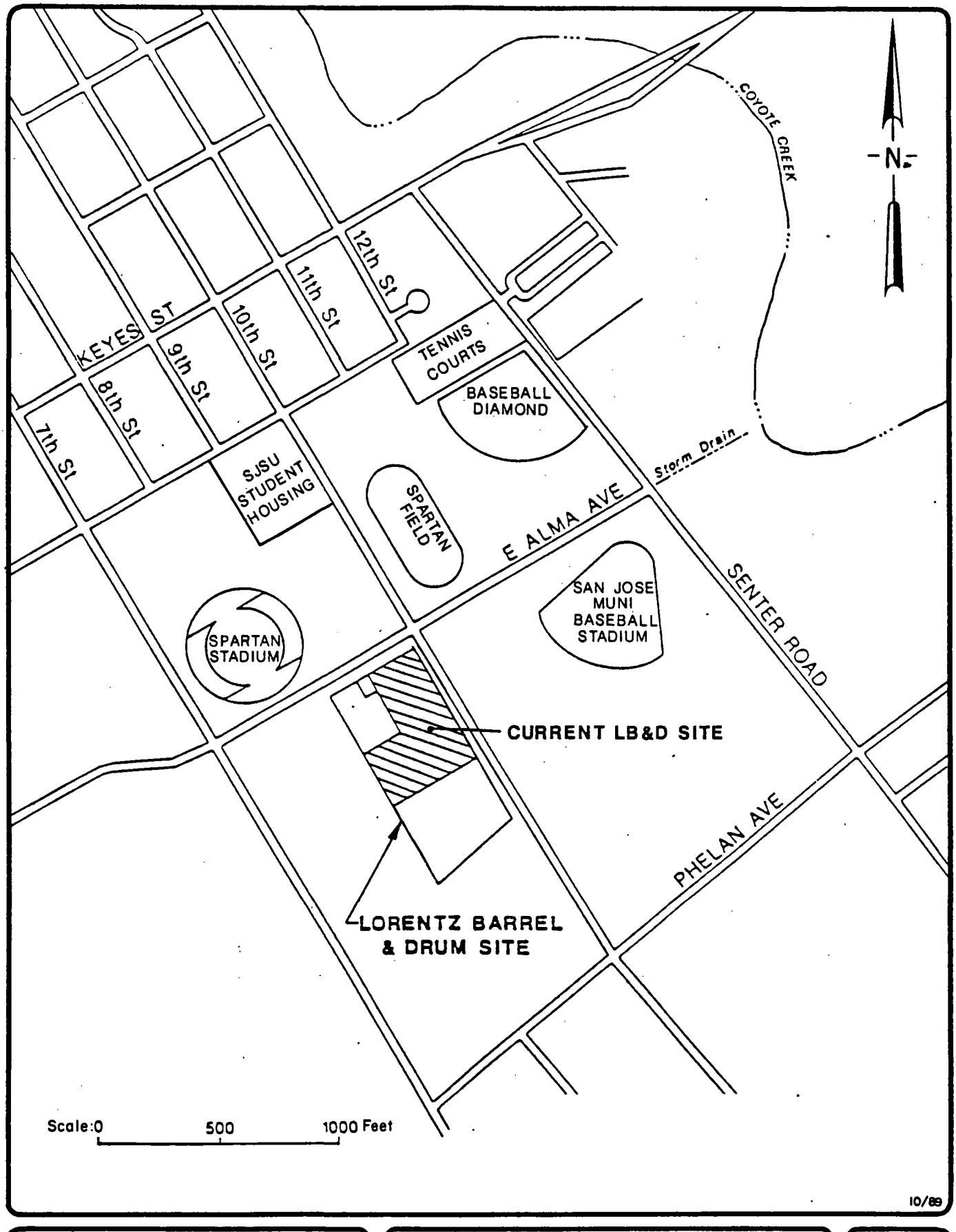
*= Interim limit only. Final limit to be established based on bioassay testing of LB&D treated effluent.

NP= No limit has been promulgated for this compound.

1. Desired treated effluent levels are estimated to be 80 percent of the expected NPDES discharge limit. These effluent levels will provide a factor of safety in the treatment process to allow for fluctuations in treatment plant removal efficiencies.

2. 0.065 µg/l is the method detection limit for aroclor 1242 only. The number 0.065 used in this table is meant to represent the detection limits of all the PCB aroclors combined.

