

December 22, 2004  
Project No. 600550004

Mr. Warren Rosebraugh, P.E.  
Flood Control District of Maricopa County  
2801 West Durango Street  
Phoenix, Arizona 85009-6399

Subject: Limited Phase II Environmental Site Assessment  
Bethany Home Outfall Channel  
Maricopa County, Arizona  
Contract FCD 2003C013  
Assignment No. 4

Dear Mr. Rosebraugh:

In accordance with your authorization, Ninyo & Moore is pleased to provide this limited Phase II Environmental Site Assessment (ESA) report for the Bethany Home Outfall Channel, along the north bank of the Grand Canal, between 67th Avenue and 75th Avenue in Maricopa County, Arizona (Figure 1). The ESA activities were performed in general accordance with Ninyo & Moore's revised proposal dated November 11, 2004.

## EXECUTIVE SUMMARY

Ninyo & Moore performed a limited Phase II ESA of the site located along the north bank of the Grand Canal between 67th and 75th Avenues. The objective was to assess soils on the north bank of the Grand Canal for potential arsenic impact from previous dredging activities. The scope of work included collecting soil samples and analyzing the samples at a fixed-based laboratory. Thirteen soil samples were collected and composited into one sample for laboratory analysis. The laboratory analyzed the samples for arsenic using United States Environmental Protection Agency (USEPA) Method 1311 for Toxicity Characteristic Leaching Procedure (TCLP) and USEPA Method 1312 for Synthetic Precipitation Leaching Procedure (SPLP). Based on analytical results, leachable arsenic was not present above laboratory reporting limits, and is well below the Resource Conservation Recovery Act (RCRA) regulatory threshold for TCLP arsenic.

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## **EXECUTIVE SUMMARY**

Ninyo & Moore performed a limited Phase II ESA of the site located along the north bank of the Grand Canal between 67th and 75th Avenues. The objective was to assess soils on the north bank of the Grand Canal for potential arsenic impact from previous dredging activities. The scope of work included collecting soil samples and analyzing the samples at a fixed-based laboratory. Thirteen soil samples were collected and composited into one sample for laboratory analysis. The laboratory analyzed the samples for arsenic using United States Environmental Protection Agency (USEPA) Method 1311 for Toxicity Characteristic Leaching Procedure (TCLP) and USEPA Method 1312 for Synthetic Precipitation Leaching Procedure (SPLP). Based on analytical results, leachable arsenic was not present above laboratory reporting limits, and is well below the Resource Conservation Recovery Act (RCRA) regulatory threshold for TCLP arsenic.

## BACKGROUND

Based upon a review of a memo provided by the Flood Control District of Maricopa County (FCDMC), dredging activities were historically conducted along the north bank of the Grand Canal. The dredged material was stockpiled and left to dry on the canal bank and was subsequently disposed without characterization sampling and testing. Located upstream of the project area is the Glendale Water Treatment Plant; therefore, there is a potential for residual concentrations of arsenic to have been present in the dredged material.

Ninyo & Moore was retained by the FCDMC to perform soil sampling along the north bank of the Grand Canal between 67th and 75th Avenues. The objective of this sampling was to assess the north bank soils for leachable arsenic along the swale of the canal where earlier dredging activities occurred.

## SCOPE OF WORK

To achieve the stated objective, the following tasks were included in our scope of work:

### Site Reconnaissance and Field Activities

Ms. Holly Land of Ninyo & Moore performed site reconnaissance and surficial soil sampling on December 1, 2004. Proposed sampling locations were provided to Ninyo & Moore by Mr. Warren Rosebraugh and Mr. Bob Stevens of FCDMC. Sample locations were marked in the field based on the provided aerial photograph. In addition, coordinates of each sampling location were collected using a hand-held Global Positioning System (GPS) with an accuracy of 25 feet. The GPS coordinates for each sample location are provided on Table 1.

**Table 1 – GPS Coordinates for Sampling Locations**

Sample ID	Latitude and Longitude
SS-1	N 33°30'31.4" W 112°13' 10.0"
SS-2	N 33°30'26.8" W 112°13' 05.1"

**Table 1 – GPS Coordinates for Sampling Locations**

Sample ID	Latitude and Longitude
SS-3	N 33°30'24.0" W 112°13' 02.1"
SS-4	N 33°30'19.9" W 112°12' 57.3"
SS-5	N 33°30'16.5" W 112°12' 53.7"
SS-6	N 33°30'13.2" W 112°12' 50.1"
SS-7	N 33°30'10.2" W 112°12' 44.9"
SS-8	N 33°30'07.8" W 112°12' 39.9"
SS-9	N 33°30'05.7" W 112°12' 34.2"
SS-10	N 33°30'04.3" W 112°12' 28.7"
SS-11	N 33°30'03.0" W 112°12' 23.3"
SS-12	N 33°30'00.9" W 112°12' 17.7"
SS-13	N 33°29'58.2" W 112°12' 13.0"

**Soil Sampling**

A total of 13 sampling locations were identified and sampled along the north swale of the Grand Canal between 67th and 75th Avenues (Figure 2). On December 1, 2004, Ms. Holly Land of Ninyo & Moore collected 13 discrete soil samples from each of the proposed locations. An aerial photograph showing the approximate sampling locations is presented in Attachment A. A portion of discrete soil sample was composited by Ninyo & Moore into one sample for laboratory analysis. The 13 discrete soil samples were retained for future analysis

if levels of arsenic were present above toxicity levels in the composite sample. Photographs taken during the site reconnaissance and sampling activities are presented in Attachment B.

