Statement of Basis
for
Soil Remediation at
the O'Brien Corporation's facility,
located at
450 East Grand Avenue
South San Francisco, CA
(EPA ID CAD005130455)

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Prepared by the U.S. Environmental Protection Agency
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1. Introduction

This document explains the proposed remedy for soil contamination at the O'Brien Corporation's facility located at 450 East Grand Avenue, South San Francisco, CA (the facility or O'Brien). It also explains the rationale for selecting the proposed remedy. EPA or DTSC will make a remedy selection for groundwater at a later date.

This document summarizes EPA's evaluation of the information contained in the Revised Remedial Alternatives Evaluation (in RCRA terminology, a Corrective Measures Study), dated October 20, 1997 and the Final RCRA Facility Investigation, dated May 31, 1996. Section 10 of this Statement of Basis lists key reference documents used by EPA to develop our proposed remedy. EPA has also created an index of the administrative record for this site. It contains a complete list of all documents EPA considered in making its decision on this proposed remedy. EPA encourages the review of any and all documents in order to gain a more comprehensive understanding of the facility and the RCRA corrective action activities proposed for the site. Additionally, Figure 1 provides a brief outline of the RCRA corrective action process.

2. Public Participation

The U.S. EPA solicits public comments from any party, including the company, other regulatory agencies, and the public, on the cleanup options considered and proposed for soil contamination at the site. EPA may modify the proposed remedy or select another remedy based on new information or public comments. Therefore, the public is encouraged to comment on all alternatives. Comments can be submitted to EPA in writing during the public comment period from July 28, 1999 to September 10, 1999.

Comments should be postmarked no later than September 10, 1999 and sent to:

Tom Kelly
EPA, Region 9, Waste Management Division
RCRA Corrective Action Office (WST-5)
75 Hawthorne Street
San Francisco, CA 94105

A final remedy for soil contamination will be selected by EPA only after the public comment period has ended and the information submitted during the comment period has been reviewed and considered. Modification may be made to the proposed remedy or another remedy selected based on new information or public comments.

At the time EPA makes a final remedy selection, EPA will respond to all comments. Similar comments may be grouped together and receive a single response. All comments and EPA responses will be incorporated into EPA's administrative record for this decision. Anyone who comments on the proposal will receive notice of the final decision. The U.S. EPA encourages the public to participate in this process. If you need additional information or have questions concerning the proposed remedy, contact Tom Kelly, EPA's project manager, at (415) 744-2070.

If you would like to review the Administrative Record (the documents and information that are considered or relied upon to make a remedy selection decision for a site) for this proposal, please call Vern Christianson, (415) 744-2422 to schedule a visit. These documents are available for public inspection at EPA's RCRA Records Center located at: U.S. Environmental Protection Agency, Region 9 Office, 7th Floor, Room 722, 75 Hawthorne Street, San Francisco, California.

3. Background

3.1. Facility Background

The facility is located in South San Francisco, one mile east of Highway 101 at the eastern end of Grand Avenue, as shown in Figure 2. Figure 3 is a more detailed facility map of the 26-acre facility, prepared by AT Kearney in December 1987 as part of the RCRA Facility Assessment for the site. The plant, originally owned by W.P. Fuller, has been in operation since 1898. The O'Brien Corporation purchased the facility in 1968. In 1994, O'Brien employed 85 people at the site. ICI Glidden recently purchased the remaining paint manufacturing operations, an area of seven acres. Except for the portion now owned by ICI Glidden (the warehouse, administrative building west of the warehouse), all structures have been removed from the facility.

The O'Brien site is located on Point San Bruno adjacent to the San Francisco Bay. To the south lies the former San Bruno Channel, which was used for shipping. It was filled in with soil from the late-1960s to the mid-1970s. The southwestern portion of the site was previously occupied by Steiger Pottery Works. A trucking company is located west of the site. To the north lies undeveloped land owned by Genentech. Northeast of the site, Marine Magnesium previously operated a plant that recovered magnesium and other salts from bay-water. The entire area around the site is zoned for commercial and light industrial uses.

3.2. Resource Conservation and Recovery Act (RCRA) Status

The site operated one RCRA regulated storage area, two RCRA regulated storage tanks and three RCRA regulated surface impoundments. All of the units were operated under RCRA interim status. In a September 23, 1987 letter, DTSC and EPA approved a closure plan for three surface impoundments and two waste storage tanks as a closure with waste in-place. However, the facility submitted and followed a post-closure plan that included a seven year post-closure monitoring period, not the thirty year period described in state and federal regulations. During closure, O'Brien removed soil contaminated with lead above a concentration of 200 mg/kg from the impoundments and the area that surrounded the impoundments, shown in Figure 4. DTSC approved the certification of closure in July 18, 1988. Recently, O'Brien has requested that DTSC re-evaluate the closure to determine if it meets clean closure standards.

On May 27, 1994 , DTSC similarly approved the closure plan and provided oversight on the closure of the storage area. Although the soils at one location (a composite of four samples) contained lead at concentrations well above the previously approved level (see Figure 5) the facility demonstrated that the contamination beneath the pad came from operations previous to

the use of the drum storage pad. Therefore, DTSC indicated that further work may be required under EPA's 3008(h) order.

EPA issued an administrative 3008(h) order to O'Brien on February 24, 1989. O'Brien filed a request for a hearing on April 7, 1989. After negotiations with O'Brien, EPA issued a revised administrative 3008(h) order on April 16, 1991. O'Brien did not request a hearing for the revised order, which became effective thirty days after issuance. EPA's order, both the original and revised, were based on the RCRA Facility Assessment, completed by A.T. Kearney Inc. for EPA. Figure 3 includes numbers that identify the Solid Waste Management Units and Areas of Concern identified in the RCRA Facility Assessment. The numbers correspond with the named areas in Table 1. Although, over time, some of the areas have broadened from the original designation.

3.3. Interim Remedial Measures

During soil excavation for the surface impoundment closures, O'Brien discovered a breakwater (or bulkhead), see Figure 6. The breakwater was constructed in the 1910s presumably to protect the fill along the southern edge of the site. At that time, the San Francisco Bay was located immediately south of the site, but it has since been land filled.

The breakwater was constructed from 110 gallon drums stacked two-high along with clay pots, construction and demolition debris, all covered with concrete. EPA's 3008(h) order required immediate submission of a CMS for the breakwater area. O'Brien submitted the Breakwater Alternatives Analysis in response. EPA approved the plan on December 24, 1991. O'Brien removed the breakwater from March 1992 to May 1992 and documented the results of the breakwater remediation in Bulkhead Remediation Project, dated April 1993.

4. A Summary of the Problem

Elevated lead levels, ranging up to 3.8% lead, have been found at numerous locations and varying depths around the Warehouse area. EPA does not consider the characterization of the Warehouse area to be complete. The likely source of contamination in the warehouse area may have been paint manufacturing and waste management practices employed by the facility or operations from the pottery factory, prior to construction of the warehouse. The warehouse itself is not the source of contamination since it has a solid concrete foundation and no evidence of release can be found within it. Because contamination predates the Warehouse, further characterization would mean sampling beneath the warehouse foundation to determine the extent of contamination near sample locations SWB-7, PM-8 and SWB-8, see Figure 7 for these sampling locations. Additionally, elevated lead levels have also been found at the Eastern Property (5.9%) and Former Still Area 1%. Within these areas of lead contamination, arsenic and semivolatile organic compounds have also slightly exceeded EPA media cleanup standards discussed in Section 8.

5. Proposed Remedy for Contaminated Soil

5.1 Warehouse

The proposed remedy is asphalt and concrete capping of contaminated soil near the warehouse and the surrounding paint manufacturing facility, see Figure 8. The cap consists of asphalt paving around the warehouse and administrative building as well as the buildings themselves and the concrete foundation of the tank storage area. EPA considers this a streamlined remedy selection, because capping was the only alternative proposed by the facility. As part of this remedy, O'Brien must submit a plan to maintain the asphalt and concrete cap in good condition. For this portion of the property, O'Brien or ICI Glidden must submit institutional controls (deed restrictions) that accomplish the following objectives:

- restrict the future use of the property to commercial and industrial use, unless approved by EPA or DTSC,
- minimize excavations in the capped area,
- if excavations are necessary, notify EPA or DTSC at least 14 days in advance of any planned activities and explain how contaminated soils will be managed,
- characterize any soil that is excavated beneath the cap, but not replaced (soil excavated for the repair of underground utilities may be removed without characterization, provided the soil is replaced in the original excavation), and
- with EPA or DTSC approval, existing buildings may be removed or new buildings constructed, provided that the area remains capped after construction is complete and that soils are properly managed during construction or demolition activities.

The institutional controls must run with the land and remain in perpetuity unless EPA or DTSC agrees that no further remediation is necessary.

Normally, EPA places specific groundwater monitoring requirements where contaminated soils are left in place. In this case EPA is still evaluating releases from the site to groundwater, so EPA prefers to delay this decision until a comprehensive remedy decision can be made for groundwater. Currently O'Brien is monitoring two wells on the southern border of the Warehouse area in addition to other wells at the site. Until a groundwater remedy is selected, these wells must continue to be monitored on a quarterly basis. No wells are currently located upgradient of the Warehouse, where a different geologic unit is located. This limits the value of statistical comparisons between upgradient and downgradient water quality. Consequently, EPA is not requiring O'Brien to monitor water quality upgradient of the Warehouse area.

EPA notes its disagreement with the following statement from the Revised Remedial Alternatives Evaluation: "[h]istorical groundwater data shows that the high concentrations of lead that is present in the soils is not impacting groundwater." Lead in groundwater at the site is a concern that EPA is continuing to evaluate.

This remedy selection does not restrict O'Brien or ICI Glidden from proposing further characterization or remediation of soils under the direction of EPA or DTSC. However, if

proposed, EPA or DTSC will provide public notice of significant changes to this remedy, such as excavation and treatment of contaminated soils in the Warehouse area.

5.2 Eastern Property and Former Still Area

For the eastern property and former still areas, the proposed remedy consists of (1) excavating contaminated soil in the areas shown in Figure 9; (2) soils not subject to the land disposal requirements for volatile or semi-volatile organic compounds, may either be stabilized with lime, modified phosphates, or silicates so that the lead is no longer leachable (as determined by the Toxicity Characteristic Leaching Procedure) or transported off-site for treatment and disposal; (3) soils that are subject to the land disposal requirements for volatile or semivolatile organic compounds must be transported off-site for treatment prior to disposal in a hazardous waste landfill; and (4) backfilling excavated areas with clean soil.