129126



EMCON Associates

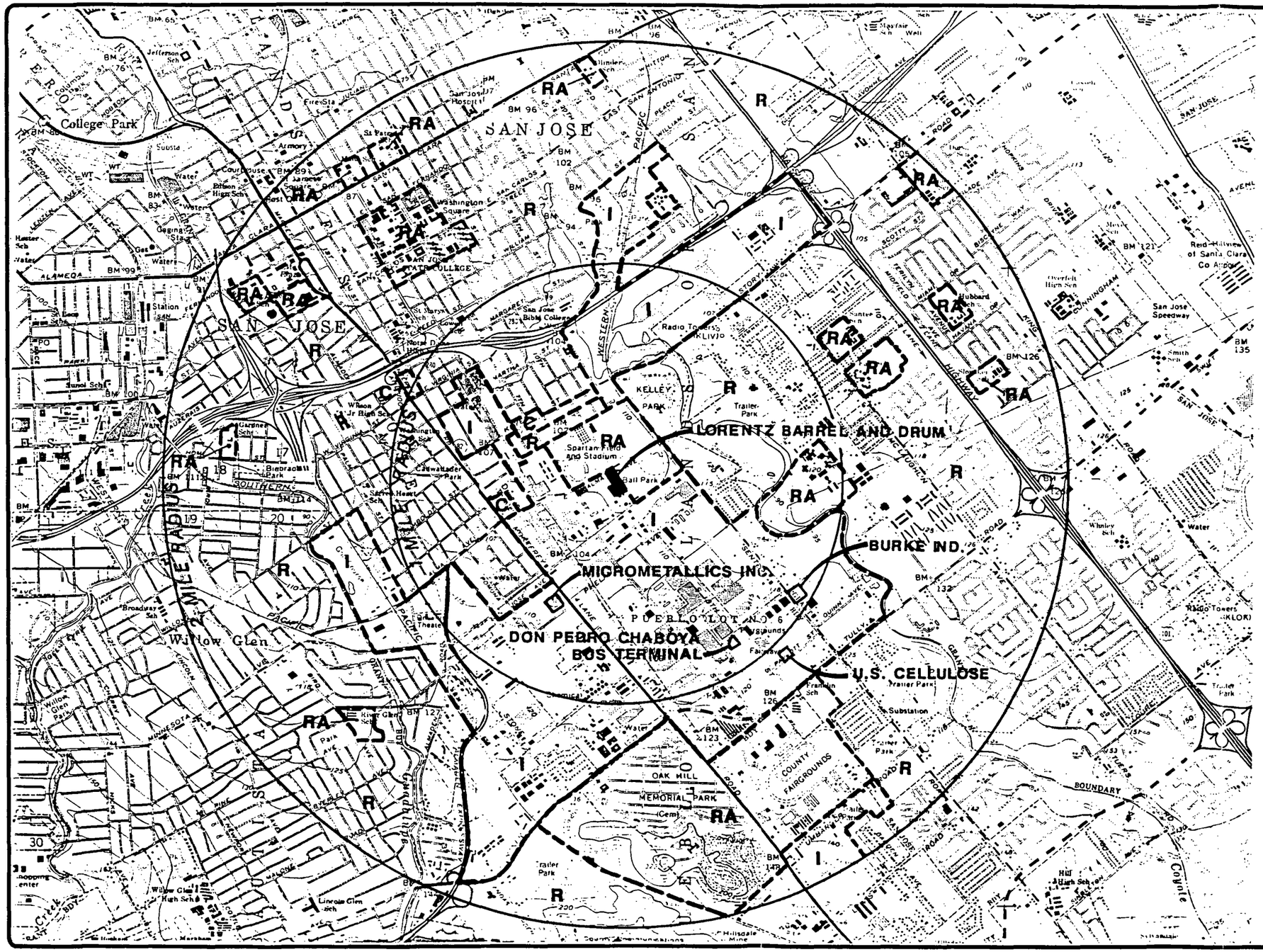
LORENTZ BARREL AND DRUM
SHALLOW GROUND-WATER
TREATMENT REMEDIAL DESIGN
SAN JOSE, CALIFORNIA

LOCATION MAP

FIGURE
2-1

PROJECT NO.
787-03.01

121963



-N-

LEGEND

R	Residential
I	Industrial and manufacturing
C	Commercial
RA	Schools, sports complex, etc.

SOURCE: USGS 7.5 min quadrangles East and West San Jose, California. Photorevised 1980. (Original scale 1:24000)

10/89

EMCON Associates

Scale: 0 1/2 1 Mile

Scale: 0 1000 2000 3000 Feet

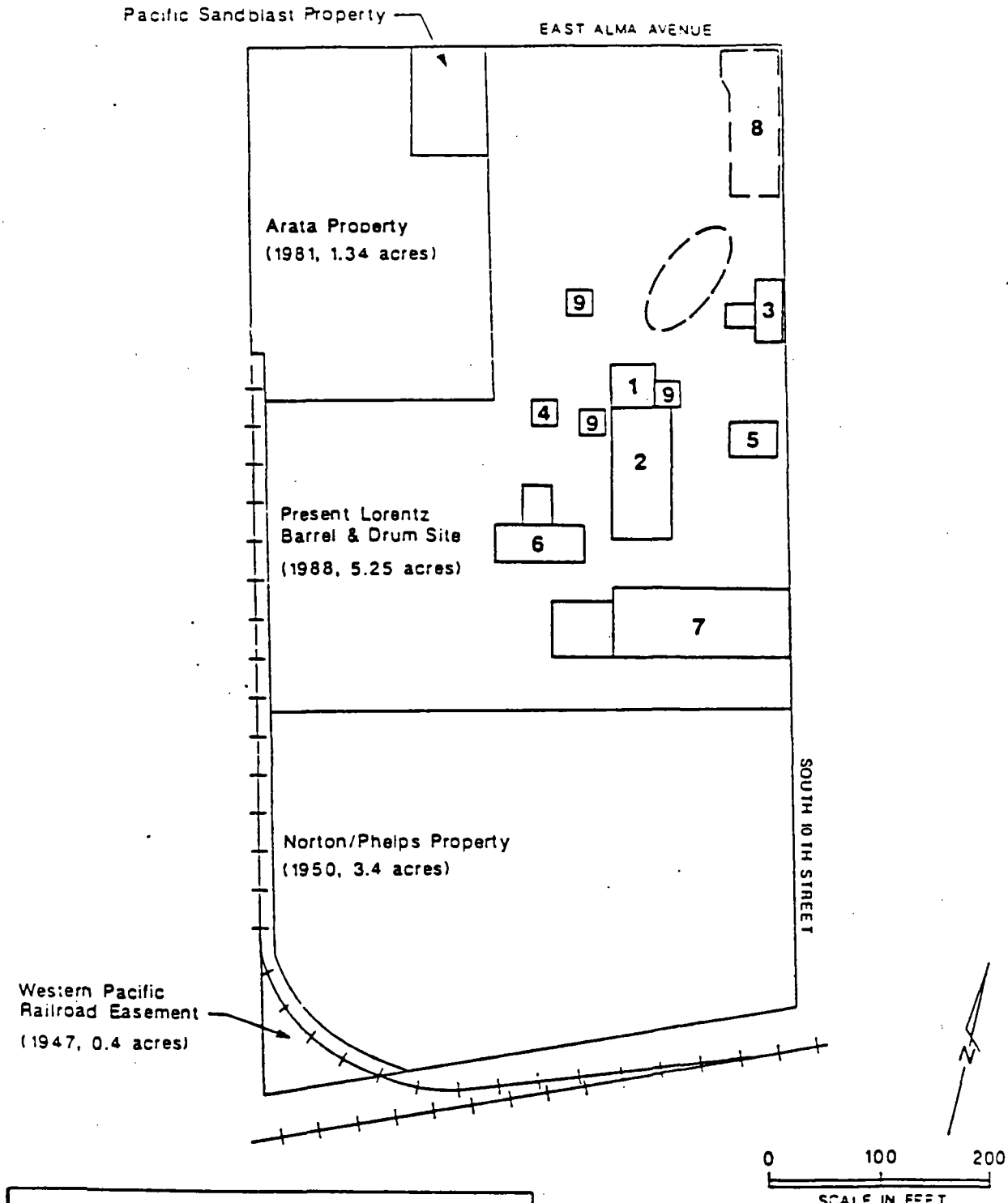
LORENTZ BARREL AND DRUM
SHALLOW GROUND-WATER TREATMENT REMEDIAL DESIGN
SAN JOSE, CALIFORNIA

