NWRO

Site Assessment

Rosario Resort
One Rosario Way
Eastsound, WA

Prepared For
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Prepared By
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I. Introduction

On March 27 and 28 and April 2, 1991, a site assessment for five underground storage tanks (UST) was made at Rosario Resort, One Rosario Way Eastsound, WA. The tanks were being removed due to their age and to replace the tanks with a single compartmented 10,000 gallon tank. No complaints of gasoline leakage were made prior to the removal process. According to available information, four tanks were used for gasoline and a one tank was used for diesel. The tanks were buried in three pits (see site map and Figure 1). According to the hotel manager, the station was used just prior to the time the tanks were removed. There was one 500 gallon, one 1000 gallon, two 2000 gallon and one 6000 gallon tanks. The age of the tanks has been estimated to be 20-30 years old. The tanks were located between the Discovery House Convention Center and the building that houses the hotel employees. The tank closest to Cascade Bay was within 40ft of the high tide line. No other tanks are known to have been on the property. The soil type in this area consisted of a histosol with mixed shell, sand and gravel. The condition of the tank site along with supporting analytical data is described.

II. Field Observations and Chemical Analysis

Pit 1

This pit, closest to the service island, contained tanks 4 and 5 (Figures 2 through 5). Gasoline fumes were present in the pit when these tanks were removed from the ground. Tank 5 was covered with iron scales along the bottom half of the tank. No holes were observed though a complete search was not concluded due to the extent of the scale covering. Tank pitting was observed were the scale was removed. Soil samples from the north wall and from beneath the tank were collected.

Tank 4 was apparently encased in tar/creosote as a protective measure before it was placed in the ground. This was evident from the collection of the paper and tar/creosote covering on the underside of the tank (Figure 4). While no holes were detected in tank 4 a pocket of heavily gasoline contaminated soil was found under this tank. Approximately 10 yards of this contaminated soil was removed from the pit after which a bottom soil sample and a pit water sample were taken. The analytical results from Pit 1 are presented in Table 1. The initial results indicated that while the water was grossly contaminated, the soil samples were below the maximum contamination level (MCL) set by the Washington State Department of Ecology (WSDOE) both total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylenes (BTEX). Subsequent excavation of pit 1 disclosed another pocket of gas laden soil under Tank 4. This soil was excavated to a depth of 12ft with no further contamination observed. Additional samples were collected on April 2, 1991, from below tank 4 and along the west side of the pit. The results indicate that the pit was sufficiently free of contamination. The lack of protective covering on the upper two-thirds of the tank indicates that the tank was likely overfilled on numerous occasions thus washing the tar/creosote off the tank.

The pit water was clear and without petroleum films by the April 2nd visit. The ground water depth in this area is directly related to the tidal action. The movement of the tide helped to breakup and wash out the petroleum contaminants from the open pit. In addition to the effect of the tide natural groundwater flow comes from off the hill on the north side of the pit. Now that the source of contamination has been removed (the old tanks and the contaminated soil) the pit water will be cleansed by the forces of the water movement described above. Periodic water testing in the pit area should help to determine if the site is indeed free of contamination.

Pit 2

This pit held a single 2000 gallon gasoline tank. This tank was similar in appearance to tank 5 when it was removed from the ground (Figures 6 and 7). No holes were observed in the tank, though as noted before, the tank bottom was covered with scales. The pit appeared free of gas with no odors being present in the soil samples from beneath the tank and from the north and south pit walls. All samples were collected from the 7ft to 8ft depth. Analytical results confirmed that the soil surrounding Tank 3 was below the MCL for both (TPH) and (BTEX) (Table 1).

Pit 3

This pit was located closest to the shoreline. Tanks 1 and 2, 2000 gallon diesel and 6000 gas, respectively, were situated in this pit with tank 1 being furthest south (Figure 8 through 11). Gas contaminated soil was observed beneath tank 1 and diesel contaminated soil was seen beneath tank 2. The area in pit 3 was excavated until the contamination was no longer observed. Soil samples from beneath both tanks and from the north and south walls were collected at depths below the bottom of the tank. Additionally, a pit water sample was taken from the pit. Lab results indicated that the soil beneath the diesel tank was 560 ppm TPH (above the 200ppm MCL for diesel in soil). The other soil samples were below the MCL for both TPH and BTEX. The pit water contained benzene, toluene and xylene at levels above the MCL for those components in water while the TPH was just slightly below the MCL (Table 1). Further excavation below tank 2 disclosed a pocket diesel that extended toward pit 2. After the excavation was completed samples were collected from beneath tanks 2 and 3. The lab data indicated that the soils were sufficiently free of petroleum contamination.

