ENVIRONMENTAL ASSESSMENT SUMMARY
AND
REMEDIAL ACTION PLAN
CEMENT RETURNS AREA
NEWPORT BANNING RANCH
ORANGE COUNTY, CALIFORNIA

Prepared for:

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1. INTRODUCTION

1.1 Report and Project Objectives

A Clean-up and Abatement Order (CAO No. 01-77) was issued by the Regional Water Quality Control Board, Santa Ana Region (RWQCB), to the owner partnership of the Newport Banning Ranch (NBR) in July 2001. One of the issues addressed within the CAO was the discharge of oily materials within what is commonly referred to as the Cement Returns Area. The Cement Returns Area is adjacent to the Main Site Tank Farm at the NBR in Orange County, California.

The objective of this report is to summarize the results of the investigation activities conducted at the Cement Returns Area, both before and after the issuance of CAO, and present the Remedial Action Plan (RAP) for the area. The area investigation was conducted as part of a larger environmental assessment performed at the NBR in May through August 2001. Subsequent investigation of the Cement Returns Area was conducted in November 2001. The results of the area investigation were initially summarized in the Environmental Assessment document (EA document) [GeoSyntec, 2001a] that was submitted to the RWQCB. Whereas the EA document provided data on the entire site, this report provides a concise summary of results and remedial plans specifically focused on the Cement Returns Area. This report has been prepared by GeoSyntec Consultants (GeoSyntec) on behalf of the site owners and the site operator, West Newport Oil Company (WNOC).

1.2 Background and Project Overview

The NBR site covers approximately 400 acres and is located east of the mouth of the Santa Ana River near the Huntington Beach – Newport Beach city boundary in Orange County, California (Figure 1-1). The NBR is currently operated as a crude oil and natural gas production facility by the WNOC. Oil and natural gas production operations are conducted at the NBR as certain areas are being abandoned.

The site assessment history is described in the Summary Report [GeoSyntec, 2001b], as well as the EA document [GeoSyntec, 2001a]. These reports are incorporated by reference. Although certain information is included in this document for background, details within these documents are not repeated here.

Previous environmental assessments conducted at the site have identified areas of the NBR that may require further investigation and/or remedial action. These areas were designated as areas of Potential Environmental Concern (PECs) due to potential soil or groundwater quality impacts at the site. The Cement Returns Area is located adjacent to Main Site Tank Farm and was included in the assessments performed at the Tank Farm. The Cement Returns Area was used by site personnel on a limited basis as a temporary depository for spoils from the oil well abandonment process. During the abandonment process, cement slurry is

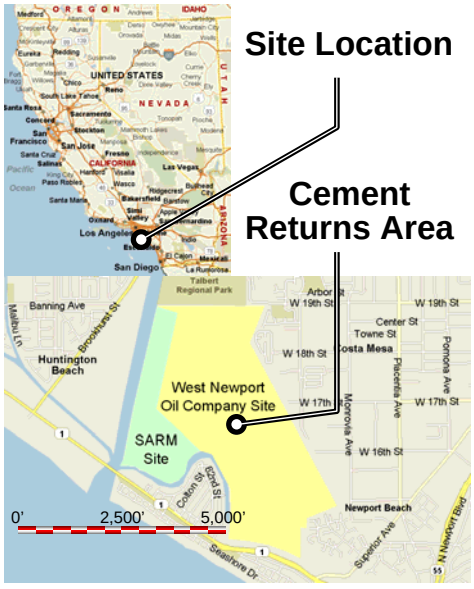


Figure 1-1: Site Map

pumped to the bottom of an oil well. The slurry in turn displaces materials collected in the inactive oil well casing, specifically geologic formation materials, water, and oil residue. As this material emerges at the surface of the oil well, it is collected and transported to separation facilities at the site. Near the end of the slurry process, a "transition mix" of cement slurry mixed with geologic formation materials, water, and oil residue emerges at the surface. As wells were abandoned, this transition mix (or cement returns) was collected and transported to the base of the upland bluffs for temporary handling prior to final disposal.

To evaluate the Cement Returns Area, data on soil quality were collected to:

- characterize the nature and extent of impacts to soil within the Cement Returns Area;
- evaluate the volume of impacted material; and
- develop a remedial action approach.