LAND USE

FIGURE 2-2

PROJECT NO. 787-03.01

129126



LEGEND

1 Treatment Facility
2 Processing Facility
3 Former Location of Lorentz Residence
4 Former Location of Incinerator
5 Shop and Bathrooms
6 Storage Facility
7 Warehouse and Office
8 Former Sump
9 Existing Sump
1987 Excavations

EMCON Associates

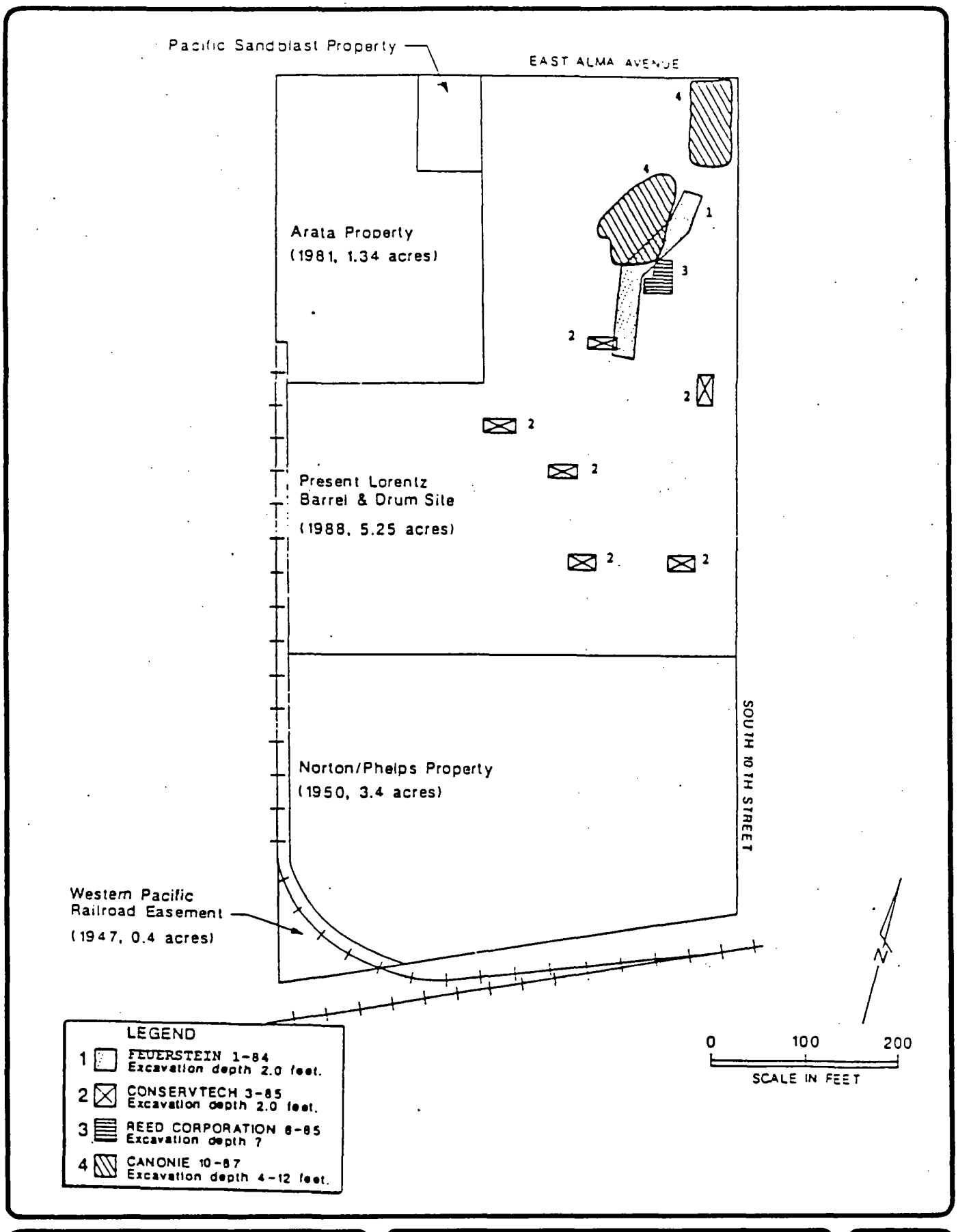
LORENTZ BARREL AND DRUM
SHALLOW GROUND-WATER
TREATMENT REMEDIAL DESIGN
SAN JOSE, CALIFORNIA