In all, approximately 300 cubic yards of soil was removed from the combined pits. This soil was a mixture of clean and contaminated materials and therefore does not accurately estimate the amount of contamination. A view of pits 1 and 3 is presented in Figures 12 and 13, respectively.

The same argument concerning the disposition of contaminated water in pit 1 described above applies to pit 3. Periodic water testing should also be conducted in the pit 3 area.

III. CONCLUSION AND RECOMMENDATIONS

One diesel and four gasoline UST's were removed from the service station area at Rosario Resort on March 27 and 28, 1991. Contaminated soil was discovered in two of the three tank containing pits. The dirty soil was removed using a track hoe. Laboratory tests of soil samples collected from beneath the tanks and pit walls indicated that the ground surrounding the tanks was satisfactorily free of petroleum contamination. Pit waters collected on March 27, 1991, were greater than allowable. Although the contaminated soil was removed residual amounts of gas and diesel may still be present in the pit water until sufficient amounts of clean water, either by tidal action or ground water flow, have dissipated the contaminates. It is therefore recommended that periodic sampling, via the vent tubes located in the former pits, and testing of the water be used to establish the cleanliness of the soil. Such testing should be performed quarterly until two consecutive tests are below the MCL. It is anticipated that such testing would not extend for a period of more than one year.

LIMITATIONS

This report has been prepared for the specific application to this project and for the exclusive use of Geiser Land Company and their representatives. The conclusions are based on the site conditions observed, and analytical results. The conclusions and recommendations are professional opinions derived in accordance with current standards of practice within the scope of our services and within the budget and time constraints. No warranty is expressed or implied.

Should there be any questions or if we can be of further service please feel free to call.

Respectfully submitted,

L. J. Henderson, Ph.D., CPSS

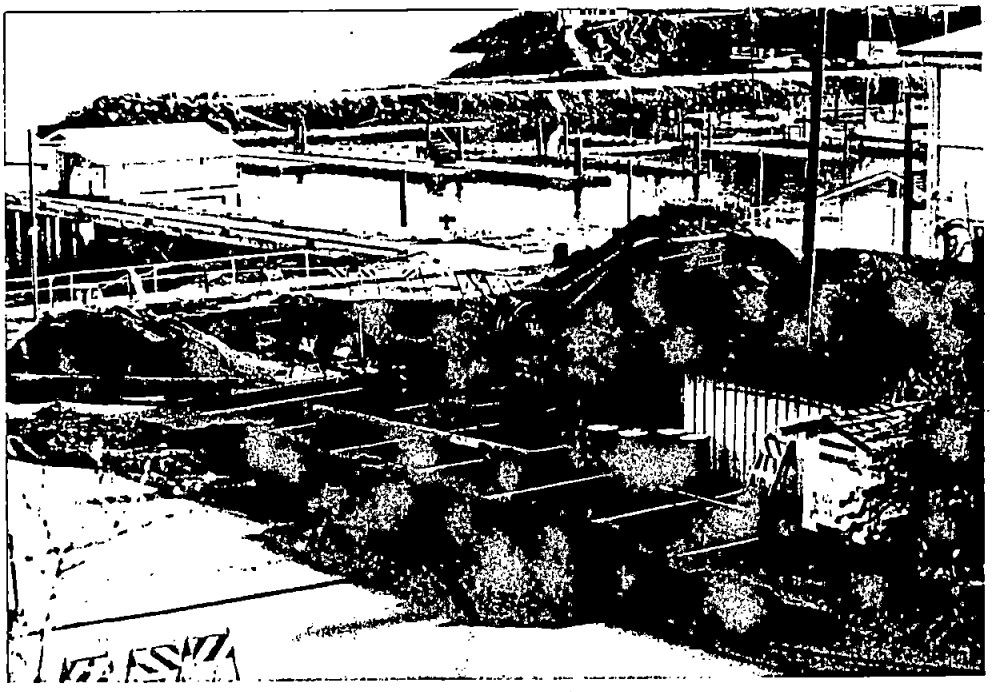

Figure 1. Site location. Rosario Resort Orcas Island, WA. Looking Southwest.

