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March 16, 1993

Environmental Protection  
Ca, Hayward

Dr. Ravi Arulunanthum  
Alameda County Department of Environmental Health  
80 Swan Way, Suite 200  
Oakland, California 94261

Dear Dr. Arulunanthum:

Re: Site Mitigation Activities Conducted at Union Pacific -  
Hayward Train Derailment Site - Report Submittal

Enclosed for your review is a copy of the above referenced report. Site mitigation activities were completed by Radian Corporation and West Valley Construction during January and February 1993. The attached report summarizes the excavation of diesel contaminated soil at the site.

If you have any questions or comments, please call me at (402) 271-2234.

Thank you.

Yours truly,

A handwritten signature in black ink, appearing to read "Glenn Thomas".

Glenn Thomas  
Manager Environmental Site Remediation

CC: G. R. Davidson - Los Angeles  
G.O. Everett - Room 1200

Mr. M. H. Kazemi  
California Regional Water Quality Control Board  
San Francisco Bay Region  
2101 Webster Street  
Oakland, California 94612

**Site Mitigation Activities Conducted at  
Union Pacific-Hayward  
Train Derailment Site**

Prepared for:

Union Pacific Railroad  
1416 Dodge Street  
Omaha, Nebraska 68179

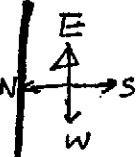
Prepared by:

Radian Corporation  
1990 N. California Blvd., Suite 500  
Walnut Creek, California 94596

March 15, 1993

Peralta

City of Hayward



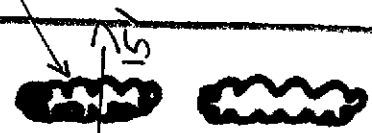
Simon



295'



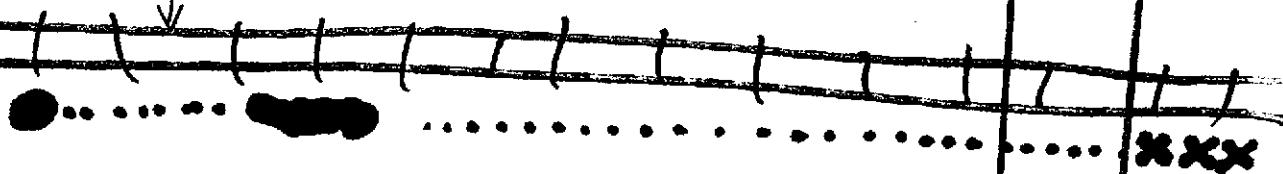
Western Blvd.



15'

SUNSET

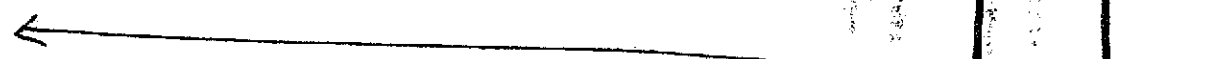
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XXX

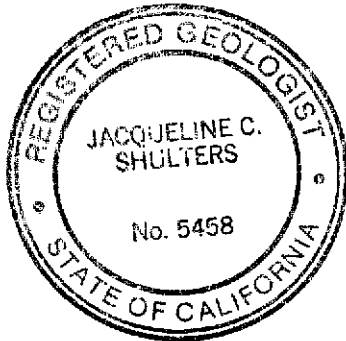
15'

Western Blvd.



400 yds.

I certify that Radian Corporation's work on this project was conducted under my supervision. To the best of my knowledge, the data contained herein are true and accurate, and satisfy the specified scope of work for this project.



*Jacqueline C. Shulters* 3/15/93  
Jacqueline C. Shulters Date  
Registered Geologist  
No. 5458  
License Expires June 30, 1994

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## EXECUTIVE SUMMARY

Site mitigation activities at the Union Pacific-Hayward train derailment site have been completed. These activities were conducted in accordance with the Union Pacific-Hayward Derailment Mitigation Plan (Radian Corporation, 1992). The Mitigation Plan was approved by the Alameda County Department of Environmental Health and established site-specific cleanup levels.

Diesel-contaminated soil between the main track and the siding was excavated to a depth of 3 feet. Visual and olfactory observations, as well as a flame ionization detector survey, indicated that cleanup between the tracks was accomplished. Diesel-contaminated soil south of the siding was excavated to depths of 15 to 23 feet. Confirmatory samples collected from the bottom, end walls, and the south sidewall of this excavation indicate that all known soil in these areas with diesel and benzene concentrations exceeding cleanup levels of 100 mg/kg and 0.03 mg/kg, respectively, has been removed. Approximately 2,760 cubic yards of excavated soil (100 cubic yards from north of the main track, 160 cubic yards from between the tracks, and 2,500 cubic yards from south of the side track) was sent to Pacific West, a soil recycling facility in Erda, Utah.

Soil with diesel and benzene concentrations exceeding cleanup levels remains in place beneath the railroad tracks. This soil was left in place because of potential safety problems that could arise if the railroad tracks were disturbed. A General Risk Appraisal was performed based on guidelines in the LUFT Manual (1989) to assess the potential for groundwater to be impacted by contaminants remaining in the soil. The results of this appraisal indicate that groundwater will not be affected by the diesel and benzene remaining in the soil.

No further action is recommended for this site. Diesel- and benzene-contaminated soil has been removed, except directly beneath the railroad tracks. The Mitigation Plan (Radian Corporation, 1992) called for installation of a groundwater

monitoring well if site conditions indicated a need to monitor groundwater quality. Groundwater at the site is at a depth of approximately 49 feet. Diesel contamination extended to a depth of no more than 23 feet and the General Risk Appraisal indicates that groundwater will not be affected by diesel and benzene remaining in place beneath the tracks. Therefore, site conditions do not indicate a need to monitor groundwater quality.

1.0 INTRODUCTION

This report summarizes site mitigation activities at the Union Pacific-Hayward train derailment site. During a train derailment on May 1, 1992, approximately 1,000 to 2,000 gallons of diesel fuel were released to the soil at the site.

Activities at the site conducted prior to those detailed in this document included emergency response actions, excavation of diesel-contaminated soil north of the railroad tracks, and a site investigation which included drilling and sampling seven boreholes (Radian Corporation, 1992). Based on the results of these previous activities, a Mitigation Plan was prepared and approval obtained from Alameda County Department of Environmental Health.

Site mitigation activities were performed during January and February, 1993. Contaminated soil was excavated to established cleanup levels, except directly beneath the tracks. A General Risk Appraisal was performed, the results of which indicate that groundwater will not be affected by diesel-contaminated soil remaining in place. No further action is recommended for this site.

More detail regarding activities at the site are presented in the body of this report. Section 2.0 describes the history of the site, including a summary of previous activities. Section 3.0 summarizes the site mitigation activities. Section 4.0 provides conclusions and recommendations.