SITE FACILITIES

FIGURE
2-3

PROJECT NO.
787-03.01

129126



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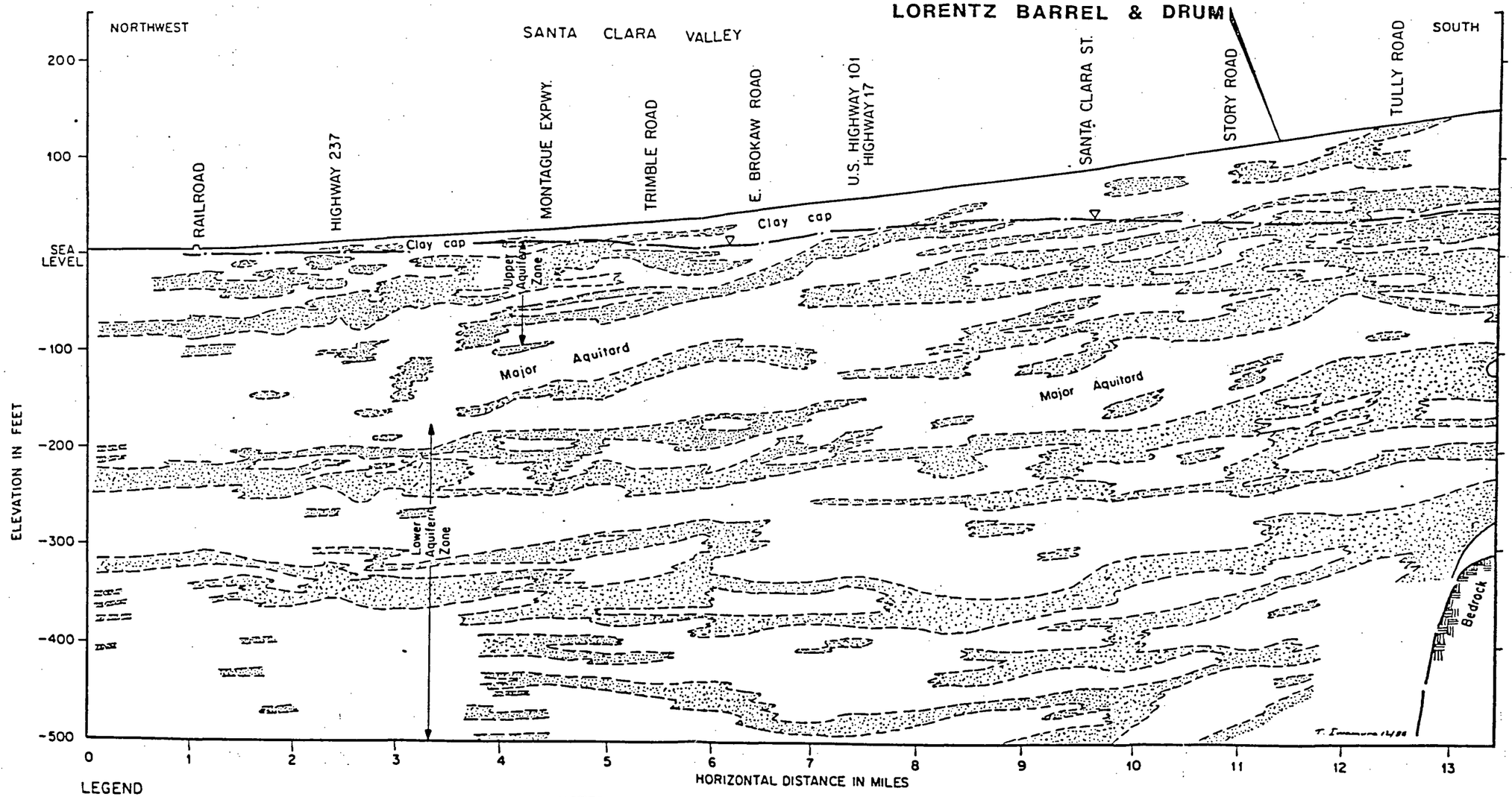
LORENTZ BARREL AND DRUM
SHALLOW GROUND-WATER
TREATMENT REMEDIAL DESIGN
SAN JOSE, CALIFORNIA

PREVIOUS SOIL EXCAVATIONS

FIGURE
2-4

PROJECT NO.
787-03.01

121963



LEGEND

DISTINGUISHABLE AQUIFERS--MIXTURES OF GRAVEL AND SAND. MEDIUM TO VERY HIGH PERMEABILITIES.

AQUITARD-- MIXTURES OF CLAY AND SILT, WITH SOME SAND AND GRAVEL, LOW TO VERY LOW PERMEABILITIES

APPROXIMATE WATER TABLE, 1984

NOTES:

INTERPRETIVE SECTION BASED UPON AVAILABLE WELL LOGS.

AQUIFERS ARE GROUPED INTO UPPER AQUIFER ZONE AND LOWER AQUIFER ZONE, SEPARATED BY "MAJOR" AQUITARD.