Figure 2. Tank 5. Before Removal. Looking East.

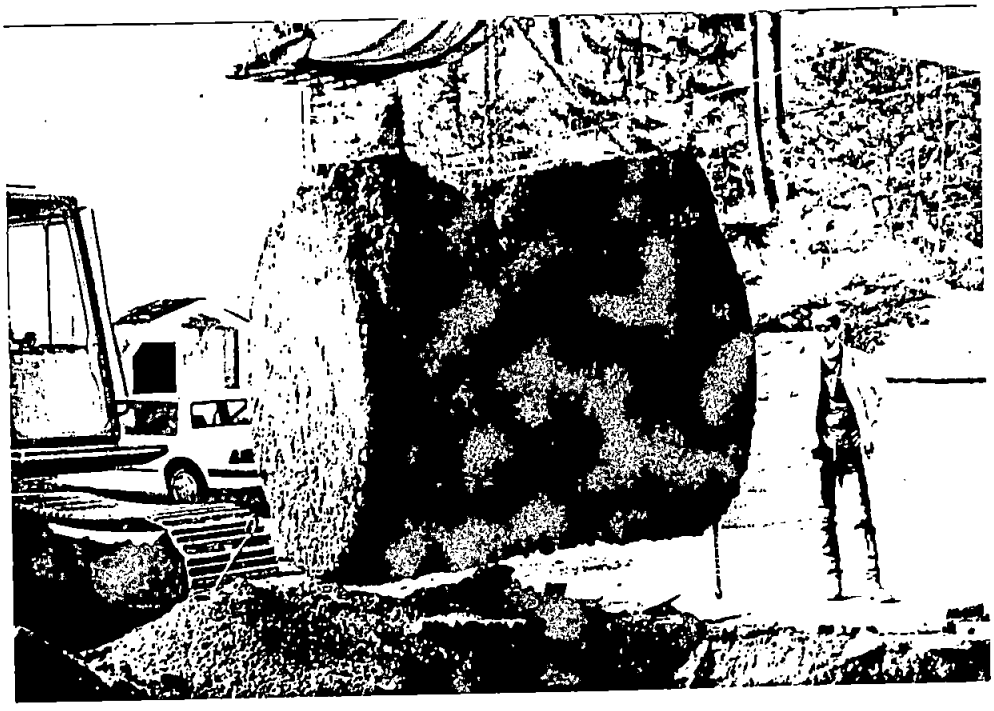

Figure 3. Tank 5. After Removal.

Figure 4. Tank 4. Before Removal. Looking East.