For the eastern property and the solvent still area, O'Brien has proposed the areas shown in Figure 9 for remediation. In addition to these areas, EPA is proposing to include the southeast portion of the storage area shown in Figure 5, where the composite lead concentration was 1,150 mg/kg. EPA is also proposing further sampling near sample locations EB-16 and S-4 (a minimum of four samples at each location). Sample S-4, shown in Figure 10, was collected for Genentech Inc. on a small portion of land between O'Brien and the San Francisco Bay. The lead and arsenic contamination at S-4 are consistent with those found at the O'Brien facility and do not appear releated to the site's historic operations of recovering magnesium from water in the Bay. If this confirms that either EB-16 or S-4 locations exceeds the media cleanup standards (described in Section 7), these areas will be remediated along with those in Figure 9 and the southesast portion of the hazardous waste storage area.

O'Brien estimated that it will excavate 3,500 cubic yards of contaminated soil. This determination is based on limited data. As part of the remedy, O'Brien must submit a plan to complete the characterization of the lateral and vertical extent of contamination for the areas shown in Figure 9 (and near EB-16 and S-4). After treating the contaminated soil, O'Brien will collect confirmation samples to verify that treated soil is no longer hazardous, based on the Toxicity Characteristic Leaching Procedure (TCLP). O'Brien must also verify that the treated soil meets the land disposal restriction treatment standards. These samples will be collected and analysed for each 500 tons of soil excavated.

EPA could have chosen to approve the planned remediation of the eastern property and the solvent still area as an interim measure, which involves less public involvement than this remedy selection process. However, EPA believes it is important to recognize that O'Brien's RFI investigation and the added characterization that will take place as part of the remedy, sufficiently characterizes soil contamination to implement a final soil remedy. Additionally, a final decision with regard to contaminated soils will encourage redevelopment of the property. This is consistent with EPA's brownfield guidance and policies which encourage the assessment, cleanup and reuse of contaminated industrial property.

6. Environmental Setting

6.1 Geology

Artificial fill can be found throughout the southern and eastern portions of the site. The exact source of the fill is unknown. Probable sources include debris from the 1906 earthquake and spoils from hydraulic mining and dredging. The artificial fill is composed of gravel, sand, silt and clay along with man-made debris like pottery shards, bricks, concrete, asphalt, glass and wire.

The depth of the fill ranges from 0 feet near the center of the site to twenty feet or more at the southern edge and eastern edge. In the south, the fill lies over younger bay mud interbedded with layers of sand and silty-sandy clay. This layer pinches out toward the northern half of the facility, but extends laterally to the east, south and west. The unit may be as much as 70 feet thick beneath the southern portion of the facility.

In the northeast, the fill lies over a sandstone bedrock. An outcropping of the sandstone bedrock elevates the area north of the road, including the former tank farm, more than twenty feet above the rest of the site. In the northwest, south of the road, colluvium overlies the bedrock. Near the center to the north-central part of the site lies a subsurface ridge of bedrock with little or no fill covering it. The ground surface of the site slopes slightly from North to South.

6.2 Hydrogeology

In the fill, groundwater flows to the south. Groundwater can be found four to ten feet below the ground surface. The average hydraulic conductivity of the fill is 10^{-2} to 10^{-4} cm/s. The hydraulic conductivity in the bay mud (with sand layers) varies widely from 10^{-4} to 10^{-8} cm/s. EPA agrees with O'Brien's conclusion that groundwater at the site is unlikely to be used as a source of drinking water. However, groundwater at the site eventually flows to the San Francisco Bay. So, the impact of the site's groundwater on the Bay is expected to be the primary factor in the remedial decision for groundwater.

6.3 Surface Water

O'Brien currently manages storm water on the site in impoundments as specified in their storm-water management plan. The paved portions of the property owned by ICI Glidden are managed in accordance with the facility's stormwater permit.

7. Scope of the RCRA Facility Investigation

Summary of Contaminated Soil Risks and Media Cleanup Standards

Figure 7 shows the sampling location and results for metals contamination at the site. This includes locations where high levels of lead were detected near the warehouse, including EB-23

(8,700 mg/kg), PM-8 (37,000 mg/kg), SWB-7 (21,000 mg/kg), SWB-8 (21,000 mg/kg) and PM-7 (23,000 mg/kg). These high levels of lead are found at various depths at these sampling points. EPA does not consider the characterization of the Warehouse area to be complete. Because contamination may predate the Warehouse, further characterization would mean sampling beneath the warehouse foundation to determine the extent of contamination near SWB-7, PM-8 and SWB-8. Additional investigation would also be necessary near EB-23.

In the warehouse area, semi-volatile organic compounds have been detected at MW-21, PM-2, PM-3, PM-8, SWB-8 and SWB-7, as shown in Figure 11. However, only benzo (a) anthracene and benzo (b) fluoranthene, at SWB-7 exceed the Region 9 Preliminary Remediation Goals (PRGs). The exceedence was less than 1 mg/kg and only for samples taken at a five foot depth. Many of these semivolatile contaminants exceed soil screening levels, included in the PRGs, designed to protect groundwater from leaching contaminants. However, the groundwater results to date indicate little migration of semi-volatile contaminants to groundwater. Volatile organic compounds (VOCs) were rarely detected in the warehouse area, as shown in Figure 12. MW-21 has shown low but decreasing concentrations of VOCs in groundwater, but no source area has been discovered.

For the eastern property and the solvent still area, high levels of lead were found at SWB-9 (28,000 mg/kg), EB-10 (3,300 mg/kg), EB-12 (59,000 mg/kg), EB-20 (3,400 mg/kg), PM-9 (1,200 mg/kg), EB-19 (1,300 mg/kg) and EB-18 (10,000 mg/kg). Additionally, at SWB-9, benzo (a) anthracene and benzo (b) anthracene were detected at 84,000 ug/kg and 11,000 ug/kg, respectively. Other VOCs, SVOCs and metals were detected at the site, but not in concentrations that exceeded the PRGs.

The media (in this case soil) cleanup standards proposed for this site are based on Region 9's PRG for industrial land use, and shown in Table 3. These levels corresponds to a one in a million cancer risk, under a conservative set of assumptions. The PRGs consider three pathways of exposure: ingestion, inhalation and dermal adsorption. The PRGs do not consider the potential risk to groundwater from soil leachate. Additionally, the PRGs do not address ecological impacts. Given the industrial nature of the past, current and expected land use, and the institutional controls to ensure that future land use is industrial or commercial, the PRG for lead, 1000 mg/kg, is appropriate for this facility.

For arsenic, EPA is setting the media cleanup standard at 30 mg/kg. If the industrial PRG is considered for the site (3 mg/kg), capping most of the facility would likely be the only practical way to reduce arsenic exposures. However, a 10^{-5} risk level (1 in 100,000 cancer risk) for arsenic would require little cleanup beyond that proposed for lead contamination, since high arsenic is often located at borings that also contained high lead levels, like EB-12, EB-18, SWB-6 and SWB-9. EPA believes that the 10^{-5} risk level is warranted considering (1) the industrial nature of the site, (2) the difficulty in distinguishing between background and site-related arsenic, and (3) the similarly high levels of arsenic that can be found throughout California and San Francisco Bay Peninsula. One area that arsenic was found that will not be addressed by the proposed remedy is at EB-14 (60 mg/kg). At the time other areas will be characterized for remediation, EPA requests that O'Brien verify that the area near EB-14 has an average concentration of less

than 30 mg/kg of arsenic. Otherwise, the area near EB-14 should also be remediated along with lead contaminated soils.

EPA also notes that high levels of Total Petroleum Hydrocarbons (TPH) were found in the tank farm area at boring B-12 (1,300 mg/kg at 3.5 feet and 2000 mg/kg at 8 feet), numerous borings near SWB-9 (up to 40,000 mg/kg) and at a former underground storage tank site at EB-16 (8,900 mg/kg as oil). All of the TPH results can be found in Figure 13. At this time, EPA does not see a need for remediation, because the tank farm is located on a rock outcropping which makes cleanup very difficult. Also, repeated borings near B-12 did not show similar levels of TPH. SWB-9 area is already proposed for remediation. While EB-16 was not proposed for remediation by O'Brien, it also exceeds the cleanup standard for lead and will be considered for remediation, based on the results of further sampling. EPA does not set media cleanup standards based on TPH, which is more of a general indicator of contamination. EPA sets cleanup levels based on the underlying constituents. Even at the locations with the highest concentrations of TPH, only the two semi-volatile identified in Table 3 exceed the PRG levels, and these areas will have soil excavated as part of the proposed remedy.

EPA is also setting a cleanup standard for treated soil at the level required by EPA's land disposal restrictions. For lead (or any other contaminant listed in Table 1 of 261.24) , the treatment standard is 5 mg/kg as measured by the TCLP. For other hazardous constituents, as of August 24, 1998, the treatment standards for soil that exhibits a characteristic of hazardous waste, will change, see 63 Federal Register 28556 - 28753. Previously, lead was the only constituent subject to land disposal restriction. After August 24, 1998, all hazardous constituents must be reduced 90% or ten times the universal treatment standard. The Universal Treatment Standard (UTS) concentrations can be found in Table 2. Even though EPA similarly changed the treatment standard for lead (90% reduction or 10 times the UTS), California's standard, in Table CCW - Constituents in Waste Extract at Section 66268.43, remains in effect, because it is more stringent. If, prior to implementation of the approved remedy, California adopts the federal standard for lead and other TCLP contaminants, the new federal (and California) standard will be the media cleanup standard for lead in soil.

8. Scope of Corrective Action

This action is intended to address contaminated soils at the O'Brien site, which have not been previously addressed in the closure plans for the surface impoundments and container storage area or the interim measure for the breakwater. EPA envisions a future decision regarding groundwater at the site, which could range from active groundwater remediation to continued monitoring for the entire site or portions of the site. Additionally, the slough or former San Bruno Channel may require further investigation or cleanup. However, this area was not named in EPA's 1991 3008(h) order, which is currently in effect at the site.

8.1 Summary of Alternatives

8.1.1 Warehouse Area

O'Brien has proposed to cap soil contamination in the warehouse area. The cap would consist of the warehouse and foundation, the administrative building (west of the warehouse) and foundation, the secondary containment for the tanks south of the administrative building and the surrounding paved areas. Figure 8 shows the extent of the capped area, including a small portion that has not yet been capped. The Revised Alternatives Evaluation recognized that capping alone was not sufficient, so it also discusses institutional controls. EPA has expanded on this discussion in Section 5 of this Statement of Basis.