## 2.0 BACKGROUND

### 2.1 Train Derailment and Emergency Response Actions

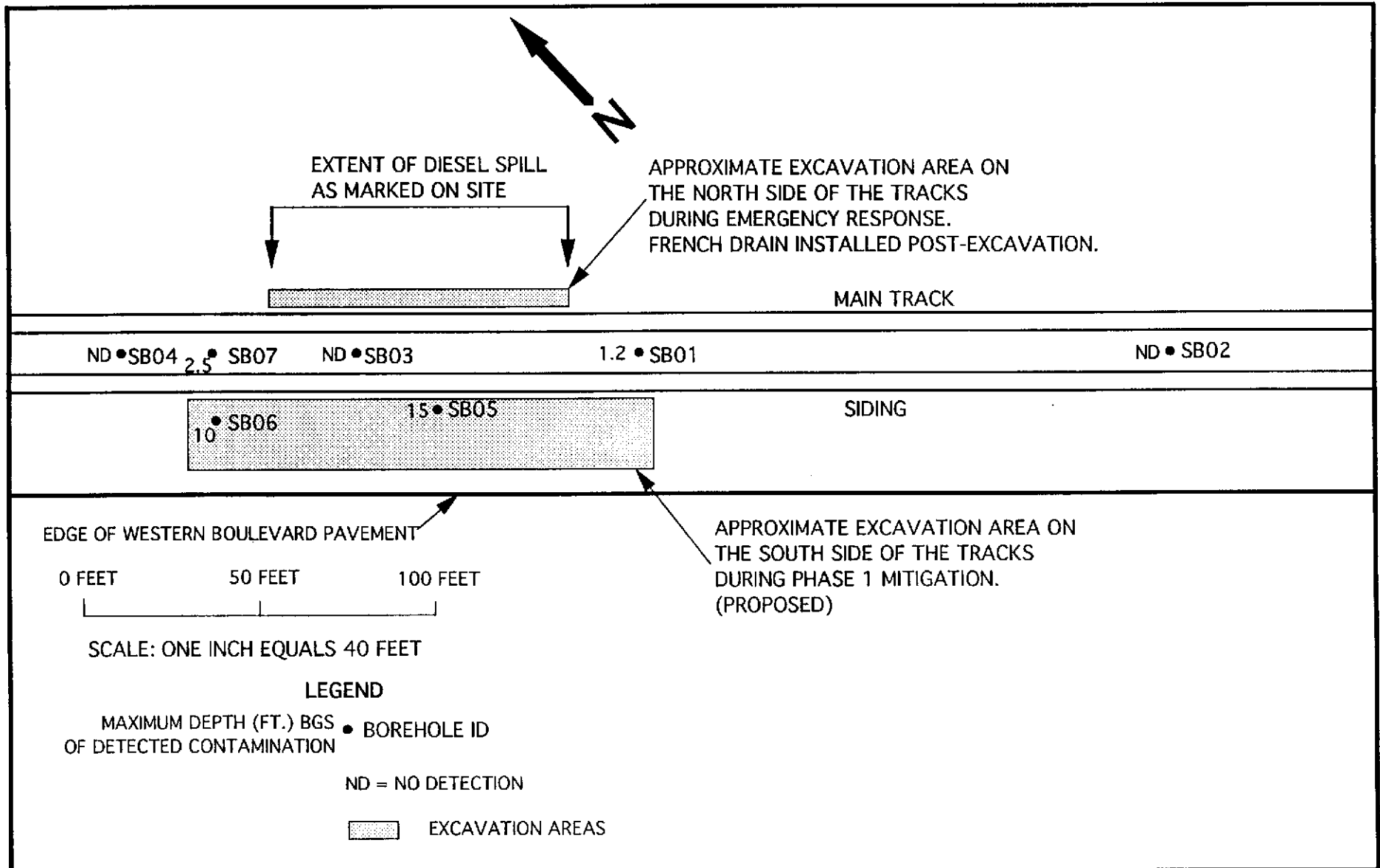
On May 1, 1992, a west bound Union Pacific train collided with a front-end loader near A Street, Hayward, California (see Figure 2-1). The engine was derailed and came to rest between the main track and the siding. The train came to a stop on the main track adjacent to the siding near Sunset Boulevard. The engine's fuel tanks were damaged during the collision resulting in the release of approximately 1,000 to 2,000 gallons of diesel fuel. Union Pacific and Alameda County Department of Environmental Health personnel determined that the release had affected a segment of the tracks approximately 100 feet long starting at a point approximately 300 feet southeast of Sunset Boulevard (see Figure 2-2). On the same day, the Hayward Fire Department doused the release area with an unknown quantity of water to control potential fire hazards.

On May 1 and 2, 1992, Union Pacific personnel, under the direction of Alameda County Department of Environmental Health personnel, excavated approximately 100 cubic yards of diesel-contaminated soil on the north side of the main tracks along the 100 foot long release area. The excavation reached a depth of approximately 8 feet. Samples of the stockpiled soil had diesel concentrations between 55 and 223 mg/kg total petroleum hydrocarbons as diesel. Benzene was not detected although other BTEX compounds were detected at concentrations varying from 0.009 to 2.97 mg/kg (Radian Corporation, 1992). Prior to backfilling, a French Drain was installed to capture any free liquid that might be present in the subsurface. The French drain has remained dry and free of odors indicating that diesel-contaminated soil was completely removed on the north side of the tracks.

The excavated soil was stockpiled on top of plastic sheeting on-site. The stockpile was also covered by plastic sheeting while stored. This soil was off-hauled



Figure 2-1. Site Vicinity Map



2-3

Figure 2-2. Summary of Previous Site Activities

during current site mitigation activities and taken to Pacific West, a soil recycling facility in Erda, Utah.

## 2.2 Summary of Previous Investigation Conducted by Radian Corporation

On May 18 and 19, 1992, Radian Corporation conducted an investigation to evaluate the extent of diesel-contaminated soil between the main track and the siding and on the south side of the tracks (Radian Corporation, 1992). Seven soil borings (see Figure 2-2) were drilled to depths varying from 21.5 to 58 feet. Soil samples were collected at 2.5 foot intervals to a depth of 10 feet beginning below the ballast. From 10 feet to the total depth, soil samples were collected at 5 foot intervals. Groundwater was encountered at a depth of 49 feet in SB-01. A groundwater sample was collected through the augers at this location. All samples were analyzed by EPA Methods 8015 modified for diesel and 8020 for BTEX compounds.

The results of these analyses indicated that diesel-contaminated soil was isolated to the following areas:

- Between the main track and the siding to a depth of approximately 2.5 feet. The shallow depth of diesel contamination between the tracks is as anticipated: the sub-base of the railroad tracks was constructed to divert water to either side of the tracks to prevent water logging of the soil beneath the tracks during rain storms.
- South of the siding to a depth of approximately 15 feet in the vicinity of SB-5 and SB-6.

Diesel (87  $\mu\text{g}/\text{l}$ ) and BTEX compounds (<0.03 to 0.9  $\mu\text{g}/\text{l}$ ) were detected in the groundwater sample collected from SB-1. The presence of these compounds in the water sample is attributed to cross-contamination from the surface soils or the augers during sampling.

**2.3**      Planned Site Mitigation

The Union Pacific-Hayward Derailment Mitigation Plan (Radian Corporation, 1992) approved by the Alameda County Department of Environmental Health called for the excavation of diesel-contaminated soil. Conservative cleanup levels of 100 mg/kg diesel and 0.03 mg/kg benzene were established based on guidelines presented in the LUFT Manual (1989). This Mitigation Plan called for excavation of soil between the tracks to a depth of approximately 3 feet. Soil on the south side of the tracks would be excavated to a depth of 15 feet near the location of SB-05 (see Figure 2-2). Final depth of excavation on the south side of the tracks would depend upon the results of confirmation samples. The excavated soil would then be shipped via gondolas by Union Pacific Railroad to Pacific West, a soil recycling facility in Erda, Utah.



### 3.0 SITE MITIGATION ACTIVITIES

Site mitigation activities took place during the period January 5, 1993, to February 11, 1993. Excavation activities were performed by West Valley Construction Company, Inc., of Campbell, California, a subcontractor to Union Pacific Railroad. Radian personnel were on-site during most excavation activities and performed all environmental compliance activities, including monitoring soil conditions with a flame ionization detector (FID), collecting compliance soil samples, and determining completion of excavation activities. The Mitigation Plan was executed as planned. For consistency, all excavation depths were measured relative to the railroad tracks. The tracks are elevated approximately 4 feet above the grade of Western Boulevard.

#### 3.1 Excavation of Soil Between Railroad Tracks

Soil between the tracks was excavated to a depth of 3 to 3.5 feet on January 5, 1993. Evidence of additional diesel contamination was not observed on the bottom of the excavation. A thorough survey of the excavation bottom using the FID was conducted prior to beginning backfill activities. No FID readings above background were observed during the bottom survey. A total of approximately 160 cubic yards of soil was excavated, assuming a 15% swell factor. Backfill activities occurred immediately after completion of excavation activities so that the main track could be put back into service by Union Pacific.

Minor diesel staining was observed on the sidewalls of the excavation to a depth of approximately 2.5 feet. As discussed in more detail below, isolated lenses of diesel-contaminated soil have been left in place below the railroad tracks.



### 3.2 Excavation South of Railroad Tracks

Excavation of diesel-contaminated soil on the south side of the railroad tracks began on January 6, 1993. Because of the depth and length of the affected soil, the soil was excavated in six segments (see Figure 3-1). As analytical results were obtained indicating that the cleanup level had been attained, segments were backfilled. The process minimized the potential for undercutting the rail siding located immediately adjacent to the excavation. Each segment was 22 to 26 feet long. Upon completion of excavation from a segment, trench boxes were placed in the excavation to stabilize the sidewalls as excavation continued.

Soil samples were collected from the sidewalls and bottom of each segment at the completion of excavation. Soil was collected from the bucket of the excavator in stainless steel sleeves that had been pre-cleaned and packaged in foil lined boxes. The ends of each sleeve were covered with a sheet of Teflon® before being capped, placed in a Ziploc® bag, and stored in a cooler with ice. Each sleeve was labeled with the sample number, date, time, and sampler's initials. Soil samples were submitted to Superior Analytical using proper chain of custody procedures for chemical analyses by EPA Methods 8015 modified for diesel and 8020 for BTEX compounds. As previously approved by Alameda County Department of Environmental Health, selected samples were composited prior to analysis. Compositing was performed by the analytical laboratory. A complete set of analytical reports is included in Appendix A. Table 3-1 summarizes the analytical results for samples collected from each segment.

Table 3-1  
 Summary of Analytical Results

Segment	Location	Sample Numbers	Results <sup>a</sup>
Segment 1	West sidewall at 7.5 ft	E1, E2 <sup>b</sup>	TPH = 29 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
	South sidewall at 7.5 ft	S1, S2 <sup>b</sup>	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
	Bottom at 15 ft	B1, B2 <sup>b</sup>	TPH = 11 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = 0.004 mg/kg X = 0.070 mg/kg
Segment 2	South sidewall at 7.5 ft	S3, S4 <sup>b</sup>	TPH = 11 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
	Bottom at 15 ft	B3, B4 <sup>b</sup>	TPH = 210 mg/kg B = 0.005 mg/kg T = 0.021 mg/kg E = 0.021 mg/kg X = 1.2 mg/kg
	Bottom at 23 ft	2-C1, 2-C2 <sup>b</sup>	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg

Table 3-1 (Cont.)