1.3 Report Organization

The information collected during the investigation of the Cement Returns Area and the area RAP are presented in this report. The remainder of this report is organized into the following sections:

- Section 2 – Assessment presents the fieldwork methods that were used during the field activities to investigate soil quality at the Cement Returns Area, and the soil quality data and impacted volume evaluation.

- Section 3 – Remedial Action Plan presents the remedial alternative selected to address the impacts in the Cement Returns Area, and the action levels that will be used during implementation.

Tables and figures are included in the body of the text and at the end of the report.

2. ASSESSMENT

2.1 Summary

The CAO identified an area to the east of the Main Site Tank Farm where oily materials were observed being placed. Photographs of these areas were presented in the CAO administrative record (pp. 0082-0089) [RWQCB, 2001]. The area is known as the Cement Returns Area, located at the base of eroding faces of the Upland zone bluffs at the NBR. The RWQCB performed an investigation of the Cement Returns Area in January 1999, consisting of ground penetrating radar evaluation and limited sampling using a hydraulic push coring/sampling device (Geoprobe). The RWQCB Geoprobe sampling points are shown on Figure 2-1. The RWQCB results are included in the Discussion of Findings, Section 2.3.

A phased approach was applied to assess the nature and extent of impacted soil quality at the Cement Returns Area. The phased approach consisted of:

- Test pitting and sampling at the area boundary;
- Follow-up test pitting/trenching within cement returns; and
- Sample analysis.

The test pitting/trenching activities identified the boundaries of the oil-impacted material (horizontally, and with depth). Sample analysis confirmed the presence of crude oil impacts. The total volume of the impacted material is estimated to be approximately 750 cubic yards (yd^3). The field procedures and results are described in the following sections.

2.2 Field Procedures

Several previous site assessments/investigations have been performed at the NBR since 1986. Similar to the rest of the NBR, to develop the sampling and analysis program (SAP) for the Cement Returns Area, GeoSyntec reviewed previous site investigation environmental data, discussed the temporary disposal operations with on-site personnel, and identified the likely areas of potential environmental concern within the area. The area of investigation, including the RWQCB sampling locations, is shown in Figure 2-1. Photographs of the test pitting/trenching operation and trench and sample point locations are also shown on this figure.

Item	SAP
Test Pits/Trenches	15
Samples	10

Table 2-1: SAP Field Work As-Implemented

The area-specific SAP consisted of performing visual observations, collecting samples based on the visual observations, and a chemical evaluation for the presence of various chemical constituents. A summary of the SAP, as implemented during this site investigation, is provided in Table 2-1.

The chemical evaluation program was designed to provide information on the nature and extent of the impacts. Table 2-2 presents a breakdown of the analytical suites into each of the analytical components.

This approach was designed to:

- identify visually impacted soils (e.g., stained soils), and evaluate the extent of impacts by visual means and by sample collection and analysis in areas bounding the visually-impacted materials (e.g., testing in apparent clean boundary areas);

- characterize the nature of the primary site containment, crude oil, by selectively testing impacted soil samples for carbon chain components; and

- characterize the nature of additional potential contaminants (e.g., metals and polycyclic aromatic hydrocarbons [PAHs]).

Soil sampling was initiated in the Cement Returns Area in July 2001 with follow-up sampling in November 2001. Soil samples were collected by excavating test pits with a backhoe. Test pit soil sampling was conducted using a hand trowel or the backhoe bucket based on site conditions and test pit depths. The boundaries of observed impacted areas were recorded and were considered in conjunction with the laboratory chemical data when estimating impacted volumes of materials. Soil samples were sent under Chain-of-Custody procedures to the laboratory, and the test pits were backfilled with excavated material.

Each area identified was marked with flags and assigned a visual observation number. Visual observations were numbered sequentially according to PEC number, for example 01-001 (PEC # – observation #). These observations served to focus soil sampling activities to specific areas within the site. Test pit/trench logs were prepared for the trenches through the impacted Cement Returns Area (trenches 02-068 & 02-069); logs for these trenches (in gINT format) are presented in Appendix A. No biologically-sensitive areas were identified within the Cement Returns Area.