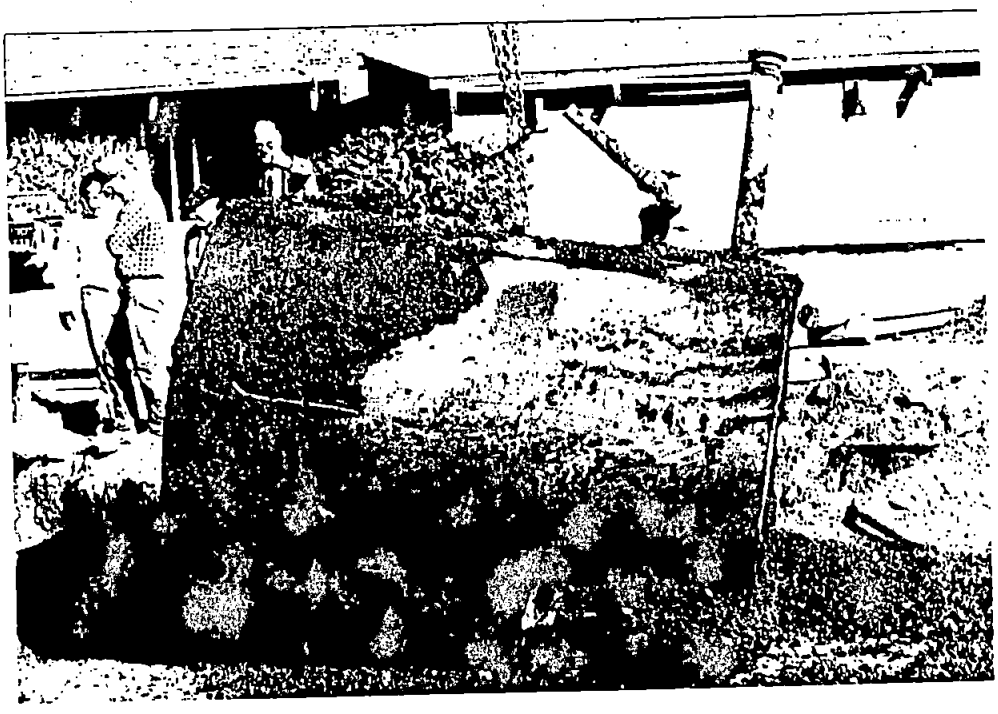

Figure 5. Tank 4. After Removal.

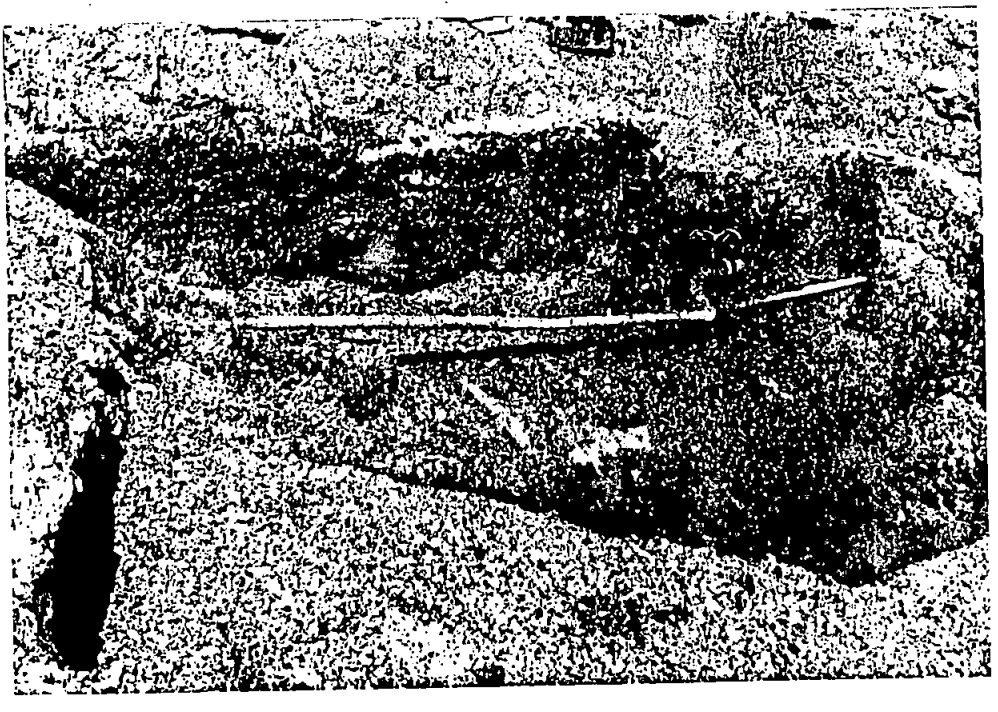

Figure 6. Tank 3. Before Removal. Looking East.