8.1.2. Former Solvent Still Area and Eastern Property

In its Revised Remedial Alternatives Evaluation, O'Brien considered four remedial alternatives for this portion of the facility. The first three alternatives include excavation of soils. For these options, O'Brien will conduct further sampling to verify that the remaining soils are below the cleanup level, after the initial soil removal is complete. Although not specified in the Revised Remedial Alternatives Evaluation, soils will be stockpiled within areas of contamination, on a bermed concrete pad, or other containment acceptable to EPA, prior to treatment.

Alternative 1: Excavate soils with lead in excess of 1000 mg/kg, backfill with imported soil, transport impacted soils to off-site Class 1 facility for treatment or disposal.

Alternative 2: Excavate soils with lead in excess of 1000 mg/kg, backfill with imported soil, stabilize soil and transport to non-RCRA facility. Solidification/stabilization agents may consist of lime, modified phosphates, or silicates. Confirmation testing will verify that the waste is no longer hazardous and meets the media cleanup standards for treated soil (equivalent to the combined federal and state land disposal requirements as discussed in Section 7 of this Statement of Basis). Testing, to verify that treated soil attains the media cleanup standard, will be conducted on every 500 tons of material (soil and solidification agents).

Alternative 3: Excavation of soil to a level of 1000 mg/kg lead, backfill with imported soil, recycle material into road base using the Encapco process for placement on-site. Although this alternative involves the treatment of hazardous waste and replacement onto the land, a Corrective Action Management Unit designation is unnecessary. Because, characteristic hazardous waste is no longer a hazardous waste, provided that (1) it has been treated so that it no longer exhibits a hazardous characteristic and (2) it meets the applicable land disposal restrictions.

Alternative 4: No Action. This alternative is evaluated to establish a baseline for comparison. Under this alternative, EPA would require no further action to prevent exposure to the soil contamination at the eastern property and solvent still area.

8.2. Evaluation of the Proposed Remedy and Alternatives

8.2.1. Warehouse Area

8.2.1.1. General Standards

Overall Protection. The alternative proposed, capping, would provide adequate protection of human health and the environment by preventing direct human contact with contaminated soils and minimize infiltration of surface water. Although not contained in the Revised Evaluation of Remedial Alternatives, the "no action" option would not provide adequate protection of human health and the environment. Much of the warehouse area is currently capped, but no requirements would remain to ensure the integrity of the cap. Furthermore, no long-term institutional controls would ensure that future uses of the property are appropriate considering the lead contamination known to exist in the warehouse area.

Attainment of Media Cleanup Standards. The media cleanup standards for treated soil (90% reduction of contaminants or 10 times the UTS concentrations in Table 2) do not apply to capping, since it does not involve the land disposal of waste. Although the proposed alternative would not meet the media cleanup standard proposed for the rest of the facility in Table 3, actual exposures would be eliminated by the cap. Additionally, it would be impractical to attain the media cleanup standards in the warehouse area.

Controlling the Sources of Releases. The proposed alternative will control the sources of releases to the maximum extent practical.

Compliance with Waste Management Standards. No waste management standards are applicable, but the proposed alternative would comply with relevant standards for RCRA hazardous waste management units that cannot remove all hazardous waste or waste residues at the time of closure. The following are the relevant standards of 40 CFR Part 264.310(a): (1) provide long-term minimization of migration of liquids through the closed landfill; (2) function with a minimum of maintenance; (3) promote drainage and minimize erosion or abrasion of the cover; (4) accomodate settling and subsidence so that the cover's integrity is maintained; and (5) have a permeability less than or equal to the bottom liner system or natural subsoils present. At landfills, these standards are met by low permeability layers of compacted soil or geomembranes. The installation of a multi-layer cap, composed of low permeability layers, is impractical beneath an existing building. While this would not necessarily be impractical for areas outside the warehouse and other structures, EPA believes it is unnecessary, as explained in the following balancing criteria and additional discussion sections.

8.2.1.2. Balancing Criteria

Short-Term Effectiveness. The short term effectiveness of the proposed alternative is excellent. The cap in the warehouse area is nearly complete. Completing the remaining portion of the cap will only minimally expose workers to lead contaminated soil.

Long-term Reliability and Effectiveness. The long term effectiveness of the proposed alternative is not as effective as removal or treatment of contaminated soil. However, these options are impractical beneath and adjacent to the warehouse. Since the contaminated soil will remain a long-term concern, EPA will require institutional controls to ensure that the cap remains in place, unless further cleanup work occurs.

EPA notes that other more rigorous caps (multi-layer engineered caps containing compacted clay and/or geomembranes) may be practical for areas not currently covered by buildings or secondary containment. An engineered cap may provide a more reliable and effective long-term barrier. However, EPA does not believe the expense of an engineered cap is justified by the slight improvement in permanence and infiltration (by surface water) protection provided. The asphalt cap is a sufficient barrier to migration of surface water through the contaminated soil.

Implementability. The proposed alternative is extremely easy to implement, because the entire cap is nearly complete. Additional paving is required only along a ten foot strip on the north side of the warehouse. Concrete and asphalt paving is a common construction activity that can be implemented by many contractors. Concrete and asphalt paving are also easy to inspect. Therefore, EPA can visually determine if the facility has followed the cap maintenance plan. Additionally, because asphalt and concrete paving are easily installed, repairs to the cap (which can occur whenever sewer or power lines must be repaired or upgraded) do not require a specialty contractor. This is a significant advantage in implementation over the engineered caps, which are difficult to install and repair.

Cost

The cost of the proposed remedy, capping the currently uncapped areas, is estimated at $4,500. Using a software program called Cost Pro, version 3.1, EPA estimates that a low permeability cap (including a geomembrane and low permeability soil layer, overlain by asphalt) would cost $1,900,000.

8.2.1.3. Additional Discussion

EPA notes that no other alternatives were considered for the warehouse area. As stated at 61 FR 19447, the Agency has encouraged facilities "... to focus corrective measures studies on realistic remedies and tailor the scope and substance of studies to the extent, nature and complexity of releases and contamination at a given facility." In this instance, EPA first expressed its preference for capping this area during the RCRA Facility Investigation. Because contamination had been found in soils on both sides of the warehouse, the next step would be samples directly under the warehouse to determine if the contamination was isolated to the locations it was found (Borings SWB-7, PM-8 and SWB-8), or contiguous beneath the warehouse. However, the warehouse is currently used to manufacture and package paint. Consequently, EPA viewed further soil investigation as impractical. EPA notes that this early consideration of capping is consistent with the Agency's policy stated in the original 1990 proposal of Subpart S (55 FR 30798 - 30884), the RCRA Corrective Action Plan (OSWER Directive 9902.3-2A, May 1994) and the 1996 Notice of Proposed Rulemaking (61 FR 19447) that recommended combining the CMS with the RFI when few remedial alternatives are available.

Other treatment methods may be practical for areas not currently covered by the warehouse, the administrative building and the secondary containment area. However, treatment of lower level soil contamination near the warehouse would not significantly reduce future risks under a different land use scenario, given the potentially large source area of lead contaminated soil

adjacent to and potentially beneath the warehouse. (Note, excavation immediately adjacent to buildings would compromise the building foundation.) Additionally, EPA views the proposed capped area as protective in that any area that could potentially be contaminated will be capped and subject to institutional controls.

Although not evaluated by O'Brien, EPA would like to clarify that the proposed remedy differs from a no-action alternative in that the institutional controls will ensure long-term maintenance of the cap on the contaminated soils and that the land use will not change without EPA or DTSC approval. Additionally, EPA or DTSC will include groundwater monitoring for the capped area at a later date, when the groundwater remedy is selected.

While EPA introduced the comparison of the low permeability cap with the proposed asphalt and concrete cap, EPA does not believe that the additional benefit sufficiently justifies the additional cost. Such a costly cap is generally used for areas with high levels of contamination. As mentioned earlier, the entire area covered by the proposed cap is not contaminated. Some of the area beneath the cap is known to be below the PRGs. So, the proposed capping remedy is overly protective, because it covers an area larger than the area of known contamination.

8.2.2. Former Solvent Still Area and Eastern Property

8.2.2.1. General Standards

The proposed remedy for remediating the contaminated soils in the former solvent still area and the eastern property is Alternative 1 or a combination of Alternative 1 and Alternative 2. Alternative 1 is excavation and off-site treatment and disposal. Alternative 2 is on-site metals stabilization and off-site disposal. If used in combination, Alternative 1 would be used for soils subject to the land disposal requirements for volatile or semivolatile organic contaminants. Alternative 2 would only be used on soils not subject to the land disposal restrictions for volatile and semivolatile organic compounds. This section explains the performance of the proposed remedy against the four threshold criteria and the balancing criteria, and compares it with the other options under consideration.

Overall Protection. All of the alternatives, with the exception of the "no action" alternative would provide adequate protection of human health and the environment by eliminating or controlling risk through removal of soil containing high levels of lead contamination.

Because the no action alternative (Alternative 4) is not protective of human health and the environment, it will not be discussed further in this analysis.

Attainment of Media Cleanup Standards. All alternatives would meet the media cleanup standards, contained in Table 3, for soil that is left at the site. However, only Alternative 1 would meet the media cleanup standards for treated soil (90% reduction or 10 times the UTS, contained in Table 2) for semivolatile organic compounds that can be expected at the site.

For soil that will be treated, the Revised Remedial Alternatives Evaluation could have provided more detail on the specific method of stabilization for Alternative 2, but it does include a brief report of laboratory treatability studies demonstrating that site soil containing 1,400 mg/kg lead can be stabilized. The exact details of the stabilization are less important than meeting the cleanup goals for stabilized material and the environmental requirements, like air district rules, that apply to the treatment.

Controlling the Sources of Releases. All of the alternatives would be effective in reducing, to the maximum extent practicable, further releases of contaminants to the ground water, surface water, air and other soils. Due to the age of the facility (100 years) and the fact that lead content of paints has dramatically decreased since the late 1960s, the leaching of lead contamination from the soil (less than 1000 mg/kg) should have occurred already. While EPA is still evaluating the question of lead in groundwater, the proposed media cleanup standard, in Table 3, should be sufficient to ensure that future leaching of lead from the soil (below 1000 mg/kg) will not adversely impact groundwater. These additional details will be included as part of the Corrective Measures Implementation (CMI) Workplan, which will be submitted after the remedy is selected.

The site's stormwater permit requires O'Brien to follow specific stormwater management practices rather than numerical goals for surface water runoff. However, the facility's Stormwater Management Update, dated April 27, 1998, indicates that no lead was detected in stormwater run off (detection limit 40 ug/l).