2.3 Discussion of Findings

In the Cement Returns Area, the test pits/trenches were excavated to depths of 2 ft to 12 ft below ground surface (bgs). Test pit depths were determined based on visual and olfactory observations and PID readings of impacted material collected as the test pits were excavated. Several test pits were excavated in the area to provide lateral delineation of impacted materials. Oil-impacted soil was encountered in four of the 15 test pits/trenches excavated within the Cement Returns Area and identifies two discrete impacted areas. This is consistent with operator knowledge of activities performed in this area. Test pit logs are included in Appendix A. Cross-sections for Trenches 02-068 and 02-069 are presented in Figure 2-2.

Samples were analyzed based on the expected constituents of concern within the area. Table 2-1 includes the total number of soil samples collected within the Cement Returns Area. Table 2-2 identifies the types of testing performed on soil samples and the rational for their use. Table 2-3 presents the results of the Total Recoverable Petroleum Hydrocarbon (TRPH) and carbon-chain analysis; Table 2-4 the results of metals analysis and Table 2-5 the results of PAH analysis. Laboratory analytical results and chain-of-custody forms are located in Appendix B. Hydrocarbon analyses provided by the RWQCB for Geoprobe Borings GP-3 through GP-7 and GP-9 are included in Table 2-3. For naturally occurring elements (i.e., metals), average NBR site background soil concentrations are provided for comparison. Background soil samples provide an

indication of the quality of the soil in a relatively undisturbed area of the site that has not been used in site operations or directly affected by urban run-off flow onto the property.

The type of hydrocarbon impacts detected were similar in characteristics to the weathered crude oil that would be expected in an oil production field. A summary of the important findings of the soil evaluation in the Cement Returns Area follows:

1. Oil impacts were observed in four of the test pits/trenches. The observed oil impacts were confined within the upper 11.5 feet of soil.

2. No samples indicated constituents above State Total Threshold Limit Concentrations (TTLC).

3. The carbon chain composition of the petroleum impacts observed within Cement Returns Area samples was compared to the weathered crude oil signature from other crude-oil impacted soil samples collected at the site. The findings were consistent and the carbon chain signatures were similar. The Cement Returns crude oil signature is presented in Figure 2-3. As noted in the figure, the sample is weighted toward the long-chain hydrocarbons (> C12).

4. Visual observations indicated that petroleum impacts exist in distinct categories based on the mixture of petroleum within the soil matrix (i.e., lightly stained to presence of observed free oil). In the two areas where impacts were observed, the soils in the Cement Returns Area exhibited brown or black staining. In each case, they were coincident with operator knowledge of their anticipated location.

5. Certain analytes were detected above USEPA Region IX Preliminary Remediation Goals (PRGs) for Residential and Industrial Areas. A summary of these exceedances is provided in Table 2-6.

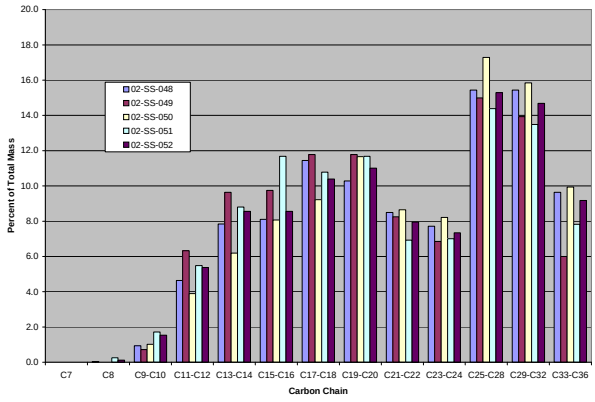


Figure 2-3: Cement Returns Area Hydrocarbon Chain Speciation

Based on the visual observations and chemical analytical findings, the extent of the soil impacts was evaluated. The purpose of this evaluation was to identify the volume of material that may have to be mitigated (either by treatment or relocation). The total volume of stained soil potentially requiring mitigation is approximately 750 yd^3. This will be further evaluated during the Remedial Action Plan development phase of the project. For reference purposes, the figure presenting the preliminary