ADAPTED FROM UCB/SEEHRL, 1985

EMCON Associates

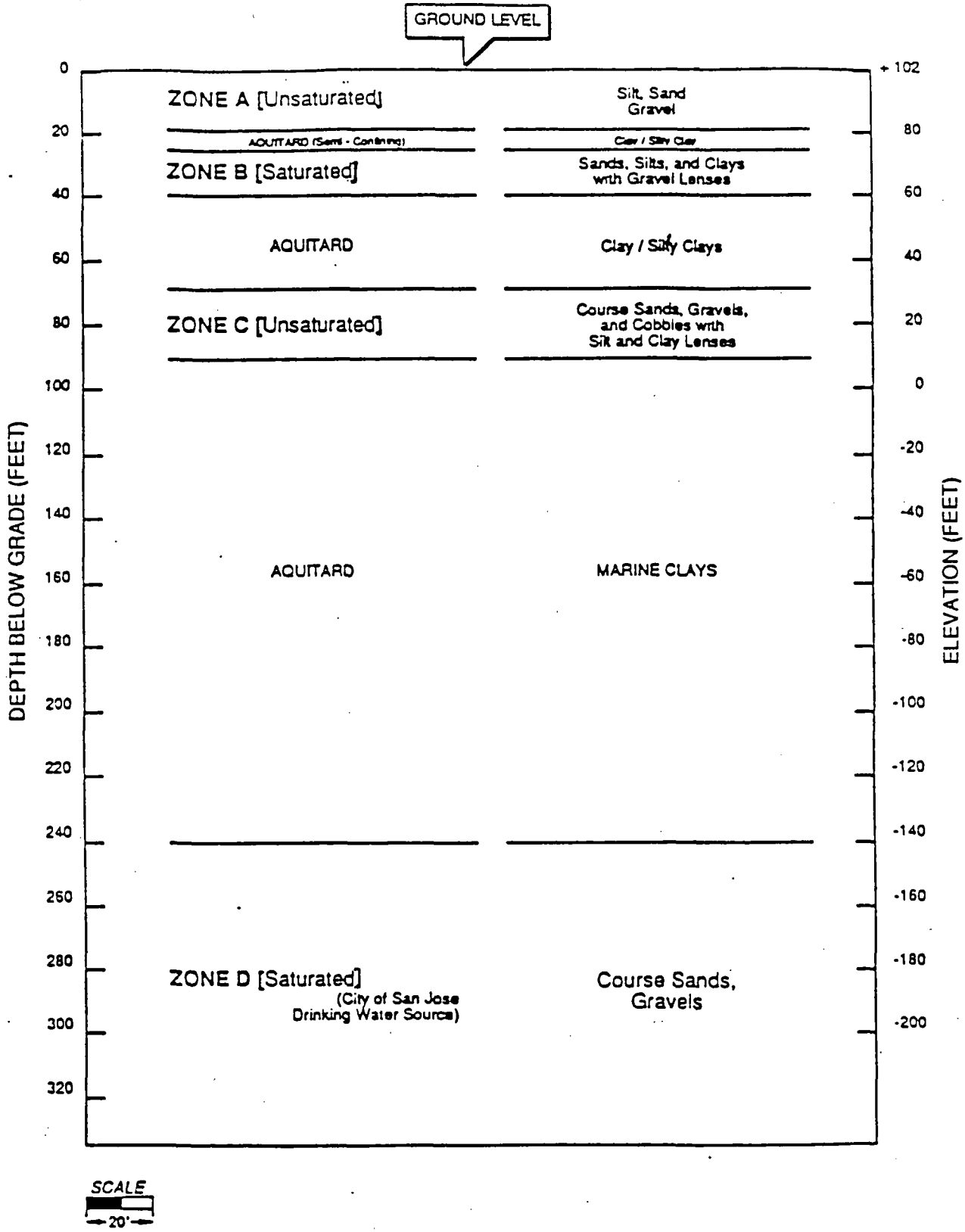
LORENTZ BARREL AND DRUM
SHALLOW GROUND-WATER TREATMENT REMEDIAL DESIGN
SAN JOSE, CALIFORNIA

REGIONAL GEOLOGIC CROSS SECTION

FIGURE 2-5

PROJECT NO. 787-03.01

129126



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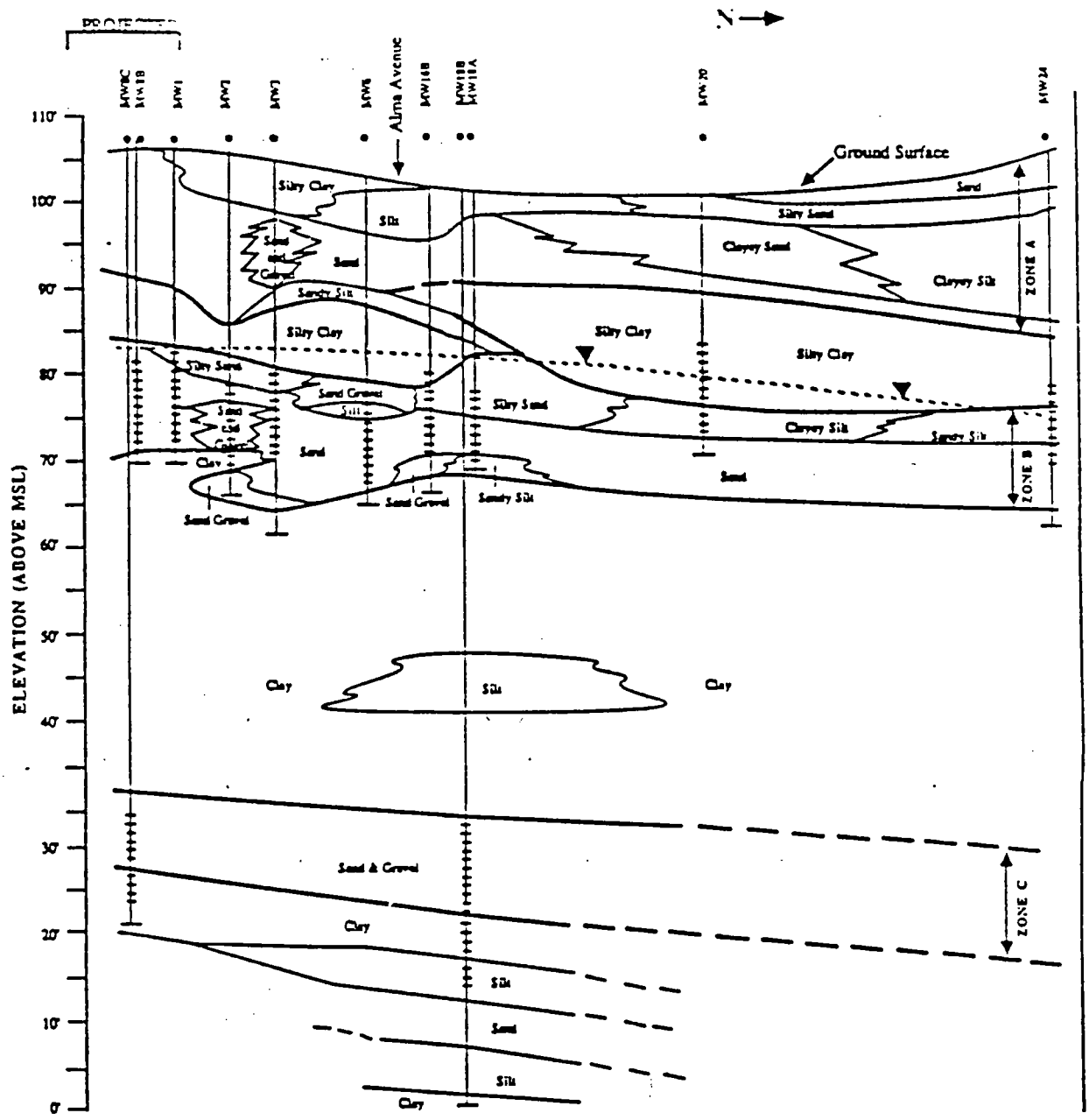
LORENTZ BARREL AND DRUM
SHALLOW GROUND-WATER
TREATMENT REMEDIAL DESIGN
SAN JOSE, CALIFORNIA