Soil, potentially contaminated at 1000 mg/kg lead, could be transported with surface water to the San Francisco Bay (where ecological contaminant levels of concern may be well below 1000 mg/kg lead). So, as part of the institutional controls, EPA will require that it or DTSC approve any future site grading project that involves more than 10 cubic yards of soil. The purpose of this review is to ensure that future grading does not cause site soils to impact the Bay.

The residual soil that is not removed may contain up to 1000 mg/kg of lead. It will not impact adjacent soils (except via surface water transport discussed above) and will only minimally impact air. The media cleanup standards, which were taken from EPA Region 9's PRG, are based on inhalation and ingestion of soil via the air pathway.

Compliance with Waste Management Standards. Alternatives 1, 2 and 3 would comply with the applicable waste generation requirements of 22 CCR 66261.11 (Hazardous Waste Determination), 66264.20-23 (manifest requirements), 66262.30-34 (Pre-Transportation Requirements). State regulations are identified above, because California is authorized to implement the RCRA program. So, California's regulations apply to the proposed remedy.

8.2.2.2. Balancing Criteria

Short-Term Effectiveness. All of the of the alternatives (except Alternative 4) will cause some short-term exposure of contaminated soil to workers. However, O'Brien will conduct air

monitoring during operations to ensure that worker exposure is within allowable Occupational Safety and Health allowable limits.

Long-term Reliability and Effectiveness. The proposed remedial alternative (# 1 or 1 and 2) and Alternative 2 (alone) would remove lead contaminated soil above the media cleanup standard. Therefore, these alternatives are very reliable and effective over the long-term at the site. In Alternative 1, the waste would be stabilized at an off-site location prior to deposition into a hazardous waste landfill. In Alternative 2, the contaminated soil would be chemically stabilized, thus reducing the potential for subsequent migration and rendering the soil non-hazardous. Then, the soil would be transported to a hazardous waste landfill.

Alternative 3 would stabilize the lead in the soil and replace the stabilized soil beneath an on-site road. This alternative is expected to have a slightly lower level of long-term effectiveness. There are no known environmental conditions at the property that are expected to affect the long-term immobilization of lead, but, because the treatment method is relatively new, long term effectiveness has not been demonstrated.

Implementability. All of the alternatives involve excavation and backfilling. Because O'Brien must obtain a permit for backfilling and grading from the City of South San Francisco, California Environmental Quality Act requirements may delay the project.

Because Alternatives 2 and 3 involve treatment, they are slightly more complex to implement. However, bench scale testing contained in the Revised Remedial Alternatives Evaluation suggests that the proposed treatment methods can achieve the treatment standard. An additional administrative requirement for these options is a permit for a Transportable Treatment Unit from DTSC.

Bay Area Air Quality Management District rules will limit the treatment of soil containing more than 100 ppm of volatile organic compounds to 120 cubic yards per day, under Regulation 8, Rule 40. Soil near SWB-9 could be affected by this requirement. Additionally, lead emissions cannot exceed 15 pounds per day of lead under Regulation 11, Rule 1.

Cost

Alternative 1	Alternative 1 and 2*	Alternative 2	Alternative 3	Alternative 4
$837,375	$687,225	$537,075	$317,625	$0

*assuming 50% of the contaminated soil is treated off-site (Alternative 1) and 50% is treated on-site (Alternative 2)

The values in the table are estimates. The actual cost will vary depending on the exact amount of

soil treated. While the Revised Remedial Alternatives Evaluation did not provide detailed breakdown of the costs associated with the alternatives, the costs appear to be consistent with EPA's understanding of the processes involved. Alternative 1 is the most expensive, because it involves off-site treatment by a commercial hazardous waste treatment and disposal facility (a Class 1 landfill). Because on-site treatment is more economical than off-site treatment for large volumes of a similar type of waste, Alternative 2 is cheaper than Alternative 1. Because Alternative 3 involves on-site treatment and no off-site shipment of waste, it is the cheapest of the three alternatives considered.

8.2.2.3. Additional Discussion

EPA notes that O'Brien did not consider capping as an alternative for the Former Solvent Still Area and Eastern Property. However, EPA views the treatment alternatives superior to capping, because these alternatives permanently reduce the toxicity, mobility and volume of contaminants present. EPA has expressed its preference for permanent reductions in toxicity, mobility and volume, because it is more protective of human health and the environment in the long-term and removes the risks associated with the potential failure of engineered or institutional controls. EPA's views on this subject are expressed at 61 FR 19449 (May 1, 1996) and "A Guide to Principal Threat and Low Level Threat Wastes, (Superfund Publication 9380.3-06FS, November 1991).

Other alternatives that could have been considered include vitrification, soil washing and soil flushing, among others discussed in EPA guidance (Contaminants and Remedial Options at Selected Metal-Contaminated Sites, EPA/540/R-95/512, July 1995). Again, EPA considers the alternatives considered by O'Brien as equally effective or superior. Vitrification is expensive to implement and the current commercial availability is limited. Soil washing is an innovative treatment. Soil Flushing risks creating lead contamination in the groundwater, where it may not currently exist. Finally, as discussed at 61 FR 19447, EPA has encouraged facilities "... to focus corrective measures studies on realistic remedies and tailor the scope and substance of studies to the extent, nature and complexity of releases and contamination at a given facility." EPA believes that O'Brien's Revised Remedial Alternatives Evaluation accomplishes that goal, by evaluating effective alternatives that can be easily implemented.

Finally, EPA notes that because the 1000 mg/kg of lead is an industrial cleanup level, O'Brien must put in place an institutional control, to be approved by EPA, that ensures that future use of the entire property is consistent with the current zoning.

9. Conclusions

EPA agrees with O'Brien's proposed alternative for the **wharehouse area**, capping and institutional controls. This alternative will effectively limit future exposures to lead and other contaminants in the warehouse area. Additionally, further investigation is impractical as are other remediation alternatives.

For the **solvent still area and the eastern property**, EPA is proposing Alternative 1 alone or in combination with Alternative 2 as the proposed remedy for these areas. EPA cannot propose Alternative 2 alone, which was proposed by O'Brien, because it cannot meet EPA's new land disposal requirements, which were developed after O'Brien's Remedial Alternatives Evaluation. If both alternatives are used together, Alternative 1 must be used for all soils that exceed the Universal Treatment Standards by a factor of 10 for any hazardous constituent present in the soil.

As recommended by DTSC, EPA is including the area from beneath the hazardous waste container storage area as one of the areas to be excavated and treated, unless more extensive sampling and analysis of soil in the area indicates that the soil concentrations are below 1000 mg/kg of lead. Three additional area that may be included to the proposed remedy, pending additional data, are near sample locations EB-16 (1,400 mg/kg lead) EB-14 (51 mg/kg arsenic) and S-4 (2,400 mg/kg and 38 mg/kg arsenic).

10. Key Reference Documents

Pond Closure Certification Report, April 1987

Closure Report – Solar Evaporation Ponds – Impoundment Closure Area, November 1987

RCRA Facility Assessment Report, December 1987

Hydrogeologic Assessment Report/Report of Waste Discharge, Former Surface Impoundments. Mark Group, December 1987

Breakwater Investigation: Mapping, Soils Sampling and Analysis, December 1987

Site Assessment Report, February 1990

Administrative Order (3008(h)), U.S. EPA Docket No. RCRA 0-89-016, April 16, 1991

RCRA Facility Investigation, September 1992

Risk Assessment/Ecological Evaluation (RA/EE) Phase I-Site History and Data Evaluation Report, September 1992

Bulkhead Remediation Project, April 1993

Phase I/II Environmental Site Assessment, Marine Magnesium Company/Merck Site, April 20, 1994

Sample Plan for Phase IIB Investigaton, July 22, 1994

Biological Evaluation of the Fuller-O'Brien Paint Facility, June 29, 1995

Final Phase II RCRA Facility Investigation, May 31, 1996

Revised Remedial Alternatives Evaluation, October 20, 1997

11. Glossary

3008(h) Order - A set of instructions and requirements for a facility to perform site investigation, evaluation of remedial alternatives (if necessary) and in some instances (the breakwater for the O'Brien facility) conduct the selected remedial alternative.

Administrative Record - The documents and information that are considered or relied upon to make a remedy selection decision for a site. These documents are available for public inspection at EPA's RCRA Records Center located at: U.S. Environmental Protection Agency, Region 9 Office, 7th Floor, Room 722, 75 Hawthorne Street, San Francisco, California (call Vern Christianson, (415) 744-2422 to schedule a visit).

Area of Concern - Releases that warrant further investigation under 3004(u), 3004(v) or 3008(h) of RCRA

Aquifer - An underground formation composed of materials such as sand or gravel that can store and supply ground water to wells and springs. Most aquifers used in the United States are within a thousand feet of the earth's surface.

Corrective Action - Those actions taken to investigate and clean-up contaminant releases from hazardous waste treatment, storage, and disposal facilities.

Corrective Measures Study (CMS) - A study conducted by the facility owner or operator to identify and evaluate alternative remedies to address contaminant releases at a site.

Corrective Measures Implementation (CMI) - During the CMI, the facility owner or operator designs and constructs the remedy selected by U.S. EPA. The owner or operator must also operate, maintain, and monitor the system after construction.

DTSC or Department of Toxic Substances Control - The state agency which is responsible for regulating hazardous waste in California. DTSC has the authority to enforce federal and state hazardous waste regulations.

Downgradient - Similar to downstream, ground water flows from upgradient to downgradient.

Groundwater - Water, found beneath the earth's surface, which often supplies wells and springs.

Hydrogeology - the science that relates to the study of groundwater

In-Situ Treatment - Treatment of contamination in-place.

Institutional Controls - Non-engineered controls (such as land use restrictions) which are implemented to reduce risk from a site.

Land Disposal Restrictions - Concentration limits above which hazardous waste may not be placed on the land, which includes placement into landfills. For some wastes, a type of treatment is specified rather than a concentration.

mg/kg - Milligrams of contaminant per kilogram of soil, equivalent to parts per million.

RCRA Facility Assessment (RFA) - A detailed review of records and information on the facility to identify and characterize all solid waste management units at the site; this includes a site inspection to examine all parts of the facility and identify areas of potential contamination.

RCRA Facility Investigation (RFI) - An in-depth study to determine the nature and extent of contamination at a RCRA treatment, storage, or disposal facility; establish criteria for remediating the site; identify preliminary alternatives for remediating the site; and support the technical and cost evaluation of the alternatives.