Segment	Location	Sample Numbers	Results <sup>a</sup>
Segment 3	South sidewall at 7.5 ft	S5, S6 <sup>b</sup>	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
	Bottom at 15 ft	B5, B6 <sup>b</sup>	TPH = 830 mg/kg B = 0.068 mg/kg T = 0.20 mg/kg E = 0.52 mg/kg X = 3.7 mg/kg
	Bottom at 23 ft	3-C1, 3-C2 <sup>b</sup>	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
Segment 4	South sidewall at 7.5 ft	S7, S8 <sup>b</sup>	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
	East bottom at 17 ft	B8	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
	West bottom at 17 ft	B7	TPH = 220 mg/kg B = 0.004 mg/kg T = 0.004 mg/kg E = 0.010 mg/kg X = 0.11 mg/kg
	West bottom at 23 ft	4-C1	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg

Table 3-1 (Cont.)

Segment	Location	Sample Numbers	Results <sup>a</sup>
Segment 5	West bottom at 16.5 ft	B9	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
	East bottom at 16.6 ft	B-10	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
Segment 6	South sidewall at 7.5 ft	S11, S12 <sup>b</sup>	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
	East sidewall at 7 ft	SD1	TPH = 83 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = 0.005 mg/kg
	Bottom at 7 ft	SD2	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg
	East bottom at 17 ft	B12	TPH = <10 mg/kg B = 0.007 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = 0.013 mg/kg
	West bottom at 17 ft	B11	TPH = 2900 mg/kg B = <0.15 mg/kg T = <0.15 mg/kg E = <0.15 mg/kg X = 1.8 mg/kg

Table 3-1 (Cont.)

Segment	Location	Sample Numbers	Results <sup>a</sup>
Segment 6 (cont.)	West bottom at 20 ft	6-C1	TPH = <10 mg/kg B = <0.003 mg/kg T = <0.003 mg/kg E = <0.003 mg/kg X = <0.003 mg/kg

- a TPH = total petroleum hydrocarbons as diesel; B = benzene; T = toluene; E = ethylbenzene; and X = total xylenes.  
 b Composited samples.

A QA/QC review of the soil chemical analyses was conducted. No problems were identified with the data set. Samples were analyzed within specified holding times, and no reporting or transcription errors were noted. There was no evidence of laboratory contamination. All matrix spike results met the laboratory control limits for accuracy indicating that the results were not affected by matrix interferences. All matrix spike duplicates met the laboratory control limits for precision demonstrating the laboratory's ability to replicate the analyses. Overall, the results are valid and can be used for their intended purpose.

In Segments 1 and 5 and part of Segment 4, diesel-contaminated soil was removed to depths of 15 to 16.5 feet. In Segments 2, 3, 6, and part of Segment 4, diesel contaminated soil was found to extend deeper than anticipated. Each of these segments were excavated an additional 3 to 8 feet. Excavation ended when odors and FID readings had diminished in soil from the excavator bucket. Diesel and benzene concentrations in confirmation soil samples collected from the bottoms of these segments were below the cleanup levels of 100 mg/kg and 0.03 mg/kg, respectively.

Diesel and benzene concentrations in all soil samples collected from the south sidewall (adjacent to Western Boulevard) and from the two ends of the excavation were below the site specific cleanup levels. The results of this confirmatory soil sampling

indicate that the diesel contamination does not extend into the subsurface beneath Western Boulevard.

The total volume of soil excavated from Segments 1 through 6 is estimated to be approximately 2,500 cubic yards, assuming a fluff factor of 15%.

### 3.3 Diesel Remaining Beneath Railroad Tracks

The mitigation activities at this site did not include excavation of the soil directly beneath the railroad tracks. Had this occurred, the future safety of this segment of the rail line would have been compromised. Excavation of the soil beneath the railroad tracks would have required removal of the tracks, excavation of the soil, placing of compacted fill material, and reconstruction of the tracks. The future stability of the tracks would have been affected because continued compaction of the excavated area would have lead to a segment of the tracks slightly lower than the older portion of the tracks. This warping of the tracks, in turn, would have lead to unsafe conditions for trains travelling along this segment of tracks.

During site mitigation activities, careful attention was paid to the excavation sidewalls adjacent to the railroad tracks. Between the tracks, a thin, discontinuous layer of diesel-contaminated soil was noted at the contact between native and fill materials at a depth of approximately 2.5 feet along the sidewalls of the excavation. A diesel odor was noted and the FID registered the presence of organic vapors.

On the south side of the tracks, discontinuous lenses of diesel-contaminated soil were noted to a depth of approximately 7 to 15 feet. In order to assess the concentration of diesel remaining in the soil beneath the tracks, samples were collected from the area anticipated to have the highest concentration of hydrocarbons based on FID readings. The results of these analyses are summarized in Table 3-2:



Table 3-2  
North Sidewall Samples

Sample Location	Sample Numbers	Results <sup>a</sup>
Segment 2 at 7 ft	NS1, NS2 <sup>b</sup>	TPH = 850 mg/kg B = <0.06 mg/kg T = <0.06 mg/kg E = <0.06 mg/kg X = 0.45 mg/kg
Segment 4 at 12 ft	NS3, NS4 <sup>b</sup>	TPH = 230 mg/kg B = 0.003 mg/kg T = <0.003 mg/kg E = <0.010 mg/kg X = 0.071 mg/kg

a TPH = total petroleum hydrocarbons as diesel; B = benzene; T = toluene; E = ethylbenzene; and X = total xylenes.

b Composited samples.

Soil samples NS1 and NS2 were collected within a few feet of each other (see Figure 3-1) and displayed similar characteristics (odor, FID readings). Soil samples NS3 and NS4 were collected in a similar manner.

The concentrations of diesel in these samples are higher than the site cleanup level of 100 mg/kg. A General Risk Appraisal for hydrocarbons remaining in the soil beneath the tracks has been conducted using methods described on pages 37-46 in the LUFT Manual (1989). Work sheets for this appraisal are included in Appendix B. A conservative approach has been used for this appraisal using BTEX concentrations. An appraisal of the diesel concentrations could not be performed because data are not provided in the LUFT Manual.

The analytical results for samples (NS1, NS2), (NS3, NS4), (B5, B6), and (3-C1, 3-C2) were used: (NS1, NS2) and (NS3, NS4) because they were collected along the north sidewall of the excavation (adjacent to the rail siding); (B5, B6) because it had the highest concentrations of TPH and BTEX compounds at a depth of approximately 15 feet; and (3-C1, 3-C2) because it confirmed clean soil at a depth of 23 feet.

Categories 1, 2, and 4-8 on Table 2-2 (Appendix B) are definitively "NO". Category 3 is "YES"; the aerial extent of remaining soil contamination is estimated to be approximately 2,000 ft<sup>2</sup>. This result is not considered to invalidate the results of this appraisal because the railroad tracks are underlain by compacted fill which will impede infiltration of surface water.

The results of the General Risk Appraisal indicate that the quality of groundwater will not be affected by the soil remaining in place. Table 3-3 summarizes the results of the appraisal:

**Table 3-3**  
**Summary of General Risk Appraisal**

Compound	Cumulative Concentration Levels (mg/kg)	Acceptable Contamination Levels (mg/kg)
Benzene	0 - 0.071	0 (<0.3) <sup>a</sup>
Toluene	0 - 0.20	30 - 60
Ethylbenzene	0 - 0.52	100
Xylenes	0.45 - 4.221	90 - 100

a The Acceptable Contamination Level for benzene is based on a detection limit of 0.3 mg/kg for benzene.

In no case do the cumulative concentrations of toluene, ethylbenzene, and total xylenes exceed the Acceptable Contamination Levels (ACL) for these compounds. Cumulative concentrations for benzene (0.003 mg/kg and 0.071 mg/kg; see Appendix B) do exceed the ACL for benzene; however, this ACL is based on a detection limit of 0.3 mg/kg for benzene. In no case does the cumulative concentration for benzene exceed 0.3 mg/kg.

#### 4.0 CONCLUSIONS AND RECOMMENDATIONS

Soil at the Union Pacific - Hayward train derailment site has been remediated. All soil with known diesel concentrations greater than 100 mg/kg and benzene concentrations greater than 0.03 mg/kg has been excavated north, south, and between the railroad tracks at the site. This soil has been sent to a soil recycling facility in Erda, Utah, using proper hazardous waste manifest procedures.