SIMPLIFIED SITE STRATIGRAPHY

FIGURE
2-6

PROJECT NO.
787-03.01

129126



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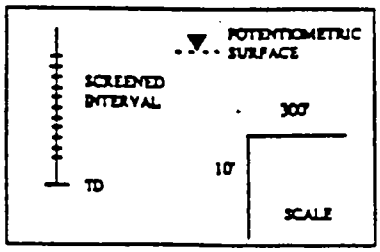

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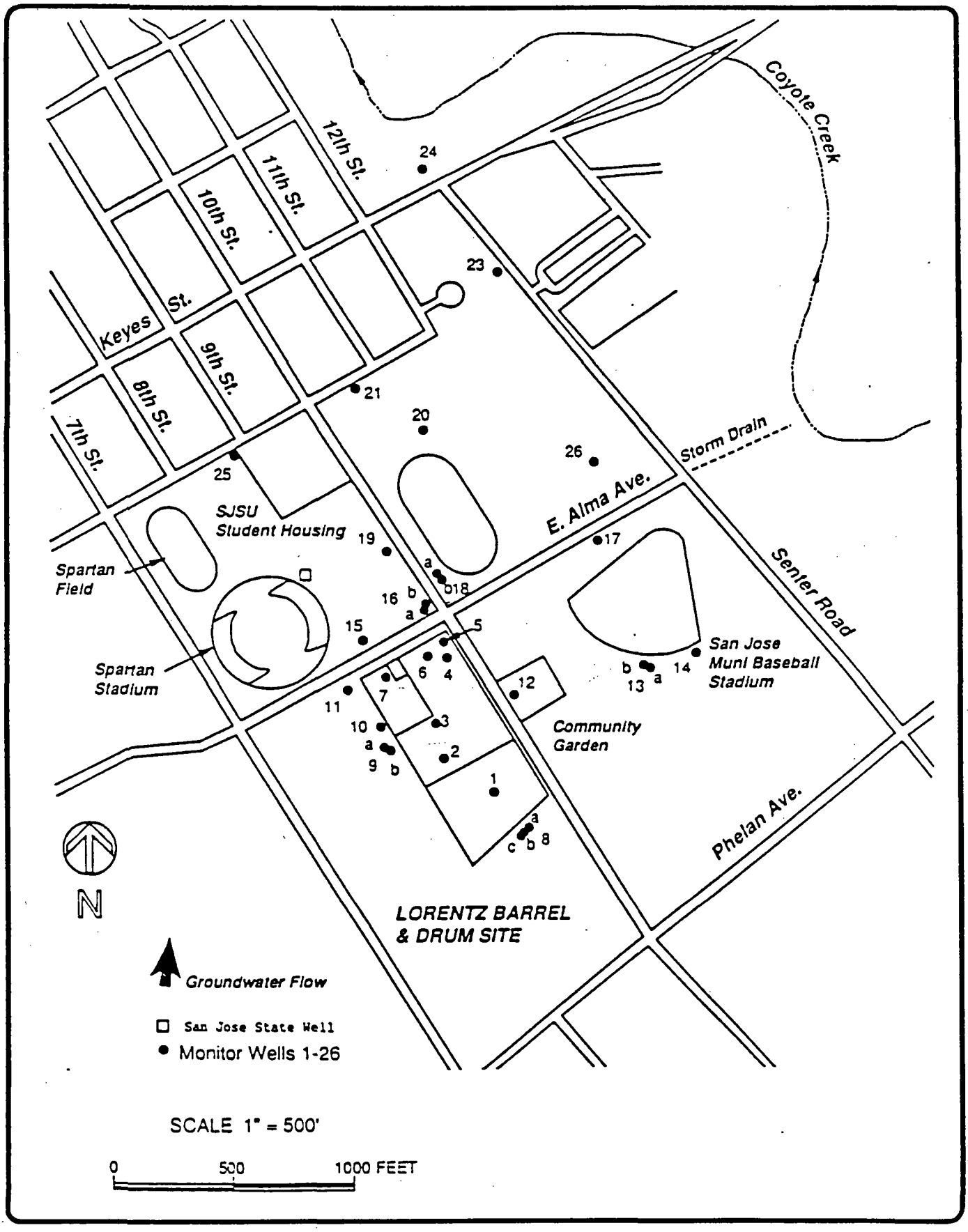
LORENTZ BARREL AND DRUM
SHALLOW GROUND-WATER
TREATMENT REMEDIAL DESIGN
SAN JOSE, CALIFORNIA