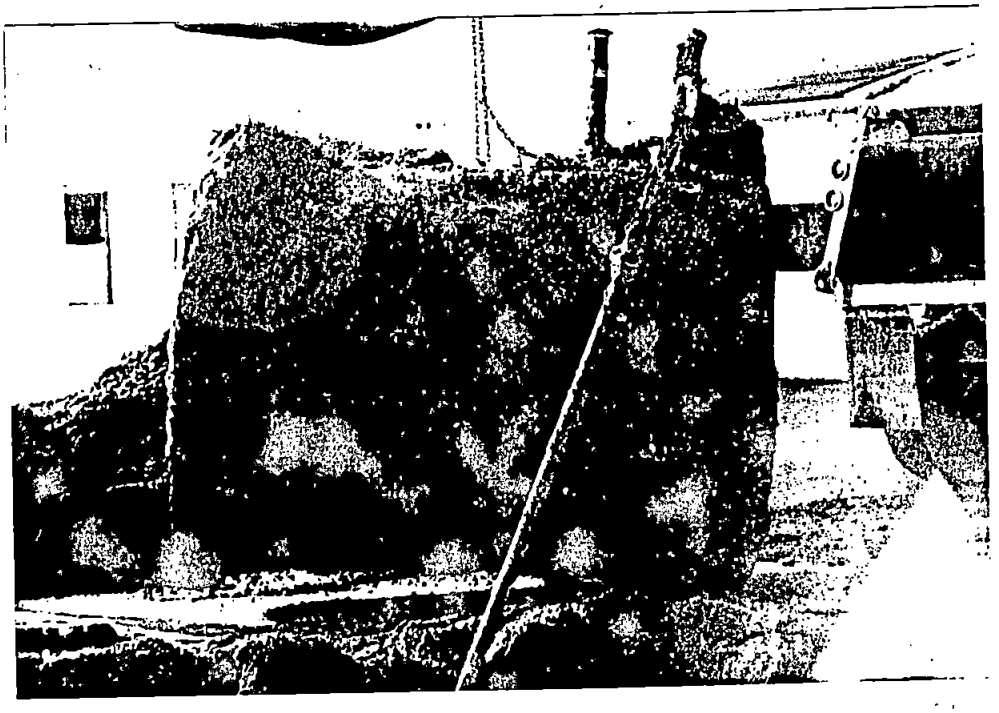

Figure 7. Tank 3. After Removal.

Figure 8. Tank 2. Before Removal. Looking East.

Figure 9. Tank 2. After Removal.

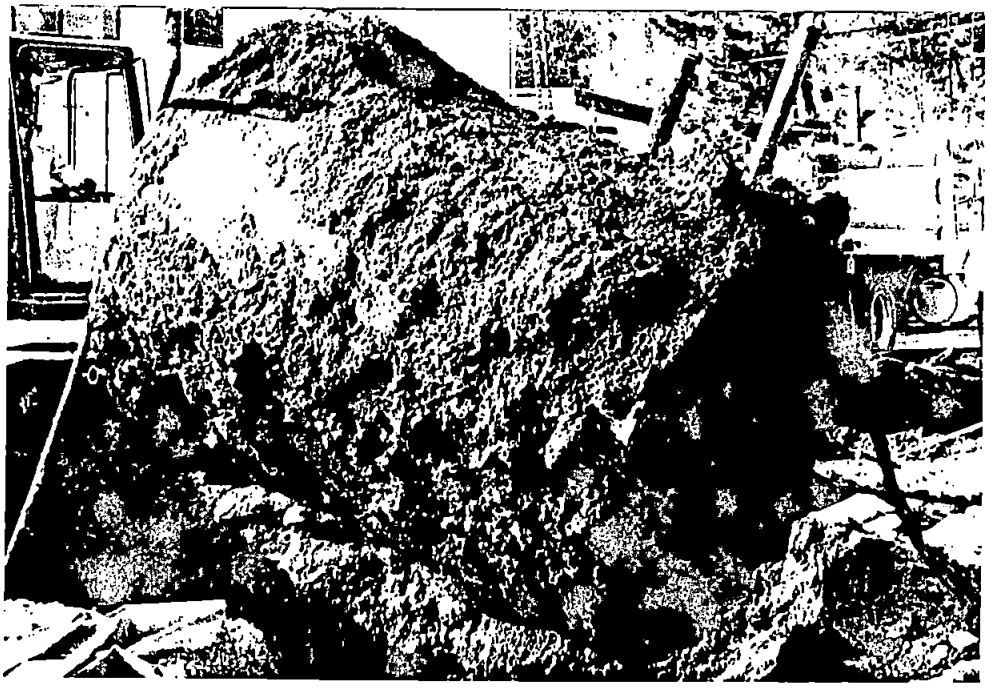

Figure 10. Tank 1. Before Removal. Looking East.