Soil with diesel concentrations up to 850 mg/kg and benzene concentrations up to 0.003 mg/kg has been left in place immediately beneath the railroad tracks to depths of 7 to 10 feet. Leaving soil with these concentrations of diesel and benzene in place at a depth approximately 37-42 feet above first groundwater (49 feet) is consistent with guidelines outlined in the LUFT Manual (1989).

No further action is considered necessary at this site. The potential for placing a groundwater monitoring well at this site was included in the Site Mitigation Plan (Radian Corporation, 1992) if subsurface conditions encountered during site mitigation indicated a need to assess groundwater conditions. The depth of diesel-contaminated soil at the site was determined to be no more than 23 feet. Groundwater was encountered at a depth of 49 feet during a previous investigation. As determined during a previous investigation (Radian Corporation, 1992), the lithology in the depth interval 23 to 49 feet is composed primarily of silty clay (23 to 44 feet) and clayey sand (44 to 49 feet). Additionally, the results of a General Risk Appraisal indicate that groundwater quality is not threatened by contamination remaining in place beneath the tracks. A groundwater monitoring well is therefore deemed unnecessary. Not installing a groundwater monitoring well at this site will also prevent a potential conduit from the surface in an area with heavy auto and pedestrian traffic.

5.0 REFERENCES

California Leaking Underground Fuel Tank Task Force, 1989. "Leaking Underground Fuel Tank Field Manual: Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Closure".

Radian Corporation, 1992. "Union Pacific - Hayward Derailment Mitigation Plan".

APPENDIX A  
ANALYTICAL REPORTS



# Superior Precision Analytical, Inc.

1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

## C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 55948  
CLIENT: RADIAN CORPORATION  
CLIENT JOB NO.: HAYWARD UNION PACIFIC

DATE RECEIVED: 01/06/93  
DATE REPORTED: 01/07/93

### ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS by Modified EPA SW-846 Method 8015

LAB #	Sample Identification	Concentration (mg/kg) Diesel Range
----	-----	-----
1	W1	450


mg/kg - parts per million (ppm)

Minimum Detection Limit for Diesel in Soil: 10mg/kg

#### QAQC Summary:

Daily Standard run at 200mg/L: %DIFF Diesel = <15%  
MS/MSD Average Recovery = 101%: Duplicate RPD = 6%

Richard Srna, Ph.D.

  
Laboratory Director

Chain of Custody Record

PROJECT <i>Hayward Union Pacific</i>			NO. OF CONTAINERS	<i>TPH-diesel</i>	ANALYSES				REMARKS	SAM ID NO. (for lab use only)	
SITE <i>Hayward</i>											
COLLECTED BY (Signature) <i>Philip K Tang</i>											
FIELD SAMPLE I.D.	SAMPLE MATRIX	DATE/TIME									
<i>W1</i>	<i>Soil</i>	<i>Jan 5, 93 1414</i>	<input checked="" type="checkbox"/>					<i>please Composite (2 Liners.)</i>			
<div style="border: 1px solid black; padding: 5px;"> <p>Please Initial: <u>1415 3<sup>0</sup></u></p> <p>Samples Stored in Ice: <u>✓</u></p> <p>Appropriate containers: <u>✓</u></p> <p>Samples preserved: <u>no</u></p> <p>VOA's without headspace: <u>NA</u></p> <p>Comments: _____</p> <p>_____</p> <p>_____</p> </div>											
REMARKS								RELINQUISHED BY:	DATE	TIME	
								<i>DAVE LONG</i>			
RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME
			<i>Philip Tang</i>	<i>Jan 5 93</i>	<i>1700</i>	<i>D. Long</i>	<i>Jan 5 93</i>	<i>5PM</i>			

RECEIVED FOR LABORATORY BY:		DATE	TIME	AIRBILL NO.	OPENED BY:	DATE	TIME	TEMP °C	SEAL #	CONDITION
<i>[Signature]</i>		<i>1/4/93</i>	<i>10:00</i>							
REMARKS										



# Superior Precision Analytical, Inc.

1555 Burke, Unit 1 • San Francisco, California 94124 • (415) 647-2081 Fax (415) 621-7133

RADIAN CORPORATION  
Attn: Philip Tang

Project UNION PACIFIC HAYWARD  
Reported 02/01/93

## TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed Matrix
56017- 1	E1, E2	01/29/93	02/01/93 Soil
56017- 2	S1, S2	01/28/93	01/29/93 Soil
56017- 3	B1, B2	01/29/93	02/01/93 Soil
56017- 4	NS1, NS2	01/29/93	02/01/93 Soil
56017- 5	S3, S4	01/29/93	01/29/93 Soil
56017- 6	B3, B4	01/29/93	02/01/93 Soil

## RESULTS OF ANALYSIS

Laboratory Number: 56017- 1 56017- 2 56017- 3 56017- 4 56017- 5

Benzene:	ND<.003	ND<.003	ND<.003	ND<.06	ND<.003
Toluene:	ND<.003	ND<.003	ND<.003	ND<.06	ND<.003
Ethyl Benzene:	ND<.003	ND<.003	0.004	ND<.06	ND<.003
Xylenes:	ND<.003	ND<.003	0.070	0.45	ND<.003
Diesel:	29	ND<10	11	850	11
Concentration:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

Laboratory Number: 56017- 6

Benzene:	0.005
Toluene:	0.021
Ethyl Benzene:	0.021
Xylenes:	1.2
Diesel:	210
Concentration:	mg/kg





C E R T I F I C A T E   O F   A N A L Y S I S

A N A L Y S I S   F O R   T O T A L   P E T R O L E U M   H Y D R O C A R B O N S

Page 2 of 2  
QA/QC INFORMATION  
SET: 56017

NA = ANALYSIS NOT REQUESTED  
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT  
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:  
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:  
Minimum Quantitation Limit for Diesel in Soil: 10mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:  
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE  
Minimum Quantitation Limit in Soil: 0.003mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Benzene:	87/89	2%	75-114
Toluene:	91/91	0%	78-114
Ethyl Benzene:	96/95	1%	76-120
Xylenes:	91/90	1%	71-117
Diesel:	92/91	1%	69-127

Richard Srna, Ph.D.

*Cecilia J. Joaguen (for)*  
Laboratory Director



**Chain of Custody Record**

PROJECT <i>Radian Corporation</i>			NO. OF CONTAINERS	TPH-diethyl 8015 BTEx <del>8020</del> PKT	ANALYSES				REMARKS <i>Please analyze the 2-point composites as shown below by " ] "</i>	SAM ID NO. (for lab use only)
SITE <i>Union Pacific Hayward</i>					IRUSI					
COLLECTED BY (Signature) <i>Radian Corporation, Phil Tang (PKT)</i>										
FIELD SAMPLE I.D.	SAMPLE MATRIX	DATE/TIME								
<i>S3</i>	<i>Soil</i>	<i>Jan 29, 93 1400</i>	<i>1</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<i>make one composite</i>	
<i>S4</i>	↓	↓	<i>1</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
<i>B3</i>	↓	↓	<i>1</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<i>make one composite</i>	
<i>B4</i>	↓	↓	<i>1</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
REMARKS <i>Analyze only composites.</i>			Class initial: <i>UTB</i> Samples stored in ice: <input checked="" type="checkbox"/> Appropriate containers: <input checked="" type="checkbox"/> Samples preserved: <i>NO</i> VOA's with sufficient space: <i>NO</i> Comments:				RELINQUISHED BY: <i>Radian Philip Tang</i>		DATE: <i>Jan 29 93</i>	TIME: <i>1550</i>
RECEIVED BY: <i>S. Smallwood</i>	DATE: <i>Jan 29 93</i>	TIME: <i>1550</i>	RELINQUISHED BY: <i>S. Smallwood</i>	DATE: <i>1-24</i>	TIME: <i>4:58 PM</i>	RECEIVED BY: <i>M. Peltier</i>	DATE: <i>1/24/93</i>	TIME: <i>1700</i>	LAB USE ONLY	
RECEIVED FOR LABORATORY BY:	DATE:	TIME:	AIRBILL NO.:	OPENED BY:	DATE:	TIME:	TEMP °C:	SEAL #:	CONDITION:	
REMARKS										



RADIAN CORPORATION  
Attn: Philip Tang

Project UNION PACIFIC, HAYWARD  
Reported 02/02/93

**TOTAL PETROLEUM HYDROCARBONS**

Lab #	Sample Identification	Sampled	Analyzed Matrix
56020- 1	S5,S6	02/01/93	02/01/93 Soil
56020- 2	B5,B6	02/01/93	02/01/93 Soil

**RESULTS OF ANALYSIS**

Laboratory Number: 56020- 1 56020- 2

Benzene:	ND<.003	0.068
Toluene:	ND<.003	0.20
Ethyl Benzene:	ND<.003	0.52
Xylenes:	ND<.003	3.7
Diesel:	ND<10	830
Concentration:	mg/kg	mg/kg



C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

Page 2 of 2  
QA/QC INFORMATION  
SET: 56020

NA = ANALYSIS NOT REQUESTED  
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT  
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:  
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:  
Minimum Quantitation Limit for Diesel in Soil: 10mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:  
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE  
Minimum Quantitation Limit in Soil: 0.003mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Benzene:	88/93	6%	75-114
Toluene:	90/96	6%	78-114
Ethyl Benzene:	92/99	7%	76-120
Xylenes:	88/93	6%	71-117
Diesel:	84/99	16%	69-127

Richard Srna, Ph.D.