GEOLOGIC CROSS SECTION, NORTH - SOUTH

FIGURE
2-7

PROJECT NO.
787-03.01

129126



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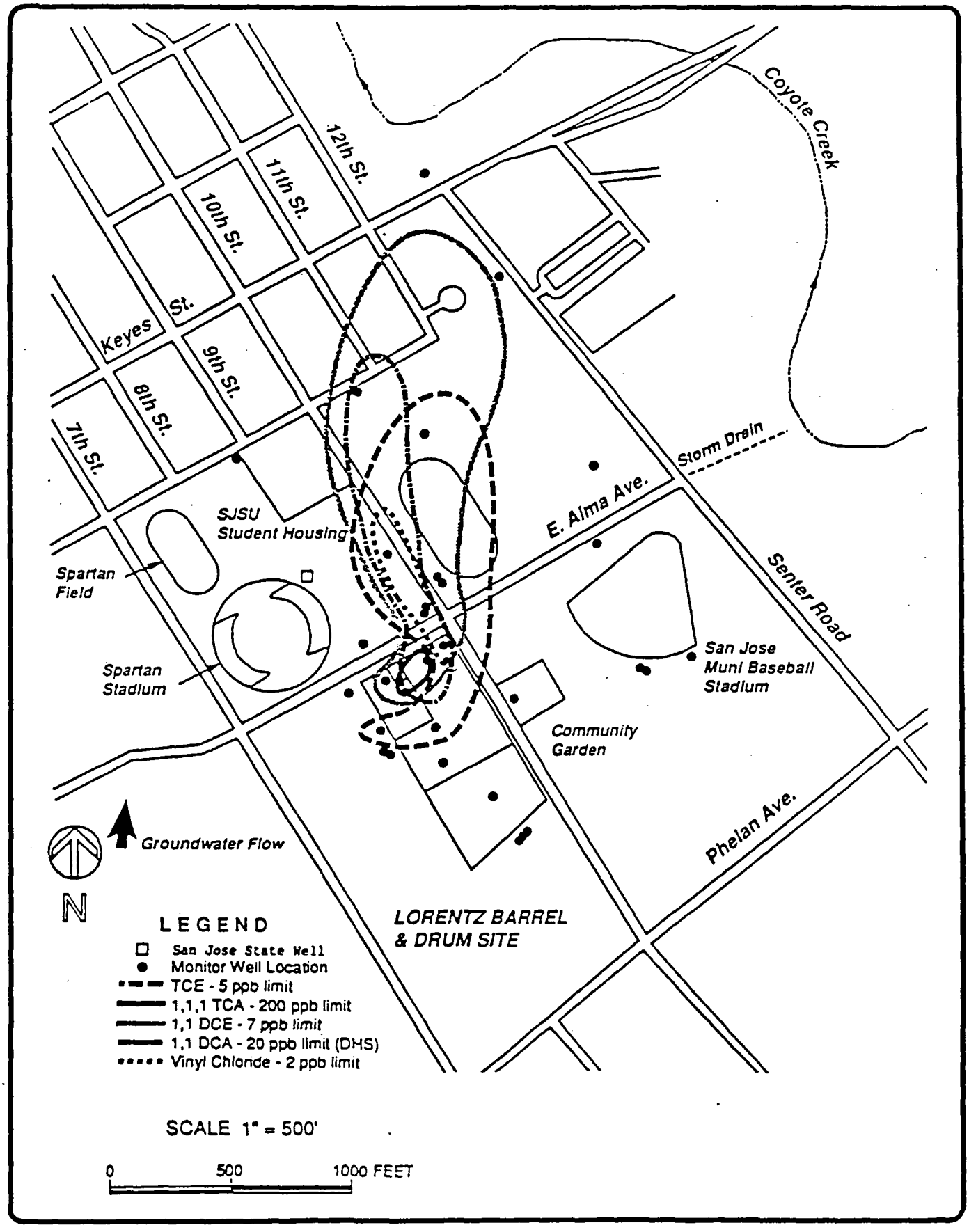
LORENTZ BARREL AND DRUM
SHALLOW GROUND-WATER
TREATMENT REMEDIAL DESIGN
SAN JOSE, CALIFORNIA

MONITORING WELL LOCATIONS

FIGURE 2-8

PROJECT NO. 787-03.01

129126



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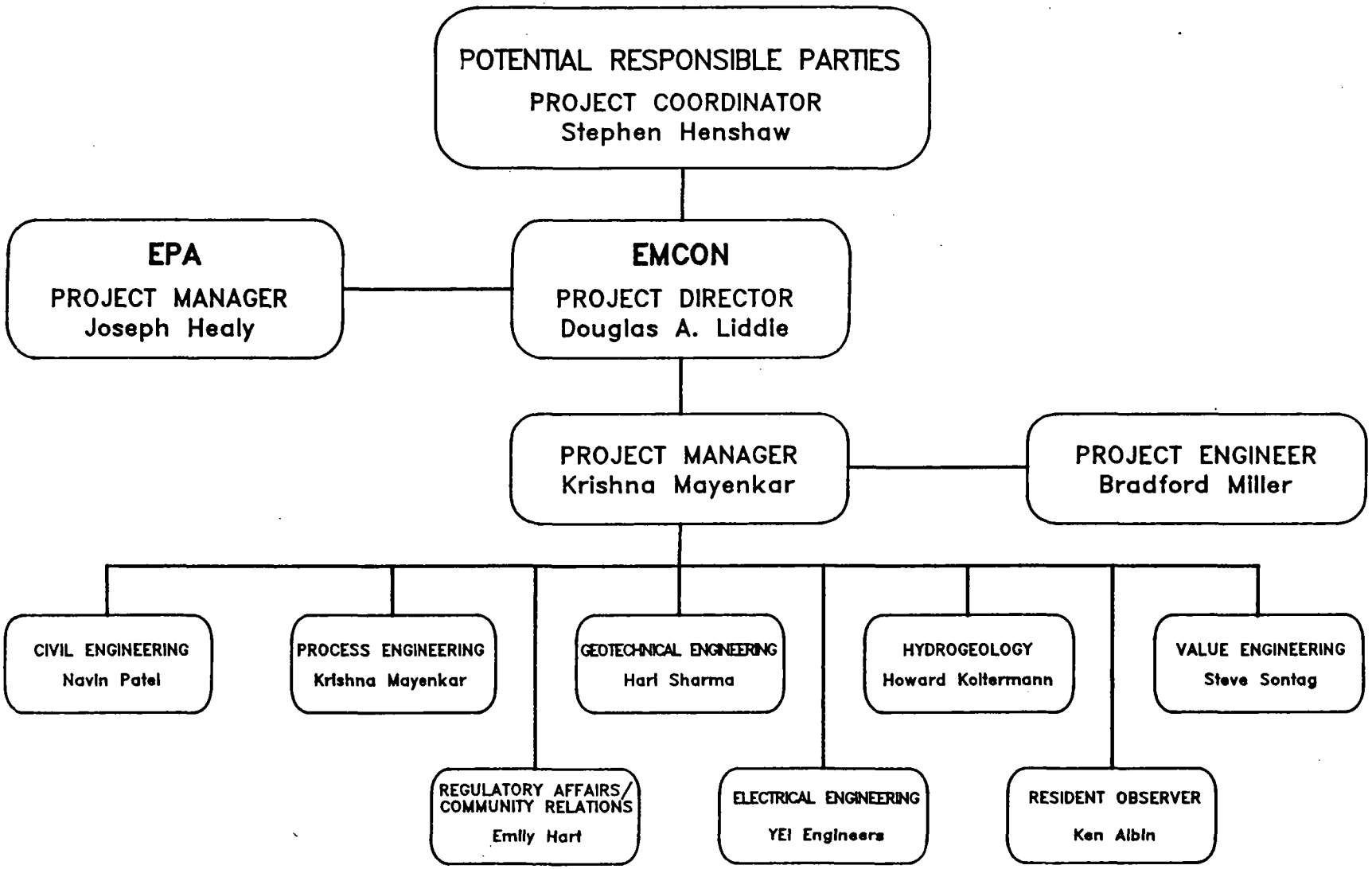
LORENTZ BARREL AND DRUM
SHALLOW GROUND-WATER
TREATMENT REMEDIAL DESIGN
SAN JOSE, CALIFORNIA