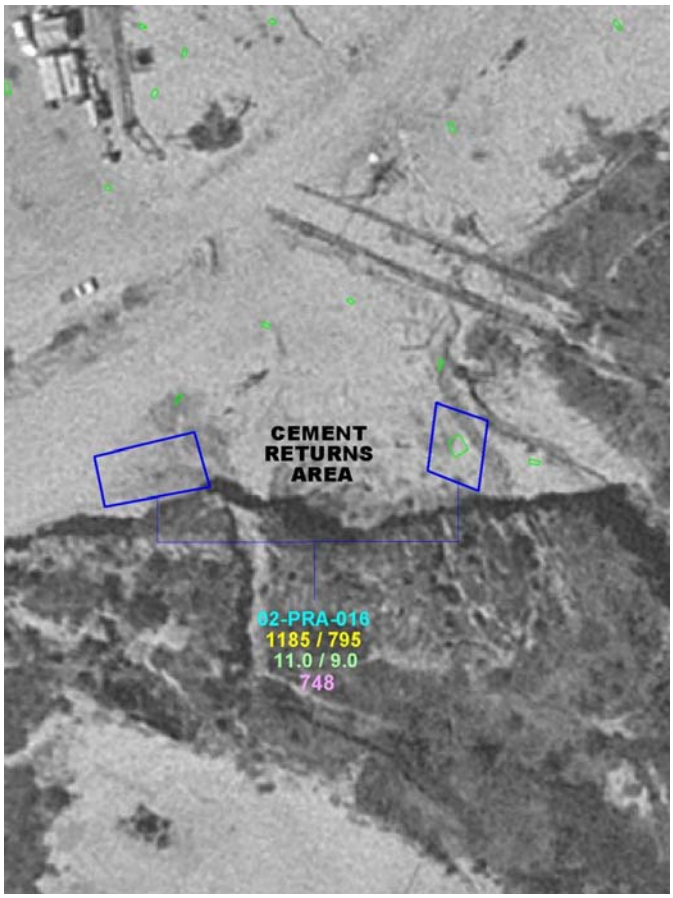
PEC	Sample	Exceeds Regulatory Threshold (PRG-Res)*
02	02-SS-048	**Arsenic**,
	02-SS-049	Benzo(k)Fluoranthene,
	02-SS-050	Benzo(b)Fluoranthene,
	02-SS-052	Indeno(1,2,3-c,d)Pyrene,
	02-SS-051	**Benzo(a)Pyrene**

* Note: No Exceedances of TTLC, bold indicates exceedances of industrial PRG

Table 2-6: Regulatory Exceedances

remediation areas (PRAs) within PEC#02, along with the anticipated volumes of material that may require remediation, is presented in this report as Figure 2-4.

The gross volume estimate of 750 yd^3 is preliminary. The volume of soil that will need to be mitigated, considering standard petroleum remediation and soils handling techniques, may vary. This is discussed in the RAP in the following section.



# Wells	# Pits/Trenches	# Samples	# Tests
0	15	10	25
Estimated Volume of Impacted Soil – 750 cy (Cement Returns Area Only)			

3. REMEDIAL ACTION PLAN

3.1 Summary

The mitigation alternative for impacted soils at the NBR depends, to a large degree, on the type of impact and its location on site. For purposes of this RAP and used only as a screening tool, impacted material within the Cement Returns Area were defined as soil media exceeding one or more of the following:

- Soils characterized by a visual observation as being impacted by petroleum hydrocarbons (e.g., black staining, oily staining),
- Soils with laboratory results for total hydrocarbons greater than 1,000 parts per million (ppm) (see Table 3-1),
- Soils with laboratory results for specific chemicals at concentrations greater than United States Environmental Protection Agency (EPA) Region IX residential preliminary remediation goal (PRGs) concentrations for specific chemicals, where provided.

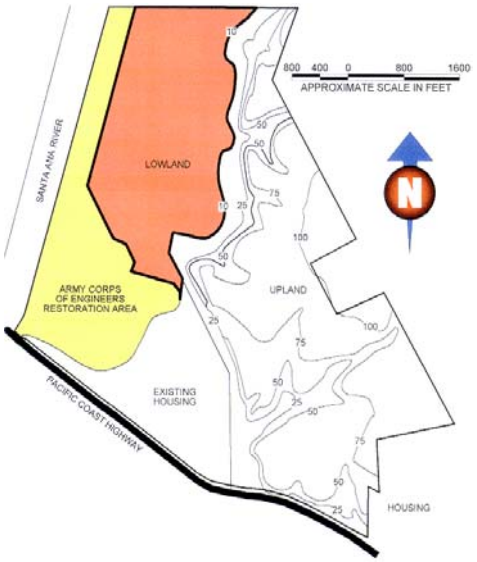


Figure 3-1: Site Topograhy

As presented in Section 2, this impacted volume in the Cement Returns Area is approximately 750 yd^3. The Cement Returns Area is located within the Upland zone (i.e., areas above 10 ft mean sea level MSL), however, it is located below the upper mesa area (Figure 3-1). Therefore, in accordance with the thresholds provided by the RWQCB in the CAO (Table 3-1), and the development plan for the vicinity of the Cement Returns Area (i.e., Open Space), the TPH carbon-chain criteria will be the primary criteria used to dictate clean-up decisions. The selected alternative to be used to mitigate the impacts in the Cement Returns Area is presented in the following section.