Region 9 Preliminary Remediation Goals (PRGs) - Risk based contaminant concentrations for evaluating and cleaning up contaminated sites. The PRGs are based on a 10^{-6} cancer risk and based on non-cancer health effects, assuming standard residential and industrial exposure scenarios.

Release - any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment

Resource Conservation and Recovery Act (RCRA) - A federal law that established a regulatory system to track hazardous waste from the time of generation to disposal. The law requires facilities to obtain a permit if they treat, store or dispose of hazardous waste. RCRA is designed to prevent new, uncontrolled hazardous waste sites.

Semi-volatile Organic Compound (SVOC) - An organic (carbon containing) compound that does not readily evaporate at room temperature

Solid Waste Management Unit (SWMU) - Any discernable unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely or systematically released.

Toxicity Characteristic Leaching Procedure (TCLP) - A test used to determine if a waste is a hazardous waste. Also used to determine if treated waste complies with the EPA's land disposal requirements. It is test method 1311 in Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods, EPA Publication SW-846.

µg/kg - Micrograms of contaminant per kilogram of soil, equivalent to parts per billion.

Upgradient - Similar to upstream, ground water flows from upgradient to downgradient.

Vadose Zone - The zone between the land surface and the surface of the saturated zone. The surface of the saturated zone is also referred to as the ground water table.

Volatile Organic Compound (VOC) - Any organic (carbon containing) compound which readily evaporates at room temperature

Well - A bored, drilled, or driven shaft whose purpose is to reach underground water.

10^{-4} to 10^{-6} lifetime cancer risk: A 10^{-4} to 10^{-6} lifetime cancer risk illustrates a range of the theoretical likelihood of developing cancer as a result of the environmental exposure of interest. The range represents the probability of developing cancer in excess of the background cancer rate. In the United States, roughly 33% of the population will develop cancer over the course of their life, which means that, on average, approximately 333,000 individuals in a population of one million individuals, will develop cancer. A 10^{-4} risk represents one additional case of cancer in a population of 10,000 (or 100 in a population of one million), while a 10^{-6} cancer risk level suggests that one additional case of cancer will develop in a population of one million.

Figures

THE CORRECTIVE ACTION PROCESS

RCRA Facility Assessment (RFA)

EPA
Reviews files and inspects site to identify hazardous waste releases

Prepares RFA report summarizing results

Issues corrective action order or permit based on findings

PUBLIC
Reviews and comments on draft permit (public hearing)

RCRA Facility Investigation (RFI)

OWNER
Develops RFI Workplan

Conducts facility investigation

Develops RFI Report summarizing results

Proposes and implements interim measures as appropriate

Establishes information repository

Develops summary report or fact sheet for public

EPA
Reviews RFI Workplan

Provides field oversight of facility investigation

Reviews RFI Report

Approves and oversees implementation of interim measures

Risk Assessment (RA)

OWNER
Develops risk assessment workplan

Conducts risk assessment

EPA
Reviews risk assessment workplan

Reviews risk assessment

Establishes cleanup requirements based on RFI and RA results

Corrective Measure Study (CMS)

OWNER
Develops CMS workplan

Identifies and evaluates cleanup alternatives

Prepares CMS Report

Recommends corrective measures

EPA
Reviews CMS workplan and report

Evaluates recommended corrective measures

Solicits public comment

Selects corrective measures

Modifies permit or order to include corrective measures

PUBLIC
Reviews and comments on RFI, Draft CMS report, proposed clean-up levels, and recommended corrective measures

Reviews and comments on draft permit modification

Corrective Measure Implementation (CMI)

OWNER
Develops Corrective Measure design and construction plans

Constructs Corrective Measure

Conducts operations and maintenance activities

Reports monitoring results to Agency

Keeps public informed of progress

EPA
Reviews and approves Corrective Measure designs and construction plans

Provides field oversight of construction

Reviews operations and maintenance activities

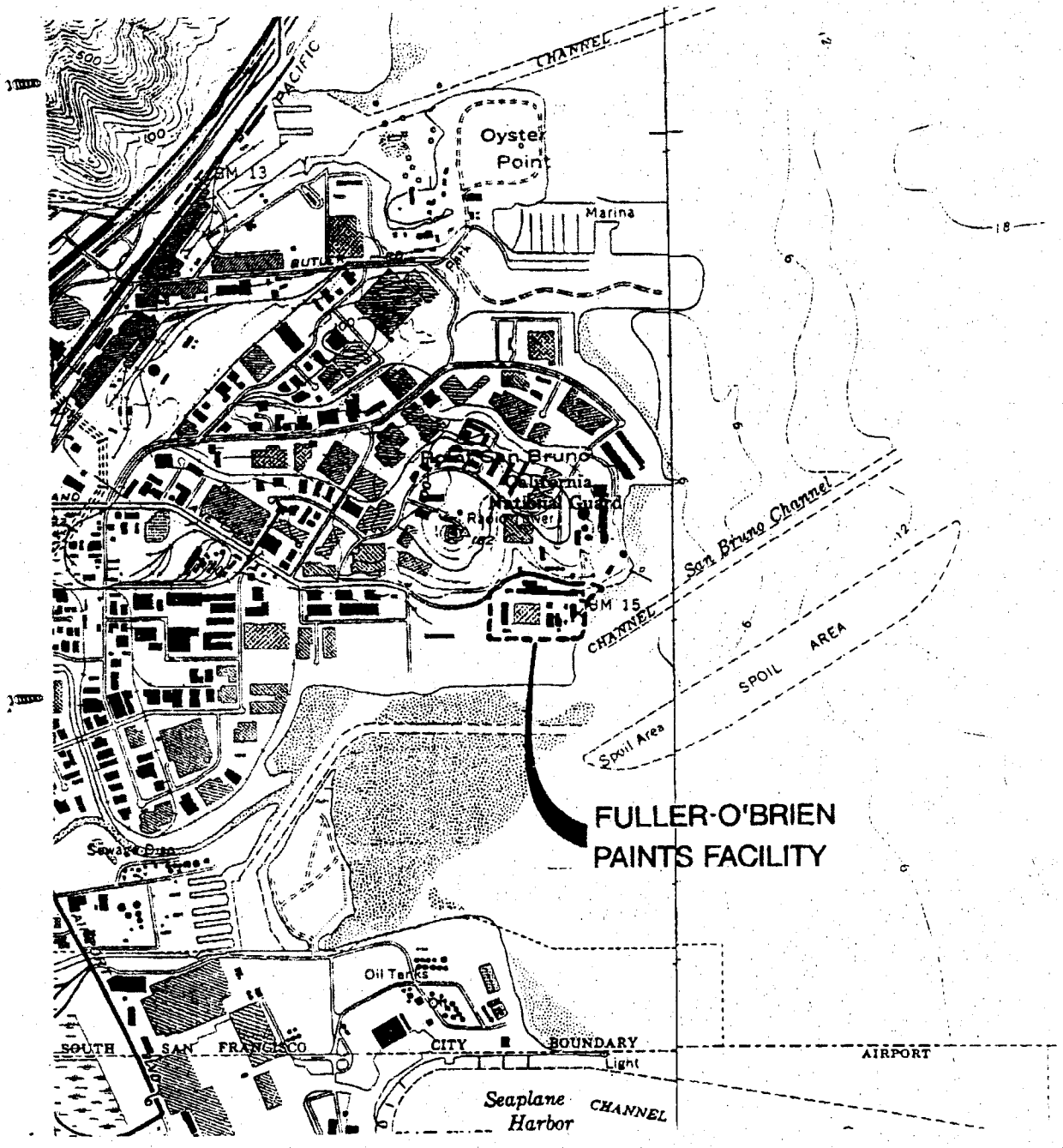
Reviews monitoring reports

INTERIM CLEAN-UP MEASURES OCCUR WHEN NECESSARY

PUBLIC INVOLVEMENT ACTIVITIES OCCUR THROUGHOUT THE PROCESS

While some of these steps are time consuming, they may occur simultaneously. Each step is essential to ensure efficient use of funds and the safety of people living near the facility. EPA recognizes the threat posed by environmental contamination, the need to implement the cleanup program expeditiously, and the importance of keeping the affected community informed.