VOCs IN SHALLOW GROUND-WATER, DECEMBER 1988

FIGURE
2-9

PROJECT NO.
787-03.01



LORENTZ BARREL AND DRUM
PROJECT ORGANIZATION
FIGURE 4-1

EMCON Associates

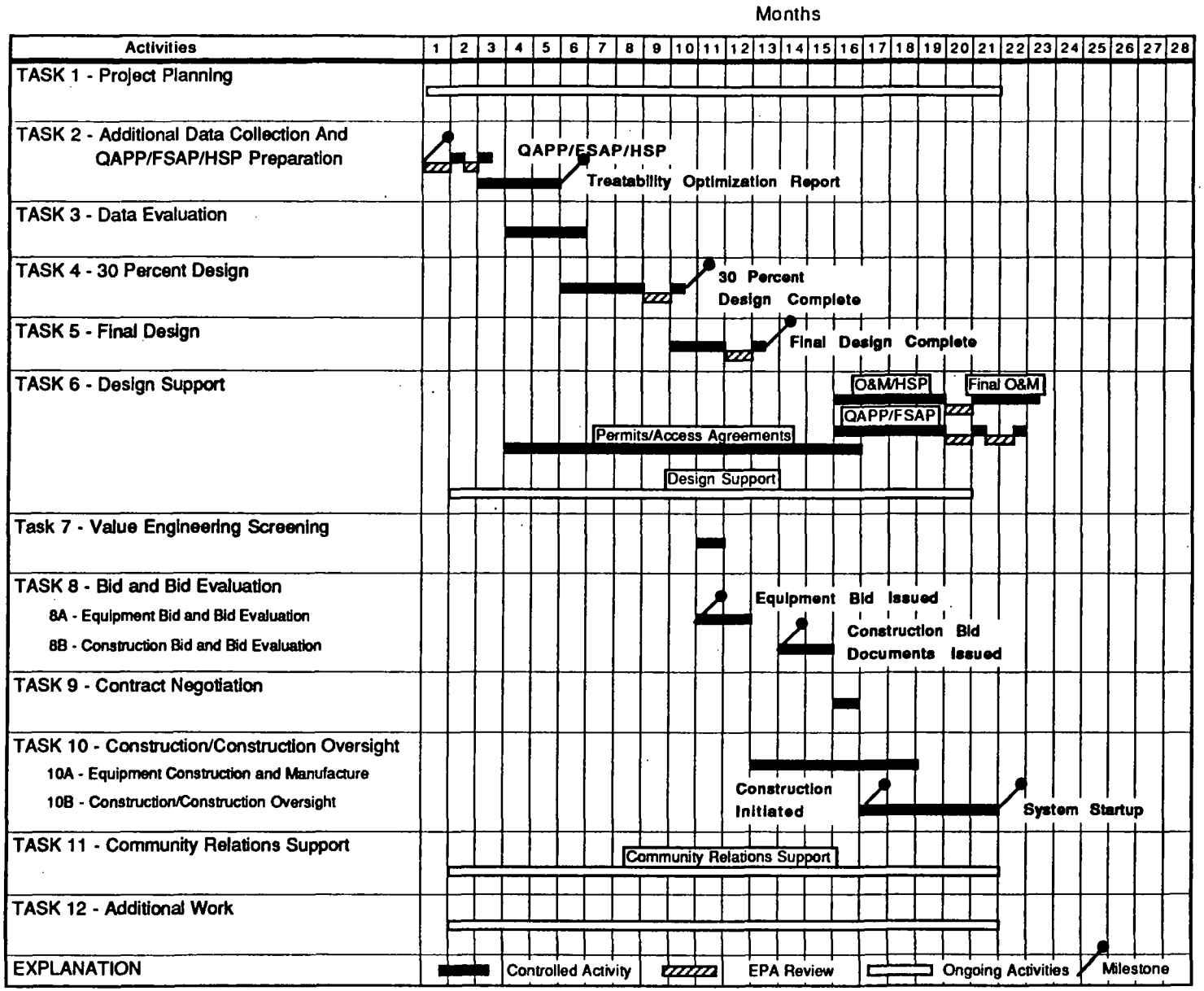


Figure 5-1 **PROJECTED RD/RA SCHEDULE WITH ANTICIPATED EPA REVIEW TIMES**

Lorentz Barrel And Drum