3.2 Selected Alternative

The selected mitigation alternative involves clean closing the Cement Returns Area. By definition, this alternative involves removing the impacted material, backfilling with clean material, and grading to surrounding contours. The impacted material excavated from the area will be handled as follows:

- Material will be moved to a secure location in the Upland zone of the NBR, where it will be stored temporarily. The material may ultimately be incorporated into the development plan (e.g., deep fill area, berm) depending on the level of impact, or
- Material will be moved to the on-site biotreatment cell for remediation, depending on the level of impact, as characterized by the testing criteria in Table 3-1.

TABLE 3-1
REGULATORY PROVIDED ACTION LEVELS

Depth from Final Grade	Chemical Constituent	Allowable Concentration (mg/kg)	EPA Method Used to Verify Concentration[(1)]
Surface to 15 feet	TRPH	1,000 (screening tool only)	418.1
	TPH	1,000	8015M w/ carbon chain identification from C^{13}-C^{23} inclusive
	BTEX	B=ND, T=0.1, E=0.68, X=1.75	8021b[(2)]
	VFH	100	8015

Notes: (1) Based on the type of hydrocarbon impact encountered one or more of these analysis may be required.
(2) Positive results confirmed with EPA 8260.
TRPH - Total Recoverable Petroleum Hydrocarbon
TPH - Total Petroleum Hydrocarbons (C^{13}-C^{23})
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes
VFH - Volatile Fuel Hydrocarbons
mg/kg - Milligrams Per Kilogram
ND - Non-Detect

A summary of the technical approach is presented below:

Temporary Storage Area Preparation

- A temporary storage area within the Upland zone of the NBR will be identified by site personnel, and proposed for approval to the RWQCB.
- The approved location will be sampled prior to movement of soil, to evaluate the soil quality at the proposed location.
- The approved temporary storage location will be graded (for drainage) and lined (e.g., 40-mil HDPE liner). The lined area will be bermed and have a low-point that will be monitored for water accumulation.

Excavation and Storage

- Impacted materials will be excavated from the Cement Returns Area and moved to the temporary storage location.
- During storage, the impacted material will be tarped to minimize precipitation infiltration and wind dispersion.
- The excavated Cement Returns Area will be backfilled with clean soil. Testing results for soil backfill will be presented to the RWQCB prior to backfilling.

Final Disposal or Treatment

- To the extent that the impacted material may be incorporated into development plans, the material will be excavated from the temporary location and moved to its final destination, based on the characteristics of the material at the time of final placement.

- If opportunities to incorporate the materials within on-site development plans are not realized, to the extent that the excavated cement returns are able to be treated within the existing on-site biotreatment cell, individual loads of the material will be placed in the biotreatment cell.

- The cement returns will be bioremediated (aerating and watering, as needed).

- The treated materials in the cell will be tested for TPH (including BTEX); regulatory approval for removal will be obtained.

- The treated materials will be excavated from the biotreatment cell and used as general fill at the NBR. Fill will meet the requirements of approved project soils specifications (i.e., environmental and geotechnical).

- Transport the cement returns to the lowland cell from the storage area. This process will be repeated until the impacted material has been treated and placed at the site.

Verification Sampling and Analysis

- Verification soil sampling and analysis will be performed both within the Cement Returns Area and the temporary material storage location. The verification sampling analyses will include the testing protocol listed in Table 3-1.

3.3 Schedule

Based on the estimate of impacted material volume, the following schedule was established:

- Submittal of this Plan to RWQCB – 1 July 2002.
- Identification of Upland Zone Temporary Storage Area – 1 July 2002.
- Verification Sampling of Temporary Storage Area – 15 July 2002.
- Begin Grading and Lining Improvements to Temporary Storage Area – 1 August 2002.
- Excavation of Cement Returns Area – August 2002.
- Backfilling of Cement Returns Area – August 2002
- Incorporation into Development Implementation – Contingent on Plan Approval.