Statement of Basis
Figure 1



APPROXIMATE SCALE IN FEET

0 2000 4000

BASE: U.S.G.S., SOUTH SAN FRANCISCO QUADRANGLE, 7.5 MINUTE SERIES, DATED 1980

HARZA

Consulting Engineers and Scientists

FULLER-O'BRIEN PAINTS
450 East Grand Avenue
South San Francisco, California

SITE LOCATION MAP

PROJECT NO.	DATE
K615	April 1994

Statement of Basis
Figure 2

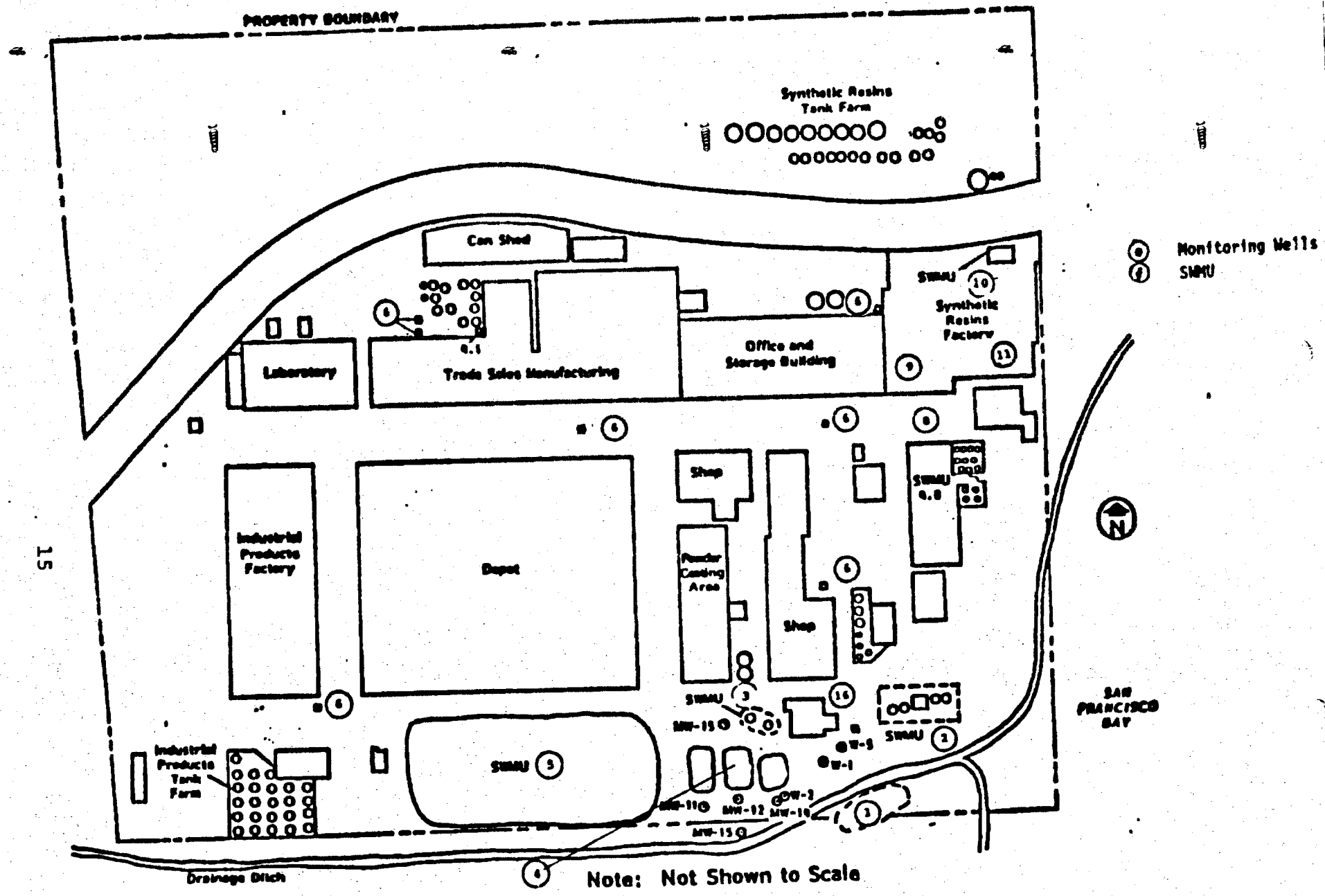
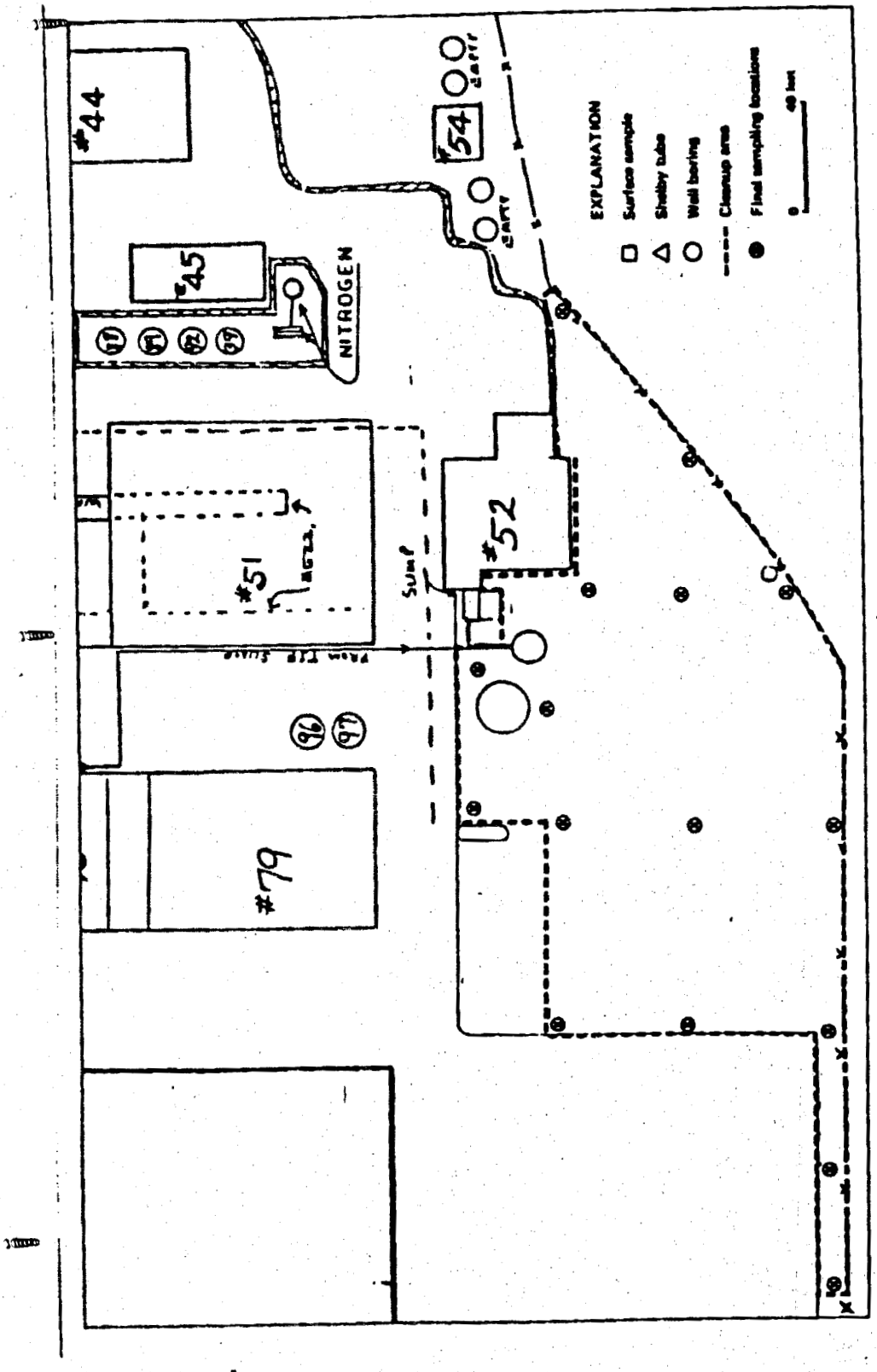


Figure 3

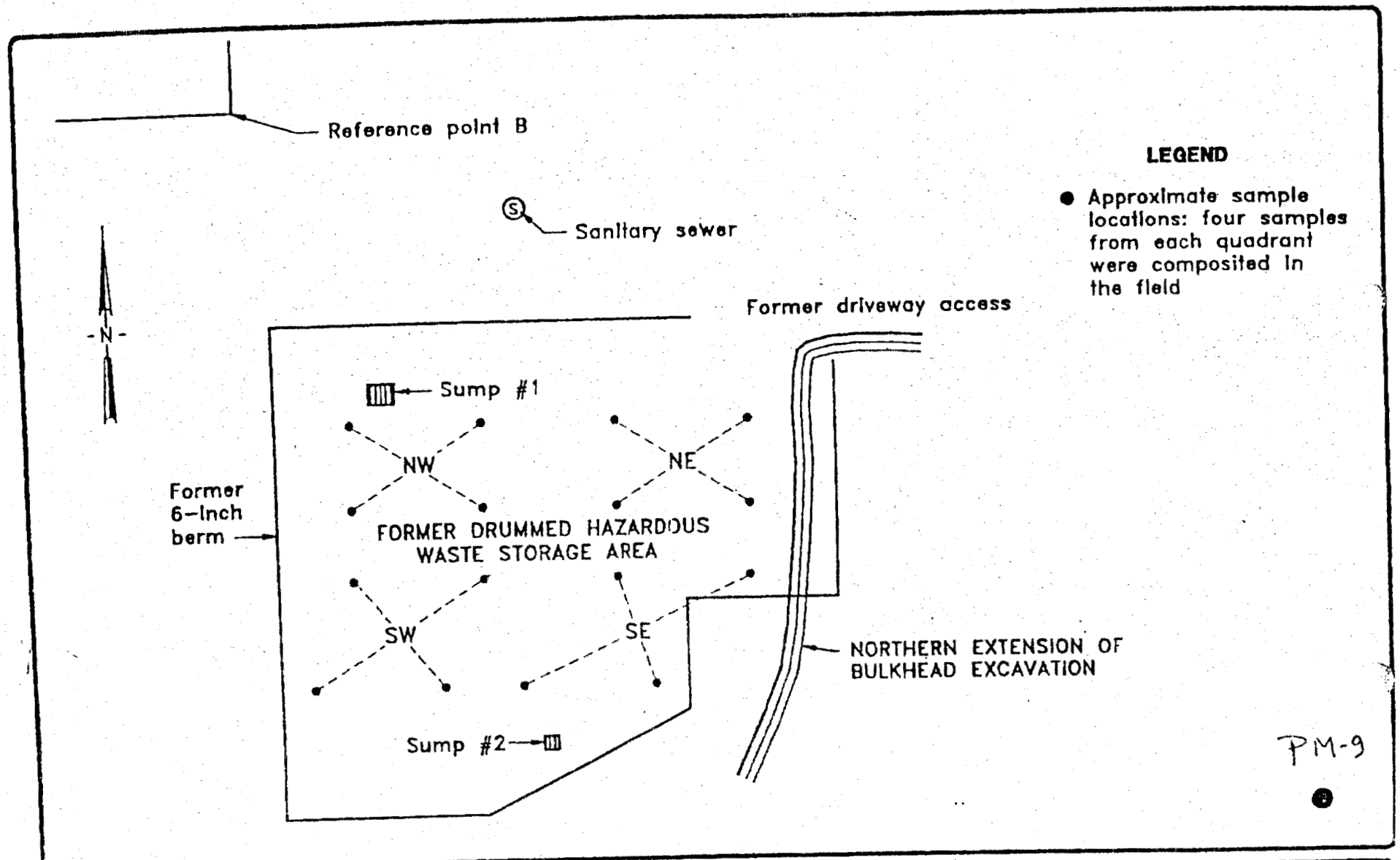
LOCATION OF SOLID WASTE MANAGEMENT UNITS AND MONITORING WELLS AT FULLER-O'BRIEN
Source: Reference 7

Statement of Basis
Figure 3



Project No. 90023A	Fuller-O'Brien	FINAL SAMPLING LOCATIONS
Woodward-Clyde Consultants		