*Cecilia Dragun (for)*  
Laboratory Director

56020

**Chain of Custody Record**

PROJECT <i>Radian Corporation</i>			NO. OF CONTAINERS	8015 IPH/diesel	8020 BTEX	ANALYSES	Please analyze composite only. Prepare composites as shown below by "J".	REMARKS	SAM ID NO. (for lab use only)	
SITE <i>Union Pacific, Hayward</i>										
COLLECTED BY (Signature) <i>Phil Tang</i> <i>Phil Tang</i> <i>Radian</i>										
FIELD SAMPLE I.D.	SAMPLE MATRIX	P.T. DATE/TIME								
S5	SOIL	Jan Feb 1, 93 1350	1	✓	✓			make one		
S6	↓	↓	1	✓	✓			composite		
B5	↓	↓	1	✓	✓			make one		
B6	↓	↓	1	✓	✓			composite		
REMARKS <i>24 hour turn around.</i>			Please Initial: <i>WT</i>		Samples stored in ice. <i>✓</i>		Appropriate containers. <i>✓</i>		Samples preserved <i>VIA</i>	
			VOCs without headspace. <i>VIA</i>		Comments: <i>[Signature]</i>		RELINQUISHED BY: <i>Radian</i>		DATE	TIME
RECEIVED BY: <i>[Signature]</i>	DATE <i>Feb 1, 93</i>	TIME <i>1551</i>	RELINQUISHED BY: <i>Nancy Petros</i>	DATE <i>1/19/93</i>	TIME <i>1620</i>	RELINQUISHED BY: <i>Phil Tang</i>	DATE <i>Feb 1, 93</i>	TIME <i>1550</i>		

RECEIVED FOR LABORATORY BY: <i>MOHINDER SINGH</i>			DATE	TIME	AIRBILL NO.	OPENED BY:	DATE	TIME	TEMP °C	SEAL #	CONDITION
REMARKS											
<b>RUSH</b>											



RADIAN CORPORATION  
Attn: Philip Tang

Project UNION PACIFIC, HAYWARD  
Reported 02/03/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed Matrix
56024- 1	NS3, NS4	02/02/93	02/03/93 Soil
56024- 2	B7	02/02/93	02/03/93 Soil
56024- 3	B8	02/02/93	02/02/93 Soil
56024- 4	S7, S8	02/02/93	02/02/93 Soil

RESULTS OF ANALYSIS

Laboratory Number: 56024- 1 56024- 2 56024- 3 56024- 4

Benzene:	0.003	0.004	ND<.003	ND<.003
Toluene:	ND<.003	0.004	ND<.003	ND<.003
Ethyl Benzene:	0.010	0.011	ND<.003	ND<.003
Xylenes:	0.071	0.11	ND<.003	ND<.003
Diesel:	230	220	ND<10	ND<10
Concentration:	mg/kg	mg/kg	mg/kg	mg/kg



CERTIFICATE OF ANALYSIS

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

Page 2 of 2
QA/QC INFORMATION
SET: 56024

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 1mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.003mg/kg

Table with 4 columns: ANALYTE, MS/MSD RECOVERY, RPD, CONTROL LIMIT. Rows include Benzene, Toluene, Ethyl Benzene, Xylenes, and Diesel with their respective recovery percentages and control limits.

Richard Srna, Ph.D.

Cecilia G. Joaquin (for)
Laboratory Director



56024

**Chain of Custody Record**

PROJECT <i>Radian Corporation</i>			NO. OF CONTAINERS	8015 TPH-diesel	8020 BTEX	ANALYSES				Please analyze 2 composites as shown by # [ ] # [ ]  Please analyze B7 and B8 as 2 discrete samples, no compositing. SAM ID NO. (for lab use only)				
SITE <i>Union Pacific, Hayward</i>														
COLLECTED BY (Signature) <i>Philip Tang (PKT) Radian</i>														
FIELD SAMPLE I.D.														
SAMPLE MATRIX										REMARKS				
DATE/TIME														
<i>NS3 NS3</i>	<i>SOIL</i>	<i>Feb 2, 93. 0752</i>	<i>1</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<b>RUSH</b>				<i>make one composite</i>				
<i>NS4</i>	↓	↓	<i>1</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<i>Do not composite</i>
<i>B7</i>	↓	<i>Feb 2, 93. 1127</i>	<i>1</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<i>Do not composite.</i>
<i>B8</i>	↓	↓	<i>1</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<i>make one composite</i>
<i>S7</i>	↓	↓		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<i>composite</i>
<i>S8</i>	↓	↓		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									
REMARKS										RELINQUISHED BY: <i>Philip Tang Radian</i>	DATE <i>Feb 2 93</i>	TIME <i>1429</i>		
RECEIVED BY: <i>W. Pritchard</i>	DATE <i>Feb 2 93</i>	TIME <i>1429</i>	RELINQUISHED BY: <i>W. Pritchard</i>	DATE <i>2-2-93</i>	TIME <i>3:54</i>	RECEIVED BY: <i>Lucia Jorgun</i>	DATE <i>2/4/93</i>	TIME <i>325</i>	RELINQUISHED BY:	DATE	TIME			
LAB USE ONLY														
RECEIVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.	OPENED BY:	DATE	TIME	TEMP °C	SEAL #	CONDITION					
REMARKS														



# Superior Precision Analytical, Inc.

1555 Burke, Unit 1 • San Francisco, California 94124 • (415) 647-2081 • Fax: (415) 821-7123

RADIAN CORPORATION  
Attn: Philip Tang

Project UNION PACIFIC HAYWARD  
Reported 02/05/93

## TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed Matrix
56035- 1	2-C1,2-C2 COMP	02/04/93	02/04/93 Soil
56035- 2	3-C1,3-C2 COMP	02/04/93	02/04/93 Soil

## RESULTS OF ANALYSIS

Laboratory Number: 56035- 1 56035- 2

Benzene:	ND<.003	ND<.003
Toluene:	ND<.003	ND<.003
Ethyl Benzene:	ND<.003	ND<.003
Xylenes:	ND<.003	ND<.003
Diesel:	ND<10	ND<10
Concentration:	mg/kg	mg/kg



C E R T I F I C A T E   O F   A N A L Y S I S

A N A L Y S I S   F O R   T O T A L   P E T R O L E U M   H Y D R O C A R B O N S

Page 2 of 2  
QA/QC INFORMATION  
SET: 56035

NA = ANALYSIS NOT REQUESTED  
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT  
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:  
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:  
Minimum Quantitation Limit for Diesel in Soil: 10mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:  
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE  
Minimum Quantitation Limit in Soil: 0.003mg/kg

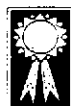
ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Benzene:	81/81	0	75-114
Toluene:	85/84	1	78-114
Ethyl Benzene:	90/87	3	76-120
Xylenes:	85/83	3	71-117
Diesel:	91/85	7	46-121

Richard Srna, Ph.D.

*Cecilia G. Jonquero (for)*  
Laboratory Director

Chain of Custody Record

PROJECT <i>Radian Corporation</i>			NO. OF CONTAINERS	8015 TPH-diesel	8020 BTEX	ANALYSES	Please analyze only the 2 composites, as shown below with a "J".	REMARKS	SAM ID NO. (for lab use only)		
SITE <i>Union Pacific Hayward</i>											
COLLECTED BY (Signature) <i>Philip Tang (PKT)</i>											
FIELD SAMPLE I.D.	SAMPLE MATRIX	DATE/TIME									
2-C1	Soil	Feb 4, 93. 1043	✓	✓			] make one composite.				
2-C2	↓	Feb 4, 93. 1126	✓	✓							
3-C1	↓	Feb 4, 93. 1407	✓	✓				] Make one composite.			
3-C2	↓	Feb 4, 93. 1545	✓	✓							
REMARKS			Files initialed: <i>CSJ</i> Samples stored in ice: <i>NA</i> Appropriate containers: <i>NA</i> Samples preserved: <i>NA</i> VOA's without headspace: <i>NA</i> Comments:			RELINQUISHED BY: <i>Radian</i>		DATE: Feb 4, 93	TIME: 1630		
RECEIVED BY: <i>S. Smallwood</i>	DATE: Feb 93	TIME: 1630	RELINQUISHED BY: <i>S. Smallwood</i>	DATE: Feb 93	TIME: 5:15	RECEIVED BY:	DATE:	TIME:	RELINQUISHED BY:	DATE:	TIME:
RECEIVED FOR LABORATORY BY: <i>PKT</i>			DATE: Feb 93	TIME: 1715	AIRBILL NO.	OPENED BY:	DATE:	TIME:	TEMP °C:	SEAL #:	CONDITION:
REMARKS											
<b>RUSH</b>											