This schedule is dependent on the review and approval times needed by the RWQCB. The RWQCB will be notified of updates to the schedule, as work progresses.

TABLE 2-2
ANALYTICAL SUITES
CEMENT RETURNS AREA
NEWPORT BANNING RANCH
ORANGE COUNTY, CALIFORNIA
(November 2001)

SUITE	ANALYSIS	METHOD	RATIONALE
Field Screening	Organic Vapor	Flame Ionization Detector (FID) Photoionization Detector (PID)	Used to establish the presence of methane and/or volatile organic compounds in soil or soil gas sample. Used as initial Yes/No impact assessment to select field samples for chemical analysis.
A	TRPH	418.1	Primarily used for Yes/No impact assessment. Also, used for confirmation sampling/boundary delineation of standard oil operations sites or general investigations.
B	TPH-CC	8015m	Used to identify carbon-chain components (used to identify light end components of impacted areas or for confirmation sampling to show light ends are not present).
C	PAH Metals Mercury	8310 ICP/AA ICP	Used on a limited basis in new sites to establish contaminant makeup.

TABLE 2-3
SUMMARY OF SOIL ANALYTICAL RESULTS – TRPH
CEMENT RETURNS AREA
NEWPORT BANNING RANCH
ORANGE COUNTY, CALIFORNIA
(November 2001)

SAMPLE NUMBER	CONCENTRATION (mg/kg)	HYDROCARBON DISTRIBUTION (% of Total)		
		LIGHT (C_6-C_{12})	MIDDLE (C_{13}-C_{22})	HEAVY (C_{23}+)
02-SS-048	121000	5.6	46.2	48.2
02-SS-049	6700	7.0	51.2	41.8
02-SS-050	49200	4.9	43.8	51.3
02-SS-051	77400	7.4	49.9	42.7
02-SS-052	108000	7.0	46.5	46.5
GP-3	4200	Reported as C_8-C_{32}		
GP-5	87000	Reported as C_8-C_{32}		
GP-7 (5 ft)	9900	Reported as C_8-C_{32}		
GP-7 (8 ft)	9200	Reported as C_8-C_{32}		
GP-9 (6 ft)	31000	Reported as C_8-C_{32}		
GP-9 (8 ft)	3900	Reported as C_8-C_{32}		

Note: Boundary samples (02-SS-030 through 034) contained non-detectable concentrations of TRPH.
GP-3 through GP-9 are results from RWQCB sampling, January 1999.

TABLE 2-4
SUMMARY OF SOIL ANALYTICAL RESULTS - METALS
CEMENT RETURNS AREA
NEWPORT BANNING RANCH
ORANGE COUNTY, CALIFORNIA
(November 2001)

SAMPLE NUMBER	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead
02-SS-048	**ND**	2.23	190	ND	**ND**	16.9	2.92	**17.1**	**35.9**
02-SS-049	**ND**	2.80	246	ND	**ND**	10.3	1.67	16.1	14.2
02-SS-050	**ND**	1.95	21.6	**0.253**	**ND**	9.87	**5.06**	9.30	5.51
02-SS-051	**ND**	**4.39**	165	ND	**ND**	11.8	2.60	7.63	17.9
02-SS-052	**ND**	2.54	**1010**	ND	**ND**	9.77	1.36	11.7	10.2
Background Average	ND	ND	61.8	0.405	ND	14.4	8.84	8.49	5.9

SAMPLE NUMBER	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
02-SS-048	**ND**	0.518	**15.2**	**ND**	**ND**	0.782	18.9	30.2
02-SS-049	**ND**	**1.69**	6.52	**ND**	**ND**	ND	11.9	20.0
02-SS-050	**ND**	0.369	14.8	**ND**	**ND**	ND	**23.5**	38.9
02-SS-051	**ND**	0.490	12.2	**ND**	**ND**	0.908	16.0	**63.4**
02-SS-052	**ND**	0.769	11.4	**ND**	**ND**	**1.01**	10.6	21.1
Background Average	ND	ND	9.68	ND	—	—	29.7	31.7

Note: All results in mg/kg. Bold indicates maximum values for each metal.