Statement of Basis
Figure 4

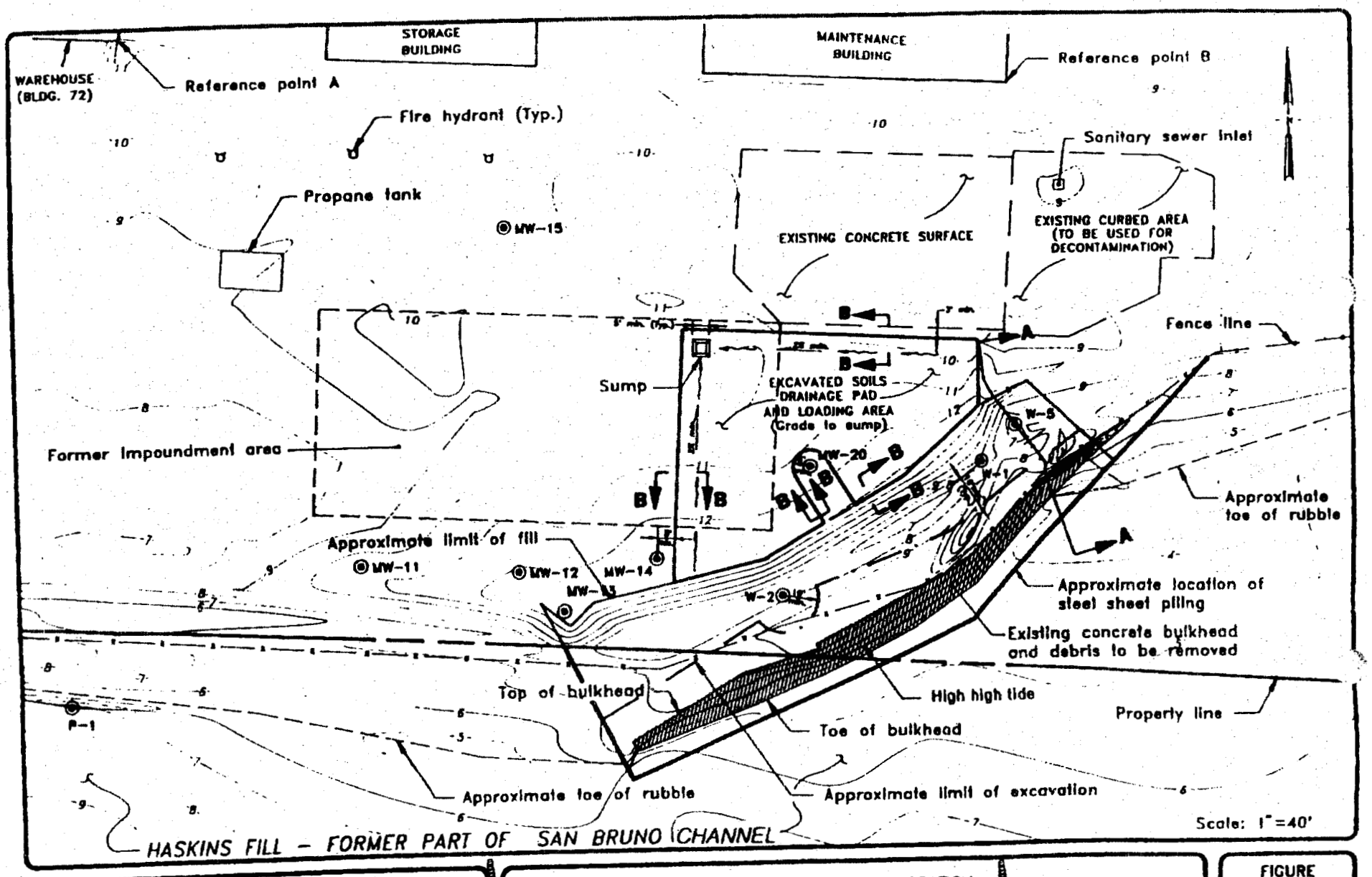


EMCON Associates

HAZARDOUS WASTE STORAGE AREA CHARACTERIZATION
THE O'BRIEN CORPORATION
SOUTH SAN FRANCISCO, CA

SOIL SAMPLING LOCATIONS BENEATH FORMER CONTAINMENT PAD

Statement of Bas
Figure 5



EMCON Associates

THE O'BRIEN CORPORATION
BULKHEAD REMEDIATION
SOUTH SAN FRANCISCO, CALIFORNIA

WORK AREA PLAN

FIGURE

Statement of Bas
Figure 6

Tables

TABLE 1. O'BRIEN CORPORATION SWMUs AND AREAS OF CONCERN

SWMUs

SWMU No.	Name
1.	Drum Burial Area
2.	Four Solvent Base Waste Treatment Tanks
3.	Two Latex Base Wastewater Treatment Tanks *
4.	Three Latex Base Wastewater Treatment * Solar Evaporation Ponds
5.	Drum Accumulation Areas
6.	Catch Basins (At Least Nine Units)
7.	Portable Tanks
8.	Transit Tanks
9.	Condenser
10.	Synthetic Resins Filter Press
11.	Fume Scrubbers (Five Units)
12.	Scrubber Tanks
13.	Portable Open Tanks
14.	Hot Box
15.	Fume Incinerator **
16.	Hazardous Waste Drum Storage Area ***
17.	Compactor
18.	Steam Cleaning Area and Sump
19.	Emergency Tank

AREAS OF CONCERN

Area No.	Name
4.20.1	Loading Areas - Truck Parking Areas
4.20.2	Toluene Spill Site - Near the Railway Siding
4.20.3	Tank Farm and Emergency Tank
4.20.4	Site of Former Diesel Fuel Tanks
4.20.5	Drainage Ditch
4.20.6	Wash-water and Solvent-water Tanks

* RCRA closed (44)
** Regulated by the Air Quality Control Board (45)
*** RCRA regulated (44)

Statement of Basis
Table 1

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable			
REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard	Nonwastewater Standard
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Benomyl [6]	17804-35-2	0.056	1.4
Benzene	71-43-2	0.14	10
Benz(a)anthracene	56-55-3	0.059	3.4
Benzal chloride	98-87-3	0.055	6.0
Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8
Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
Benzo(g,h,i)perylene	191-24-2	0.0055	1.8
Benzo(a)pyrene	50-32-8	0.061	3.4
Bromodichloromethane	75-27-4	0.35	15
Bromomethane/Methyl bromide	74-83-9	0.11	15
4-Bromophenyl phenyl ether	101-55-3	0.055	15
n-Butyl alcohol	71-36-3	5.6	2.6
Butylate [6]	2008-41-5	0.042	1.4
Butyl benzyl phthalate	85-68-7	0.017	28
2-sec-Butyl-4,6-dinitrophenol/Dinoseb	88-85-7	0.066	2.5
Carbaryl [6]	63-25-2	0.006	0.14
Carbenzadim [6]	10605-21-7	0.056	1.4
Carbofuran [6]	1563-66-2	0.006	0.14
Carbofuran phenol [6]	1563-38-8	0.056	1.4
Carbon disulfide	75-15-0	3.8	4.8 mg/l TCLP
Carbon tetrachloride	56-23-5	0.057	6.0
Carbosulfan [6]	55285-14-8	0.028	1.4
Chlordane (alpha and gamma isomers)	57-74-9	0.0033	0.26
p-Chloroaniline	106-47-8	0.46	16

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable			
REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard	Nonwastewater Standard
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Organic Constituents			
A2213 [6]	30558-43-1	0.042	1.4
Acenaphthylene	208-96-8	0.059	3.4
Acenaphthene	83-32-9	0.059	3.4
Acetone	67-64-1	0.28	160
Acetonitrile	75-05-8	5.6	38
Acetophenone	96-86-2	0.010	9.7
2-Acetylaminofluorene	53-96-3	0.059	140
Acrolein	107-02-8	0.29	NA
Acrylamide	79-06-1	19	23
Acrylonitrile	107-13-1	0.24	84
Aldicarb sulfone [6]	1646-88-4	0.056	0.28
Aldrin	309-00-2	0.021	0.066
4-Aminobiphenyl	92-67-1	0.13	NA
Aniline	62-53-3	0.81	14
Anthracene	120-12-7	0.059	3.4
Aramite	140-57-8	0.36	NA
alpha-BHC	319-84-6	0.00014	0.066
beta-BHC	319-85-7	0.00014	0.066
delta-BHC	319-86-8	0.023	0.066
gamma-BHC	58-89-9	0.0017	0.066
Barban [6]	101-27-9	0.056	1.4
Bendiocarb [6]	22781-23-3	0.056	1.4
Bendiocarb phenol [6]	22961-82-6	0.056	1.4

Statement of Basis
Table 2

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard	Nonwastewater Standard
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Chlorobenzene	108-90-7	0.057	6.0
Chlorobenzilate	510-15-6	0.10	NA
2-Chloro-1,3-butadiene	126-99-8	0.057	0.28
Chlorodibromomethane	124-48-1	0.057	15
Chloroethane	75-00-3	0.27	6.0
bis(2-Chloroethoxy)methane	111-91-1	0.036	7.2
bis(2-Chloroethyl)ether	111-44-4	0.033	6.0
Chloroform	67-66-3	0.046	6.0
bis(2-Chloroisopropyl)ether	39638-32-9	0.055	7.2
p-Chloro-m-cresol	59-50-7	0.018	14
2-Chloroethyl vinyl ether	110-75-8	0.062	NA
Chloromethane/Methyl chloride	74-87-3	0.19	30
2-Chloronaphthalene	91-58-7	0.055	5.6
2-Chlorophenol	95-57-8	0.044	5.7
3-Chloropropylene	107-05-1	0.036	30
Chrysene	218-01-9	0.059	3.4
o-Cresol	95-48-7	0.11	5.6
m-Cresol (difficult to distinguish from p-cresol)	108-39-4	0.77	5.6
p-Cresol (difficult to distinguish from m-cresol)	106-44-5	0.77	5.6
m-Cumenyl methylcarbamate [6]	64-00-6	0.056	1.4
Cyclohexanone	108-94-1	0.36	0.75 mg/l TCLP
o,p'-DDD	53-19-0	0.023	0.087
p,p'-DDD	72-54-8	0.023	0.087
o,p'-DDE	3424-82-6	0.031	0.087
p,p'-DDE	72-55-9	0.031	0.087