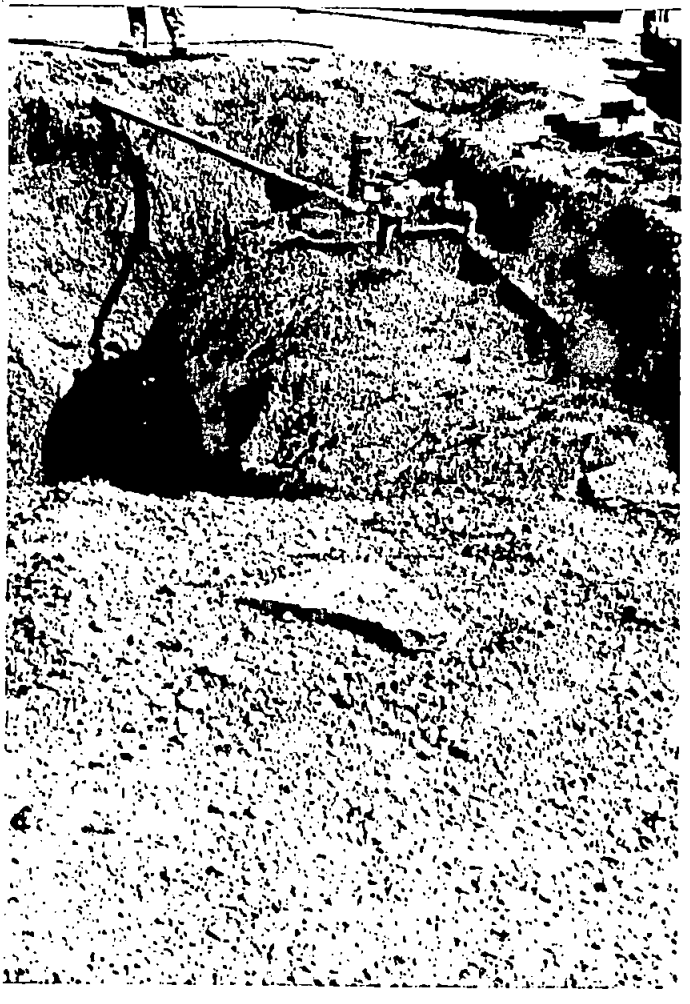

Figure 11. Tank 1. After Removal.

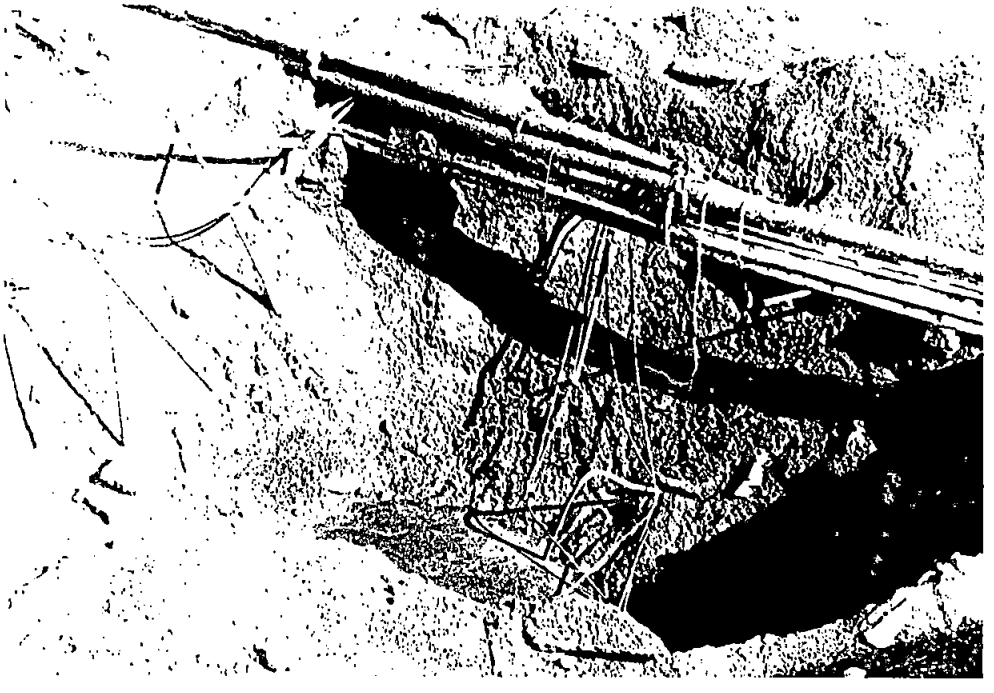

Figure 12. Pit 1 after excavation. Looking Southeast.