RADIAN CORPORATION  
Attn: Philip Tang

Project UNION PACIFIC, HAYWARD  
Reported 02/08/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed Matrix
56048- 1	4-C1	02/05/93	02/06/93 Soil
56048- 2	B9	02/05/93	02/06/93 Soil
56048- 3	SD-1	02/05/93	02/06/93 Soil
56048- 4	SD-2	02/05/93	02/06/93 Soil

RESULTS OF ANALYSIS

Laboratory Number: 56048- 1 56048- 2 56048- 3 56048- 4

Benzene:	ND<.003	ND<.003	ND<.003	ND<.003
Toluene:	ND<.003	ND<.003	ND<.003	ND<.003
Ethyl Benzene:	ND<.003	ND<.003	ND<.003	ND<.003
Xylenes:	ND<.003	ND<.003	0.005	ND<.003
Diesel:	ND<10	ND<10	83	ND<10
Concentration:	mg/kg	mg/kg	mg/kg	mg/kg



C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

Page 2 of 2  
QA/QC INFORMATION  
SET: 56048

NA = ANALYSIS NOT REQUESTED  
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT  
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:  
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:  
Minimum Quantitation Limit for Diesel in Soil: 10mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:  
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE  
Minimum Quantitation Limit in Soil: 0.003mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Benzene:	82/86	5%	75-114
Toluene:	85/88	3%	78-114
Ethyl Benzene:	88/90	2%	76-120
Xylenes:	84/86	2%	71-117
Diesel:	95/97	2%	75-125

Richard Srna, Ph.D.

*Richard Srna*  
Laboratory Director

Chain of Custody Record

56048

PROJECT <i>Radian Corporation</i>			NO. OF CONTAINERS	8015 TPH-diesel	8020 BTEX	ANALYSES				Please analyze each of the 4 samples. (No compositing)		
SITE <i>Union Pacific Hayward</i>												
COLLECTED BY (Signature) <i>Philip Tang (PKT) Radian</i>												
FIELD SAMPLE I.D.	SAMPLE MATRIX	DATE/TIME								REMARKS	SAM ID NO. (for lab use only)	
4-C1	Soil	Feb 5, 93. 1014	1	✓	✓							
B9	↓	Feb 5, 93. 1533	1	✓	✓							
SD-1		Feb 5, 93. 1543	1	✓	✓							
SD-2		Feb 5, 93. 1547	1	✓	✓							
<b>RUSH</b>												
REMARKS										RELINQUISHED BY: <i>Radian Philip Tang</i>	DATE: Feb 5 93	TIME: 1625
RECEIVED BY: <i>Lee Pritchard</i>	DATE: Feb 5	TIME: 1428	RELINQUISHED BY: <i>Lee Pritchard</i>	DATE: 2/5	TIME: 1720	RECEIVED BY: <i>[Signature]</i>	DATE:	TIME:	RELINQUISHED BY:	DATE:	TIME:	
PRITCHARD (AEROSTATION DELIVERY) LAB USE ONLY												
RECEIVED FOR LABORATORY BY: <i>[Signature]</i>	DATE: 2/5	TIME: 1720	AIRBILL NO.:	OPENED BY:	DATE:	TIME:	TEMP °C:	SEAL #:	CONDITION:			
REMARKS												



RADIAN CORPORATION  
Attn: Philip Tang

Project UNION PACIFIC, HAYWARD  
Reported 02/09/93

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TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed Matrix
56050- 1	B-10	02/08/93	02/08/93 Soil

RESULTS OF ANALYSIS

Laboratory Number: 56050- 1

---

Benzene: ND<.003  
Toluene: ND<.003  
Ethyl Benzene: ND<.003  
Xylenes: ND<.003  
Diesel: ND<10

Concentration: mg/kg





C E R T I F I C A T E   O F   A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

Page 2 of 2  
QA/QC INFORMATION  
SET: 56050

NA = ANALYSIS NOT REQUESTED  
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT  
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:  
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:  
Minimum Quantitation Limit for Diesel in Soil: 10mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:  
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE  
Minimum Quantitation Limit in Soil: 0.003mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Benzene:	84/89	6%	75-114
Toluene:	86/89	3%	78-114
Ethyl Benzene:	88/90	3%	76-120
Xylenes:	84/86	2%	71-117
Diesel:	92/87	6%	46-121

Richard Srna, Ph.D.

*Richard A. Srna (for)*  
Laboratory Director





# Superior Precision Analytical, Inc.

1555 Burke, Unit 1 • San Francisco, California 94124 • (415) 647-2081 / Fax (415) 821-7123

RADIAN CORPORATION  
Attn: Philip Tang

Project UNION PACIFIC, HAYWARD  
Reported 02/10/93

## TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed Matrix
56055- 1	B11	02/09/93	02/10/93 Soil
56055- 2	B12	02/09/93	02/09/93 Soil
56055- 3	S11, S12	02/09/93	02/09/93 Soil

## RESULTS OF ANALYSIS

Laboratory Number: 56055- 1 56055- 2 56055- 3

Benzene:	ND<.15	.007	ND<.003
Toluene:	ND<.15	ND<.003	ND<.003
Ethyl Benzene:	ND<.15	ND<.003	ND<.003
Xylenes:	1.8	.013	ND<.003
Diesel:	2900	ND<10	ND<10
Concentration:	mg/kg	mg/kg	mg/kg



C E R T I F I C A T E   O F   A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

Page 2 of 2  
QA/QC INFORMATION  
SET: 56055

NA = ANALYSIS NOT REQUESTED  
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT  
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:  
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:  
Minimum Quantitation Limit for Diesel in Soil: 1mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:  
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE  
Minimum Quantitation Limit in Soil: 0.003mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Benzene:	83/86	2%	75-114
Toluene:	86/89	4%	78-114
Ethyl Benzene:	89/91	3%	76-120
Xylenes:	85/86	2%	71-117
Diesel:	87/93	7%	69-127

Richard Srna, Ph.D.

*Cecilia G. Gonzalez (for)*  
Laboratory Director

**Chain of Custody Record**

PROJECT <i>Radian Corporation</i>			NO. OF CONTAINERS	TPH - <i>8015</i>	BTEX - <i>8020</i>	ANALYSES		REMARKS <i>Composite S11 and S12. Do not composite B11 and B12. Analyze B11 and B12 separately as <del>two</del> 2 discrete samples. Analyze composite of S11 and S12.</i>			
SITE <i>Union Pacific, Hayward</i>						SAM ID NO.			(for lab use only)		
COLLECTED BY (Signature) <i>PKT Philip Tang Radian</i>											
FIELD SAMPLE I.D.	SAMPLE MATRIX	DATE/TIME									
<i>B11</i>	<i>Soil</i>	<i>Feb 9, 93. 1050</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Do not composite.</i>			
<i>B12</i>		<i>M</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Do not composite.</i>			
<i>S11</i>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Do not composite.</i>			
<i>S12</i>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Do not composite.</i>			
Please Initial: <input checked="" type="checkbox"/> Samples Stored in ice <input checked="" type="checkbox"/> Appropriate containers <input checked="" type="checkbox"/> Samples analyzed <input checked="" type="checkbox"/> VOA's without hooding etc. Comments: <i>(Signature)</i>											
REMARKS <i>24 hr turn around RUSH</i>								REINQUISHED BY: <i>Philip Tang Radian</i>	DATE <i>Feb 9 93</i>	TIME <i>1234</i>	
RECEIVED BY: <i>D. Staats</i>	DATE <i>Feb 9 93</i>	TIME <i>1234</i>	REINQUISHED BY: <i>D. Staats</i>	DATE <i>738</i>	TIME	RECEIVED BY: <i>Nancy Petter</i>	DATE <i>2/9/93</i>	TIME <i>1400</i>	REINQUISHED BY:	DATE	TIME

DOC-STAATS/\*738/AERD.

RECEIVED FOR LABORATORY BY:		DATE	TIME	AIRBILL NO.	OPENED BY:	DATE	TIME	TEMP °C	SEAL #	CONDITION
REMARKS:										



RADIAN CORPORATION  
Attn: Philip Tang

Project UNION PACIFIC, HAYWARD  
Reported 02/12/93

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TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed Matrix
56060- 1	6-C1	02/11/93	02/11/93 Soil

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RESULTS OF ANALYSIS

Laboratory Number: 56060- 1

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Benzene:	ND<.003
Toluene:	ND<.003
Ethyl Benzene:	ND<.003
Xylenes:	ND<.003
Diesel:	ND<10

Concentration: mg/kg



C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

Page 2 of 2  
QA/QC INFORMATION  
SET: 56060

NA = ANALYSIS NOT REQUESTED  
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT  
mg/kg = parts per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:  
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:  
Minimum Quantitation Limit for Diesel in Soil: 10mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:  
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE  
Minimum Quantitation Limit in Soil: 0.003mg/kg

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Benzene:	84/85%	1	75-114
Toluene:	87/88%	1	78-114
Ethyl Benzene:	89/91%	2	76-120
Xylenes:	85/86%	1	71-117
Diesel:	103/107%	4	69-127

Richard Srna, Ph.D.