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable			
REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard	Nonwastewater Standard
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
o,p'-DDT	789-02-6	0.0039	0.087
p,p'-DDT	50-29-3	0.0039	0.087
Dibenz(a,h)anthracene	53-70-3	0.055	8.2
Dibenz(a,e)pyrene	192-65-4	0.061	NA
1,2-Dibromo-3-chloropropane	96-12-8	0.11	15
1,2-Dibromoethane/Ethylene dibromide	106-93-4	0.028	15
Dibromomethane	74-95-3	0.11	15
m-Dichlorobenzene	541-73-1	0.036	6.0
o-Dichlorobenzene	95-50-1	0.088	6.0
p-Dichlorobenzene	106-46-7	0.090	6.0
Dichlorodifluoromethane	75-71-8	0.23	7.2
1,1-Dichloroethane	75-34-3	0.059	6.0
1,2-Dichloroethane	107-06-2	0.21	6.0
1,1-Dichloroethylene	75-35-4	0.025	6.0
trans-1,2-Dichloroethylene	156-60-5	0.054	30
2,4-Dichlorophenol	120-83-2	0.044	14
2,6-Dichlorophenol	87-65-0	0.044	14
2,4-Dichlorophenoxyacetic acid/2,4-D	94-75-7	0.72	10
1,2-Dichloropropane	78-87-5	0.85	18
cis-1,3-Dichloropropylene	10061-01-5	0.036	18
trans-1,3-Dichloropropylene	10061-02-6	0.036	18
Dieldrin	60-57-1	0.017	0.13
Diethylene glycol, dicarbamate [6]	5952-26-1	0.056	1.4
Diethyl phthalate	84-66-2	0.20	28
p-Dimethylaminoazobenzene	60-11-7	0.13	NA

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable			
REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard	Nonwastewater Standard
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
2-4-Dimethyl phenol	105-67-9	0.036	14
Dimethyl phthalate	131-11-3	0.047	28
Dimetilan [6]	644-64-4	0.056	1.4
Di-n-butyl phthalate	84-74-2	0.057	28
1,4-Dinitrobenzene	100-25-4	0.32	2.3
4,6-Dinitro-o-cresol	534-52-1	0.28	160
2,4-Dinitrophenol	51-28-5	0.12	160
2,4-Dinitrotoluene	121-14-2	0.32	140
2,6-Dinitrotoluene	606-20-2	0.55	28
Di-n-octyl phthalate	117-84-0	0.017	28
Di-n-propylnitrosamine	621-64-7	0.40	14
1,4-Dioxane	123-91-1	12.0	170
Diphenylamine (difficult to distinguish from diphenylnitrosamine)	122-39-4	0.92	13
Diphenylnitrosamine (difficult to distinguish from diphenylamine)	86-30-6	0.92	13
1,2-Diphenylhydrazine	122-66-7	0.087	NA
Disulfoton	298-04-4	0.017	6.2
Dithiocarbamates (total) [6]	NA	0.028	28
Endosulfan I	959-98-8	0.023	0.066
Endosulfan II	33213-65-9	0.029	0.13
Endosulfan sulfate	1031-07-8	0.029	0.13
Endrin	72-20-8	0.0028	0.13
Endrin aldehyde	7421-93-4	0.025	0.13
EPTC [6]	759-94-4	0.042	1.4
Ethyl acetate	141-78-6	0.34	33

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard Concentration in mg/l[2]	Nonwastewater Standard Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Ethyl benzene	100-41-4	0.057	10
Ethyl cyanide/Propanenitrile	107-12-0	0.24	360
Ethyl ether	60-29-7	0.12	160
bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28
Ethyl methacrylate	97-63-2	0.14	160
Ethylene oxide	75-21-8	0.12	NA
Famphur	52-85-7	0.017	15
Fluoranthene	206-44-0	0.068	3.4
Fluorene	86-73-7	0.059	3.4
Formetanate hydrochloride [6]	23422-53-9	0.056	1.4
Formparanate [6]	17702-57-7	0.056	1.4
Heptachlor	76-44-8	0.0012	0.066
Heptachlor epoxide	1024-57-3	0.016	0.066
Hexachlorobenzene	118-74-1	0.055	10
Hexachlorobutadiene	87-68-3	0.055	5.6
Hexachlorocyclopentadiene	77-47-4	0.057	2.4
HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.000063	0.001
HxCDFs (All Hexachlorodibenzofurans)	NA	0.000063	0.001
Hexachloroethane	67-72-1	0.055	30
Hexachloropropylene	1888-71-7	0.035	30
Indeno (1,2,3-c,d) pyrene	193-39-5	0.0055	3.4
Iodomethane	74-88-4	0.19	65
Isobutyl alcohol	78-83-1	5.6	170
Isodrin	465-73-6	0.021	0.066
Isolan [6]	119-38-0	0.056	1.4

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard Concentration in mg/l[2]	Nonwastewater Standard Concentration in mg/kg[3] unless noted as "mg/l TCLP"
o-Nitrophenol	88-75-5	0.028	13
p-Nitrophenol	100-02-7	0.12	29
N-Nitrosodiethylamine	55-18-5	0.40	28
N-Nitrosodimethylamine	62-75-9	0.40	2.3
N-Nitroso-di-n-butylamine	924-16-3	0.40	17
N-Nitrosomethylethylamine	10595-95-6	0.40	2.3
N-Nitrosomorpholine	59-89-2	0.40	2.3
N-Nitrosopiperidine	100-75-4	0.013	35
N-Nitrosopyrrolidine	930-55-2	0.013	35
Oxamyl [6]	23135-22-0	0.056	0.28
Parathion	56-38-2	0.014	4.6
Total PCBs (sum of all PCB isomers, or all Aroclors)	1336-36-3	0.10	10
Pebulate [6]	1114-71-2	0.042	1.4
Pentachlorobenzene	608-93-5	0.055	10
PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.000063	0.001
PeCDFs (All Pentachlorodibenzofurans)	NA	0.000035	0.001
Pentachloroethane	76-01-7	0.055	6.0
Pentachloronitrobenzene	82-68-8	0.055	4.8
Pentachlorophenol	87-86-5	0.089	7.4
Phenacetin	62-44-2	0.081	16
Phenanthrene	85-01-8	0.059	5.6
Phenol	108-95-2	0.039	6.2
o-Phenylenediamine [6]	95-54-5	0.056	5.6
Phorate	298-02-2	0.021	4.6
Phthalic acid	100-21-0	0.055	28

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable			
REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard	Nonwastewater Standard
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Isosafrole	120-58-1	0.081	2.6
Kepone	143-50-0	0.0011	0.13
Methacrylonitrile	126-98-7	0.24	84
Methanol	67-56-1	5.6	0.75 mg/l TCLP
Methapyrilene	91-80-5	0.081	1.5
Methiocarb [6]	2032-65-7	0.056	1.4
Methomyl [6]	16752-77-5	0.028	0.14
Methoxychlor	72-43-5	0.25	0.18
3-Methylcholanthrene	56-49-5	0.0055	15
4,4-Methylene bis(2-chloroaniline)	101-14-4	0.50	30
Methylene chloride	75-09-2	0.089	30
Methyl ethyl ketone	78-93-3	0.28	36
Methyl isobutyl ketone	108-10-1	0.14	33
Methyl methacrylate	80-62-6	0.14	160
Methyl methansulfonate	66-27-3	0.018	NA
Methyl parathion	298-00-0	0.014	4.6
Metolcarb [6]	1129-41-5	0.056	1.4
Mexacarbate [6]	315-18-4	0.056	1.4
Molinate [6]	2212-67-1	0.042	1.4
Naphthalene	91-20-3	0.059	5.6
2-Naphthylamine	91-59-8	0.52	NA
o-Nitroaniline	88-74-4	0.27	14
p-Nitroaniline	100-01-6	0.028	28
Nitrobenzene	98-95-3	0.068	14
5-Nitro-o-toluidine	99-55-8	0.32	28

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable			
REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard	Nonwastewater Standard
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Tribromomethane/Bromoform	75-25-2	0.63	15
2,4,6-Tribromophenol	118-79-6	0.035	7.4
1,2,4-Trichlorobenzene	120-82-1	0.055	19
1,1,1-Trichloroethane	71-55-6	0.054	6.0
1,1,2-Trichloroethane	79-00-5	0.054	6.0
Trichloroethylene	79-01-6	0.054	6.0
Trichloromonofluoromethane	75-69-4	0.020	30
2,4,5-Trichlorophenol	95-95-4	0.18	7.4
2,4,6-Trichlorophenol	88-06-2	0.035	7.4
2,4,5-Trichlorophenoxyacetic acid/2,4,5-T	93-76-5	0.72	7.9
1,2,3-Trichloropropane	96-18-4	0.85	30
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.057	30
Triethylamine [6]	101-44-8	0.081	1.5
tris-(2,3-Dibromopropyl) phosphate	126-72-7	0.11	0.10
Vernolate [6]	1929-77-7	0.042	1.4
Vinyl chloride	75-01-4	0.27	6.0
Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
Inorganic Constituents			
Antimony	7440-36-0	1.9	1.15 mg/l TCLP
Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
Barium	7440-39-3	1.2	21 mg/l TCLP
Beryllium	7440-41-7	0.82	1.22 mg/l TCLP
Cadmium	7440-43-9	0.69	0.11 mg/l TCLP
Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
Cyanides (Total)[4]	57-12-5	1.2	590

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable			
REGULATED CONSTITUENT Common Name	CAS[1] Number	Wastewater Standard	Nonwastewater Standard
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Phthalic anhydride	85-44-9	0.055	28
Physostigmine [6]	57-47-6	0.056	1.4
Physostigmine salicylate [6]	57-64-7	0.056	1.4
Promecarb [6]	2631-37-0	0.056	1.4
Pronamide	23950-58-5	0.093	1.5
Propham [6]	122-42-9	0.056	1.4
Propoxur [6]	114-26-1	0.056	1.4
Prosulfocarb [6]	52888-80-9	0.012	1.4
Pyrene	129-00-0	0.067	8.2
Pyridine	110-86-1	0.014	16
Safrole	94-59-7	0.081	22
Silvex/2,4,5-TP	93-72-1	0.72	7.9
1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.000063	0.001
TCDFs (All Tetrachlorodibenzofurans)	NA	0.000063	0.001
1,1,1,2-Tetrachloroethane	630-20-6	0.057	6.0
1,1,2,2-Tetrachloroethane	79-34-5	0.057	6.0
Tetrachloroethylene	127-18-4	0.056	6.0
2,3,4,6-Tetrachlorophenol	58-90-2	0.030	7.4
Thiodicarb [6]	59669-26-0	0.019	1.4
Thiophanate-methyl [6]	23564-05-8	0.056	1.4
Tirpate [6]	26419-73-8	0.056	0.28
Toluene	108-88-3	0.080	10
Toxaphene	8001-35-2	0.0095	2.6
Triallate [6]	2303-17-5	0.042	1.4

Table 3: Soil Cleanup Standards	
Contaminant	Concentration
arsenic	30 mg/kg
lead	1000 mg/kg
benzo (a) anthracene	3.6 mg/kg
benzo (b) fluoranthene	3.6 mg/kg