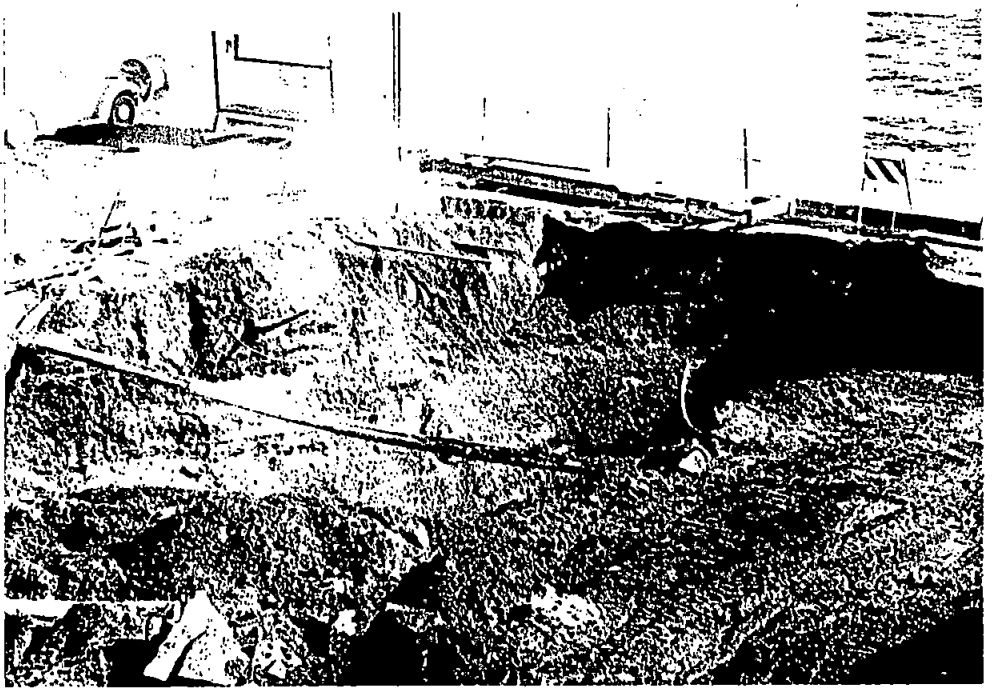

Figure 13. Pit 3 after excavation. Looking Southeast.

Table 1. Analytical data from Rosario Resort Undergreound Storage Tank Removal. Samples Collected on March 26 and April 2, 1991.

		ppm	ppb			
Lab Number	Description	TPH (ppm)	Benzene	Toluene	Ethlybenzene	Xylenes
March 26, 1991						
41-91-00302.0S	Pit 1 North Wall	3.5-D[1]	<5	<5	<5	<5
41-91-00300.0S	Pit 1 Tank 4 Beneath tank 7ft	4.9-G[2]	<50	<50	<50	193
41-91-00301.0S	Pit 1 Tank 5 Beneath tank 6ft	<0.05	<5	<5	<5	<5
41-91-00310.0W	Pit 1 Water	3923-G	860000	128000	132000	260000
41-91-00305.0S	Pit 2 North Wall	<0.05	<5	<5	<5	<5
41-91-00304.0S	Pit 2 South Wall	0.1-G	<5	<5	<5	18
41-91-00303.0S	Pit 2 Tank 3 Beneath tank	2.1-G	<5	<5	<5	18
41-91-00309.0S	Pit 3 North Wall	<0.05	<5	<5	<5	<5
41-91-00308.0S	Pit 3 South Wall	0.3-G	<50	<50	<50	<50
41-91-00307.0S	Pit 3 Tank 1 Beneath tank	25.7-D	<5	<5	<5	<5
41-91-00306.0S	Pit 3 Tank 2 Beneath tank	560-D	<50	<50	<50	<50
41-91-00311.0W	Pit 3 Water	0.8-G	348	54	4	43
April 2, 1991						
41-91-00.328.0S	Pit 1 Tank 4 Beneath tank	7.3-D 2.8-G	<5	<5	<5	23
41-91-00.329.0S	Pit 1 West side; bottom were contaminated soil was remove	1.4-D	<5	<5	<5	<5
41-91-00.327.0S	Pit 3 (formally Pit 2) Tank 3 Beneath tank	0.6-D	<5	<5	<5	<5
41-91-00.326.0S	Pit 3 Tank 2 Beneath tank	<0.5	<5	<5	<5	<5
	Maximum Contamination Leve (Soil/Water)	100/1	500/5	20000/20	40000/40	20000/20