TABLE 2-5
SUMMARY OF SOIL ANALYTICAL RESULTS – PAH
CEMENT RETURNS AREA
NEWPORT BANNING RANCH
ORANGE COUNTY, CALIFORNIA
(November 2001)

SAMPLE NUMBER	Napthalene	Acenaphythylene	Acenapthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)Anthracene	Chrysene	Benzo(b)Fluoranthene	Benzo(k)Fluoranthene	Benzo(a)Pyrene	Dibenz(a,h)Anthracene	Benzo(g,h,I)Perylene	Indeno(1,2,3-c,d)Pyrene
02-SS-048	3100	**660**	350	2900	**7800**	510	**27000**	**17000**	**430**	**380**	**2100**	**4700**	**560**	**310**	**ND**	**1700**
02-SS-049	ND	ND	**410**	**5500**	950	85	8300	6100	140	350	540	580	230	ND	ND	400
02-SS-050	ND	340	ND	2400	5900	**550**	11000	12000	350	240	1300	**4700**	520	ND	ND	820
02-SS-051	ND	ND	ND	1700	1600	240	2100	4800	110	ND	480	660	180	ND	ND	560
02-SS-052	**4400**	ND	ND	2900	6500	300	20000	11000	300	190	1300	880	ND	ND	ND	840

Note: All results in µg/kg. Bold indicates maximum values for each PAH.

GeoSyntec Consultants

100 0 100 Feet

N W E S

TRPH Concentration (mg/kg)

- 100000 - 1000000
- 10000 - 100000
- 1000 - 10000
- 100 - 1000
- 1 - 100
- 0.001 - 1
- 0

LEGEND

- Trench
- Investigation Areas
- Groundwater Wells
- Probe Boring Location
- Soil Gas Sample Locations

TITLE: Figure 2-1 - Cement Returns Area

PROJECT: HR0575
Newport Banning Ranch

02-069

02-068

GP3

GP5

GP8

GP6

GP7

GP9

GP4

PEC #10

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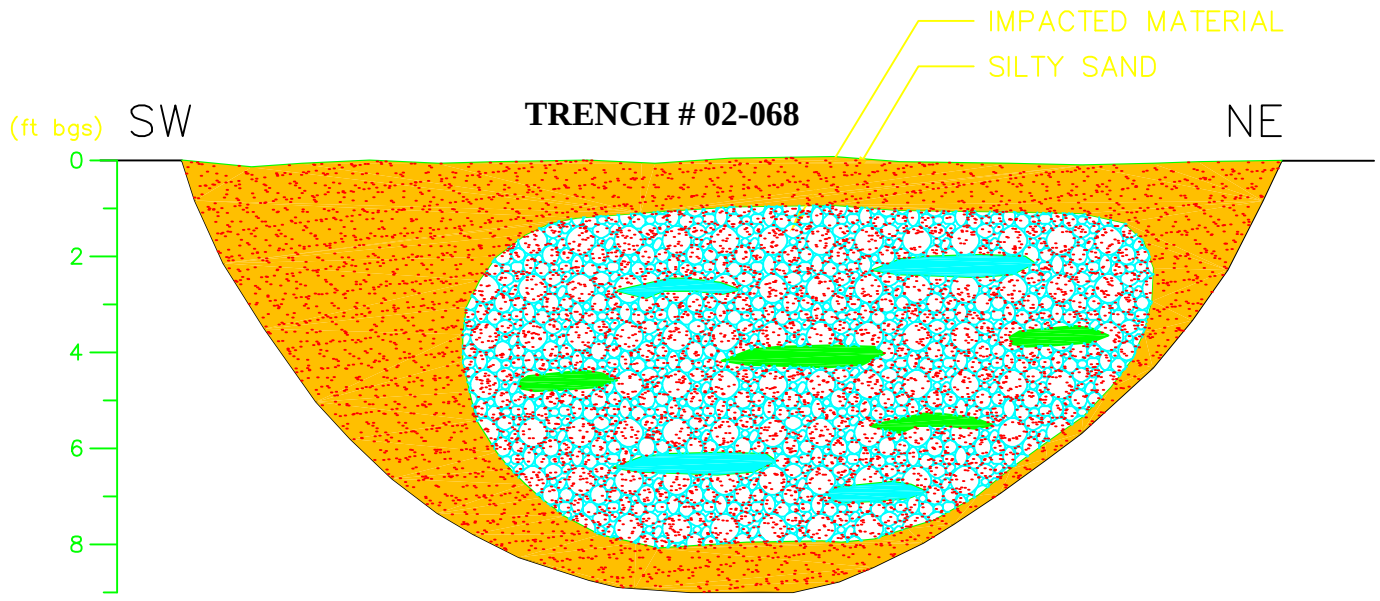