*[Signature]* (for) 2/12/93  
Laboratory Director

Chain of Custody Record

PROJECT <i>Radian Corporation</i>			NO. OF CONTAINERS <i>8015 TPH-diesel</i> <i>8020 DTEX</i>	ANALYSES				REMARKS <i>PLUG</i>	SAM ID NO. (for/lab use only)
SITE <i>Union Pacific Hayward</i>									
COLLECTED BY (Signature) <i>PKT Philip Tang Radian</i>									
FIELD SAMPLE I.D.	SAMPLE MATRIX	DATE/TIME							
<i>6-C1</i>	<i>Soil</i>	<i>Feb 11, 92 1315</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
REMARKS <i>24 Hour Turn Around</i>			RELINQUISHED BY: <i>Philip Tang Radian</i>				DATE <i>Feb 11 93</i>	TIME <i>1620</i>	
RECEIVED BY: <i>[Signature]</i>	DATE <i>Feb 11 93</i>	TIME <i>1620</i>	RELINQUISHED BY: <i>[Signature]</i>	DATE <i>Feb 11 93</i>	TIME <i>5:30</i>	RECEIVED BY: <i>Murray Pettit</i>	DATE <i>11/93</i>	TIME <i>1750</i>	
<i>J. MECUM AERO #753 J. MECUM</i>			LAB USE ONLY						
RECEIVED FOR LABORATORY BY:	DATE	TIME	AIRBILL NO.	OPENED BY:	DATE	TIME	TEMP °C	SEAL #	CONDITION
REMARKS									

Please initial:  
 Samples Stored in ice:   
 Appropriate containers:   
 Samples preserved: *NA*  
 Volatile components: *NA*  
 Comments: *[Signature]*



**APPENDIX B**

**ENVIRONMENTAL FATE WORKSHEETS FOR  
DIESEL-CONTAMIANATED SOIL LEFT IN PLACE**

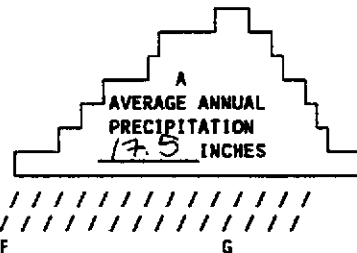
TABLE 2-2

GENERAL RISK APPRAISAL FOR PROTECTION OF WATER QUALITY: APPLICABILITY CHECKLIST			YES	NO
1. Is the site in a mountainous area? (shaded moist areas &/or areas with rocky subsurface conditions)				✓
2. Is the site in an area that could collect surface runoff or intercept water from a source other than the natural precipitation?				✓
3. Does the areal extent of soil contamination exceed 1000 feet'?	✓			
4. Do the concentrations of fuel constituents in any soil samples exceed the following amounts: benzene - 100 ppm, toluene - 80 ppm, xylene - 40 ppm, ethylbenzene - 40 ppm?				✓
5. Are there any records or evidence of man-made or natural objects which could provide a conduit for vertical migration of leachate?				✓
6. Do any boring or excavation logs show the presence of fractures, joints or faults that could act as a conduit for vertical migration of leachate?				✓
7. Do any boring logs show that contaminated soil could be within 5 ft. of highest ground water?				✓
8. Do any boring logs show the presence of a layer of material, 5 ft. thick or more, which is more than 75% sand and/or gravel?				✓

## Directions:

1. Boring logs taken during the general risk appraisal can be used to answer questions 5-8. In addition, analytical results of the soil samples taken during the general risk appraisal can be used to answer questions 3 and 4.
2. Lateral migration of constituents to problem areas should also be considered in questions 5-8.
3. The above checklist contains questions which are designed to identify sites with environmental conditions which could produce a greater risk to ground water than was modeled. The results of the general risk appraisal are most applicable if all of the questions on the checklist can be answered "no" with reasonable certainty. If any of the questions on the checklist cannot be answered "no", then the results of the general risk appraisal may be less valid.

benzene



\*columns E+F - the acceptable contamination level is based on a detection limit of 0.3 ppm for benzene in column F.

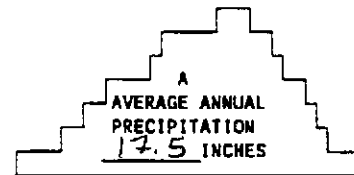
DISTANCE FROM SURFACE TO GROUND WATER	DISTANCE FROM SAMPLE TO SURFACE	=	DISTANCE FROM SAMPLE TO GROUND WATER	CUMULATIVE CONTAMINATION LEVELS C.C.L.	ACCEPTABLE CONTAMINATION LEVELS	CLEANUP? YES IF E > F NO IF E ≤ F
---------------------------------------	---------------------------------	---	--------------------------------------	--	---------------------------------	---

SOIL SURFACE						
45 ft	(WS1, WS2) 7 ft	SAMPLE 1 38 ft	SAMPLE 1 0 ppm	0(0.3) ppm*	yes	no
5 ft	(WS3, WS4) 12 ft	SAMPLE 2 33 ft	C.C.L. 1 + SAMPLE 2 0.003 ppm	0(0.3) ppm*	yes	no
5 ft	(BS, BS6) 15 ft	SAMPLE 3 30 ft	C.C.L. 2 + SAMPLE 3 0.008 ppm	0(0.03) ppm	yes	no
5 ft	(3-C1, 3-C2) 22 ft	SAMPLE 4 23 ft	C.C.L. 3 + SAMPLE 4 0 ppm	NA	yes	no
5 ft		SAMPLE 5	C.C.L. 4 + SAMPLE 5		yes	no
5 ft		SAMPLE 6	C.C.L. 5 + SAMPLE 6		yes	no
5 ft		SAMPLE 7	C.C.L. 6 + SAMPLE 7		yes	no
5 ft		SAMPLE 8	C.C.L. 7 + SAMPLE 8		yes	no
5 ft		SAMPLE 9	C.C.L. 8 + SAMPLE 9		yes	no
5 ft		SAMPLE 10	C.C.L. 9 + SAMPLE 10		yes	no
5 ft		SAMPLE 11	C.C.L. 10 + SAMPLE 11		yes	no
5 ft		SAMPLE 12	C.C.L. 11 + SAMPLE 12		yes	no

DERIVED - LAST CELL

\* NOTE: CONCENTRATIONS FOR ANY SINGLE SOIL SAMPLE CANNOT EXCEED 100ppm FOR BENZENE, 80ppm FOR TOLUENE, 40ppm FOR XYLENE AND 40ppm FOR ETHYLBENZENE IN ORDER TO BE USED WITH THE GENERAL RISK APPRAISAL. THE LAST SAMPLE TO BE INCLUDED IN THE CALCULATIONS FOR CUMULATIVE CONTAMINATION MUST BE AT OR ABOVE THE DETECTION LIMIT; DO NOT INCLUDE BOTTOM SAMPLES WHICH HAVE CONCENTRATIONS LESS THAN THE DETECTION LIMIT.

Toluene



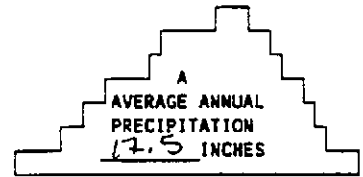
B	C	D	E	F	G
DISTANCE FROM SURFACE TO GROUND WATER	DISTANCE FROM SAMPLE TO SURFACE	DISTANCE FROM SAMPLE TO GROUND WATER	CUMULATIVE CONTAMINATION LEVELS C.C.L.	ACCEPTABLE CONTAMINATION LEVELS	CLEANUP? YES IF E > F NO IF E ≤ F
45 ft	(NS1, NS2) 7 ft	SAMPLE 1 38 ft	SAMPLE 1 0 ppm = C.C.L. 1 0	60 ppm	yes <input checked="" type="checkbox"/> no
	5ft ↓ (NS3, NS4) 12 ft	SAMPLE 2 32 ft	C.C.L. 1 + SAMPLE 2 0 ppm = C.C.L. 2 0	30 ppm	yes <input checked="" type="checkbox"/> no
	5ft ↓ (BS, B6) 15 ft	SAMPLE 3 30 ft	C.C.L. 2 + SAMPLE 3 0.20 ppm = C.C.L. 3 0.20 ppm	30 ppm	yes <input checked="" type="checkbox"/> no
	5ft ↓ (3-C1, 3-C2) 22 ft	SAMPLE 4 23 ft	C.C.L. 3 + SAMPLE 4 0 ppm = C.C.L. 4 NA	NA	yes <input checked="" type="checkbox"/> no
	5ft ↓	SAMPLE 5 ___ ft	C.C.L. 4 + SAMPLE 5 ___ ppm = C.C.L. 5 ___		yes ___ no
	5ft ↓	SAMPLE 6 ___ ft	C.C.L. 5 + SAMPLE 6 ___ ppm = C.C.L. 6 ___		yes ___ no
	5ft ↓	SAMPLE 7 ___ ft	C.C.L. 6 + SAMPLE 7 ___ ppm = C.C.L. 7 ___		yes ___ no
	5ft ↓	SAMPLE 8 ___ ft	C.C.L. 7 + SAMPLE 8 ___ ppm = C.C.L. 8 ___		yes ___ no
	5ft ↓	SAMPLE 9 ___ ft	C.C.L. 8 + SAMPLE 9 ___ ppm = C.C.L. 9 ___		yes ___ no
	5ft ↓	SAMPLE 10 ___ ft	C.C.L. 9 + SAMPLE 10 ___ ppm = C.C.L. 10 ___		yes ___ no
	5ft ↓	SAMPLE 11 ___ ft	C.C.L. 10 + SAMPLE 11 ___ ppm = C.C.L. 11 ___		yes ___ no
	5ft ↓	SAMPLE 12 ___ ft	C.C.L. 11 + SAMPLE 12 ___ ppm = C.C.L. 12 ___		yes ___ no