[1] D denotes diesel components.

[2] G denotes gasoline components

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41

Client: APS Services, Inc.
3515 South 154th
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Attn: Mr. Ken Baulaurier

Date: 4/3/91
Reference: 91-0059

Project: Rosario Resort

Data Report

Lab Number	Sample Description	ug/gm TPH	ng/gm Benzene	Toluene	Ethlybenzene	Xylenes
41-91-00300.0S	Pit 1 Tank 4 Beneath tank 7ft	4.9-G	<50	<50	<50	193
41-91-00301.0S	Pit 1 Tank 5 Beneath tank 6ft	<0.05	<5	<5	<5	<5
41-91-00302.0S	Pit 1 North Wall	3.5-D	<5	<5	<5	<5
41-91-00303.0S	Pit 2 Tank 3 Beneath tank	2.1-G	<5	<5	<5	18
41-91-00304.0S	Pit 2 South Wall	0.1-G	<5	<5	<5	18
41-91-00305.0S	Pit 2 North Wall	<0.05	<5	<5	<5	<5
41-91-00306.0S	Pit 3 Tank 2 Beneath tank	560-D	<50	<50	<50	<50
41-91-00307.0S	Pit 3 Tank 1 Beneath tank	25.7-D	<5	<5	<5	<5
41-91-00308.0S	Pit 3 South Wall	0.3-G	<50	<50	<50	<50
41-91-00309.0S	Pit 3 North Wall	<0.05	<5	<5	<5	<5
41-91-00310.0W	Pit 1 Water	3923-G	860000	128000	132000	260000
41-91-00311.0W	Pit 3 Water	0.8-G	348	54	4.2	42.9
	Methods:					
	BTEX/TPH SW846 8020/8015mod.					
	G- Gasoline D-Diesel	Soil/Water	Soil/Water	Soil/Water	Soil/Water	Soil/Water
	Method Reporting Limit (MRL)	0.05/0.01	5/1	5/1	5/1	5/1
	Maximum Contamination Levels	100/1	500/5	20000/20	40000/40	20000/20

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Attn: Mr. Ken Baulaurier

Date: 4/3/91
Reference: 91-0067

Project: Rosario Resort

Data Report

Lab Number	Sample Description	ug/gm TPH	ng/gm Benzene	Toluene	Ethlybenzene	Xylenes
41-91-00326.0S	Pit 3 Tank 2; beneath tank	<0.05	<5	<5	<5	<5
41-91-00327.0S	Pit 2 side Tank 3; beneath tank	0.6-D	<5	<5	<5	<5
41-91-00328.0S	Pit 1 Tank 4; beneath tank	7.3-D	<5	<5	<5	23
		2.8-G	<5	<5	<5	<5
41-91-00329.0S	Pit 1 West side bottom; contaminated soil	1.4-D	<5	<5	<5	<5
	Methods: BTEX/TPH SW846 8020/8015mod. G- Gasoline D-Diesel	Soil/Water	Soil/Water	Soil/Water	Soil/Water	Soil/Water
	Method Reporting Limit (MRL)	0.05/0.01	5/1	5/1	5/1	5/1
	Maximum Contamination Levels	100/1	500/5	20000/20	40000/40	20000/20

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CESS ROAD

SITE MAP - ROSARIO RESORT