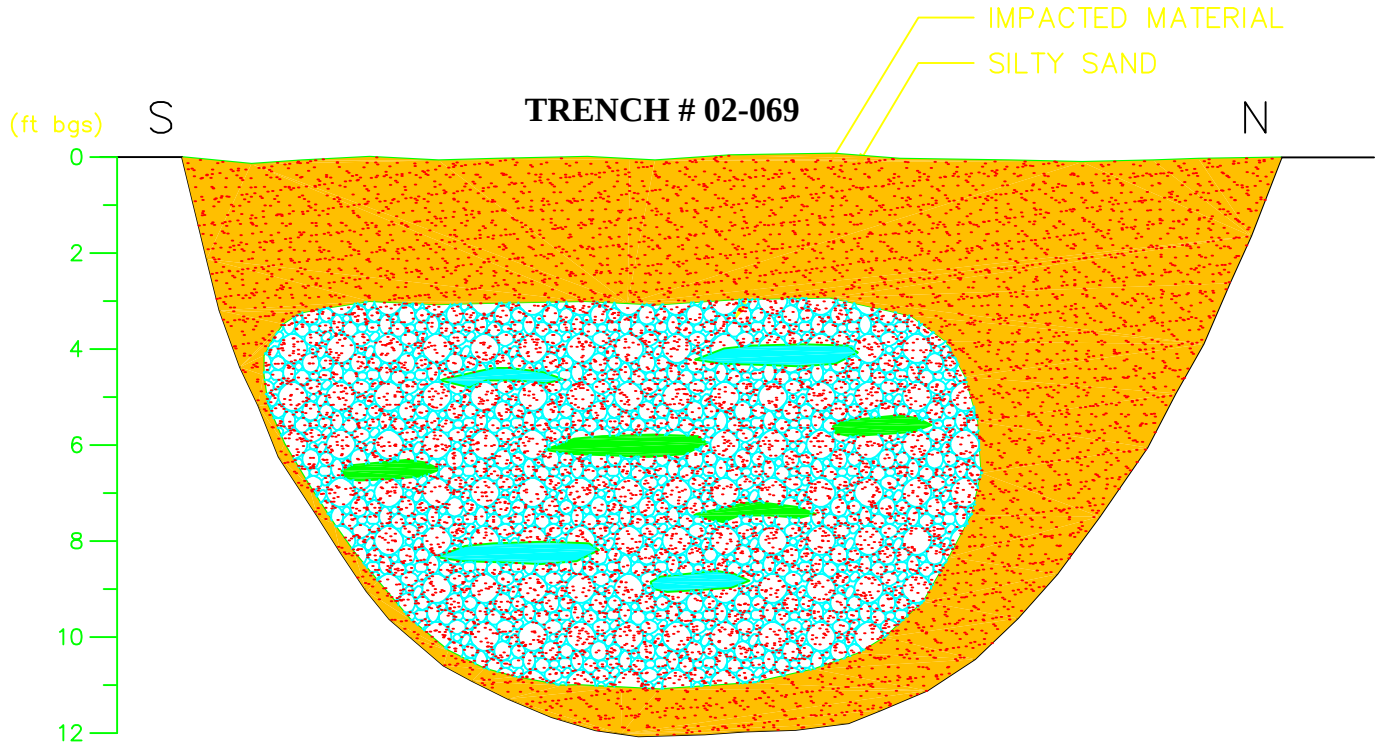

HORIZONTALLY NOT TO SCALE

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CEMENT RETURNS AREA TRENCH LITHOLOGY
NEWPORT BANNING RANCH
NEWPORT BEACH, CALIFORNIA

FIGURE NO.	2-2
PROJECT NO.	HR0657-01
DOCUMENT NO.	
DATE:	7 MAY 2002

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APPENDIX A

TEST PIT / TRENCH LOGS

APPENDIX B

LABORATORY ANALYTICAL RESULTS