~~GROUNDWATER~~

ft = feet ppm = parts per million

\* NOTE: CONCENTRATIONS FOR ANY SINGLE SOIL SAMPLE CANNOT EXCEED 100ppm FOR BENZENE, 80ppm FOR TOLUENE, 40ppm FOR XYLENE AND 40ppm FOR ETHYLBENZENE IN ORDER TO BE USED WITH THE GENERAL RISK APPRAISAL. THE LAST SAMPLE TO BE INCLUDED IN THE CALCULATIONS FOR CUMULATIVE CONTAMINATION MUST BE AT OR ABOVE THE DETECTION LIMIT; DO NOT INCLUDE BOTTOM SAMPLES WHICH HAVE CONCENTRATIONS LESS THAN THE DETECTION LIMIT.

*Ethyl benzene*



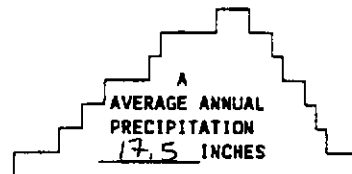
B	C	D	E	F	G
DISTANCE FROM SURFACE TO GROUND WATER	DISTANCE FROM SAMPLE TO SURFACE	DISTANCE FROM SAMPLE TO GROUND WATER	CUMULATIVE CONTAMINATION LEVELS C.C.L.	ACCEPTABLE CONTAMINATION LEVELS	CLEANUP? YES IF E > F NO IF E ≤ F
45 ft	(NS1, NS2) 7 ft	SAMPLE 1 38 ft	SAMPLE 1 0 ppm = C.C.L. 1 0	100 ppm	yes <input checked="" type="checkbox"/> no
	5ft   (NS3, NS4) 12 ft	SAMPLE 2 33 ft	C.C.L. 1 + SAMPLE 2 0 ppm = C.C.L. 2 0	100 ppm	yes <input checked="" type="checkbox"/> no
	5ft   (B5, B6) 15 ft	SAMPLE 3 30 ft	C.C.L. 2 + SAMPLE 3 30.52 ppm = C.C.L. 3 0.52 ppm	100 ppm	yes <input checked="" type="checkbox"/> no
	5ft   (3-C1, 3-C2) 22 ft	SAMPLE 4 23 ft	C.C.L. 3 + SAMPLE 4 0 ppm = C.C.L. 4 NA	NA	yes <input checked="" type="checkbox"/> no
	5ft	SAMPLE 5 _____ ft	C.C.L. 4 + SAMPLE 5 _____ ppm = C.C.L. 5 _____	_____	yes _____ no
	5ft	SAMPLE 6 _____ ft	C.C.L. 5 + SAMPLE 6 _____ ppm = C.C.L. 6 _____	_____	yes _____ no
	5ft	SAMPLE 7 _____ ft	C.C.L. 6 + SAMPLE 7 _____ ppm = C.C.L. 7 _____	_____	yes _____ no
	5ft	SAMPLE 8 _____ ft	C.C.L. 7 + SAMPLE 8 _____ ppm = C.C.L. 8 _____	_____	yes _____ no
	5ft	SAMPLE 9 _____ ft	C.C.L. 8 + SAMPLE 9 _____ ppm = C.C.L. 9 _____	_____	yes _____ no
	5ft	SAMPLE 10 _____ ft	C.C.L. 9 + SAMPLE 10 _____ ppm = C.C.L. 10 _____	_____	yes _____ no
	5ft	SAMPLE 11 _____ ft	C.C.L. 10 + SAMPLE 11 _____ ppm = C.C.L. 11 _____	_____	yes _____ no
	5ft	SAMPLE 12 _____ ft	C.C.L. 11 + SAMPLE 12 _____ ppm = C.C.L. 12 _____	_____	yes _____ no

GROUND WATER

ft = feet ppm = parts per million

\* NOTE: CONCENTRATIONS FOR ANY SINGLE SOIL SAMPLE CANNOT EXCEED 100ppm FOR BENZENE, 80ppm FOR TOLUENE, 40ppm FOR XYLENE AND 40ppm FOR ETHYLBENZENE IN ORDER TO BE USED WITH THE GENERAL RISK APPRAISAL. THE LAST SAMPLE TO BE INCLUDED IN THE CALCULATIONS FOR CUMULATIVE CONTAMINATION MUST BE AT OR ABOVE THE DETECTION LIMIT; DO NOT INCLUDE BOTTOM SAMPLES WHICH HAVE CONCENTRATIONS LESS THAN THE DETECTION LIMIT.

*Xylenes*



B	C	D	E	F	G
DISTANCE FROM SURFACE TO GROUND WATER	DISTANCE FROM SAMPLE TO SURFACE	DISTANCE FROM SAMPLE TO GROUND WATER	CUMULATIVE CONTAMINATION LEVELS C.C.L.	ACCEPTABLE CONTAMINATION LEVELS	CLEANUP? YES IF E > F NO IF E ≤ F
			SOIL SURFACE		
95 ft	(NS1, NS2) 7 ft	SAMPLE 1 38 ft	SAMPLE 1 0.95 ppm = C.C.L. 10.95 ppm	100 ppm	yes <input checked="" type="checkbox"/> no
5ft	(NS3, NS4) 12 ft	SAMPLE 2 33 ft	C.C.L. 1 + SAMPLE 2 2.071 ppm = C.C.L. 27.921 ppm	90 ppm	yes <input checked="" type="checkbox"/> no
5ft	(BS, B6) 15 ft	SAMPLE 3 30 ft	C.C.L. 2 + SAMPLE 3 3.7 ppm = C.C.L. 34.221 ppm	90 ppm	yes <input checked="" type="checkbox"/> no
5ft	(3-C1, 3-C2) 22 ft	SAMPLE 4 23 ft	C.C.L. 3 + SAMPLE 4 0 ppm = C.C.L. 4 NA	NA	yes <input checked="" type="checkbox"/> no
5ft		SAMPLE 5 _____ ft	C.C.L. 4 + SAMPLE 5 _____ ppm = C.C.L. 5 _____		yes _____ no
5ft		SAMPLE 6 _____ ft	C.C.L. 5 + SAMPLE 6 _____ ppm = C.C.L. 6 _____		yes _____ no
5ft		SAMPLE 7 _____ ft	C.C.L. 6 + SAMPLE 7 _____ ppm = C.C.L. 7 _____		yes _____ no
5ft		SAMPLE 8 _____ ft	C.C.L. 7 + SAMPLE 8 _____ ppm = C.C.L. 8 _____		yes _____ no
5ft		SAMPLE 9 _____ ft	C.C.L. 8 + SAMPLE 9 _____ ppm = C.C.L. 9 _____		yes _____ no
5ft		SAMPLE 10 _____ ft	C.C.L. 9 + SAMPLE 10 _____ ppm = C.C.L. 10 _____		yes _____ no
5ft		SAMPLE 11 _____ ft	C.C.L. 10 + SAMPLE 11 _____ ppm = C.C.L. 11 _____		yes _____ no
5ft		SAMPLE 12 _____ ft	C.C.L. 11 + SAMPLE 12 _____ ppm = C.C.L. 12 _____		yes _____ no

CONCLUDED - LAST CELL

ft = feet ppm = parts per million

\* NOTE: CONCENTRATIONS FOR ANY SINGLE SOIL SAMPLE CANNOT EXCEED 100ppm FOR BENZENE, 80ppm FOR TOLUENE, 40ppm FOR XYLENE AND 40ppm FOR ETHYLBENZENE IN ORDER TO BE USED WITH THE GENERAL RISK APPRAISAL. THE LAST SAMPLE TO BE INCLUDED IN THE CALCULATIONS FOR CUMULATIVE CONTAMINATION MUST BE AT OR ABOVE THE DETECTION LIMIT; DO NOT INCLUDE BOTTOM SAMPLES WHICH HAVE CONCENTRATIONS LESS THAN THE DETECTION LIMIT.