Soil samples were collected at a depth of approximately 1 foot, except at location SS-13, where asphalt was encountered at a depth of approximately 6 inches. Soil sample SS-13 was collected just above the asphalt. A shovel was utilized to reach the target sampling depth. Samples were retrieved and placed in glass jars provided by the laboratory using a decontaminated stainless steel spoon. A portion of each sample was placed into a stainless steel bowl for compositing. Latex gloves were used by field personnel during sample collection. Each sample container was labeled with the sample identification number, date and time of collection, and other pertinent information. Samples were given identification numbers with the prefix "SS" (e.g., SS-1 and SS-2) indicating that they were near surface samples.

Soil sampling equipment was decontaminated between samples using distilled water and alconox followed by a distilled water rinse. Following sampling, each boring was backfilled, marked with surveyor whisksers, and labeled.

Following collection of samples at the 13 discrete sampling locations, the portion retained for the composite sampling was composited into a homogenous mixture and placed in a glass jar provided by the laboratory. The composite sample was identified and labeled as GC-Comp.

#### **Analytical Methods and Protocol**

Following collection, the soil samples were labeled and preserved in a cooler with ice. The collected soil samples were transported under chain-of-custody protocol to Del Mar Analytical Laboratory (an Arizona Department of Health Services [ADHS] certified analytical laboratory, accreditation number AZ0426) at the end of the sampling day.

The composite sample was submitted to the analytical laboratory to be analyzed for arsenic, by USEPA Method 1311 for TCLP and Method 1312 for SPLP. The 13 discrete samples

were also submitted to the laboratory and placed on hold pending analytical results of the composite sample.

### **SOIL SAMPLING RESULTS**

Based on the TCLP test results, the concentration of arsenic reported for sample GC-Comp was below the laboratory reporting limit of 0.25 milligrams/liter (mg/l). This is below the RCRA regulatory threshold of 5.0 mg/l. The results for GC-Comp using the SPLP method indicated arsenic was below the laboratory reporting limit of 0.050 mg/l. The regulatory limit by SPLP has not been established by the State of Arizona. Laboratory analytical reports with chain-of-custody documentation are presented in Attachment C.

### **CONCLUSIONS**

Based on the laboratory analytical results for the composite sample, leachable arsenic was not present above laboratory reporting limits and is below the RCRA regulatory threshold for TCLP arsenic of 5.0 mg/l. Based on the results of the composite sample analysis, the discrete samples were not analyzed by the laboratory and were discarded.

### **LIMITATIONS**

The environmental services described in this report have been conducted in general accordance with current regulatory guidelines and the standard-of-care exercised by environmental consultants performing similar work in the project area. No warranty, expressed or implied, is made regarding the professional opinions presented in this report. Variations in site conditions may exist and conditions not observed or described in this report may be encountered during subsequent activities. Please also note that this study did not include an evaluation of geotechnical conditions or potential geologic hazards.

Ninyo & Moore's opinions and recommendations regarding environmental conditions, as presented in this report, are based on limited subsurface assessment and chemical analysis. Further assessment of potential adverse environmental impacts from past on-site and/or nearby use of

hazardous materials may be accomplished by a more comprehensive assessment. The samples collected and used for testing, and the observations made, are believed to be representative of the area(s) evaluated; however, conditions can vary significantly between sampling locations. Variations in soil and/or groundwater conditions will exist beyond the points explored in this evaluation.

The environmental interpretations and opinions contained in this report are based on the results of laboratory tests and analyses intended to detect the presence and concentration of specific chemical or physical constituents in samples collected from the subject site. The testing and analyses have been conducted by an independent laboratory which is certified by the State of Arizona to conduct such tests. Ninyo & Moore has no involvement in, or control over, such testing and analysis. Ninyo & Moore, therefore, disclaims responsibility for any inaccuracy in such laboratory results.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires any additional information, or has questions regarding content, interpretations presented, or completeness of this document.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

Ninyo & Moore appreciates this opportunity to be of service to the Flood Control District of Maricopa County. If you have any questions or comments regarding this report, please call the undersigned at your convenience.

Respectfully submitted,  
**NINYO & MOORE**



Holly A. Land  
Project Environmental Geologist



Robert D. Laumann, R.G.  
Principal Geologist

HAL/RDL/avv

Distribution: (1) Addressee

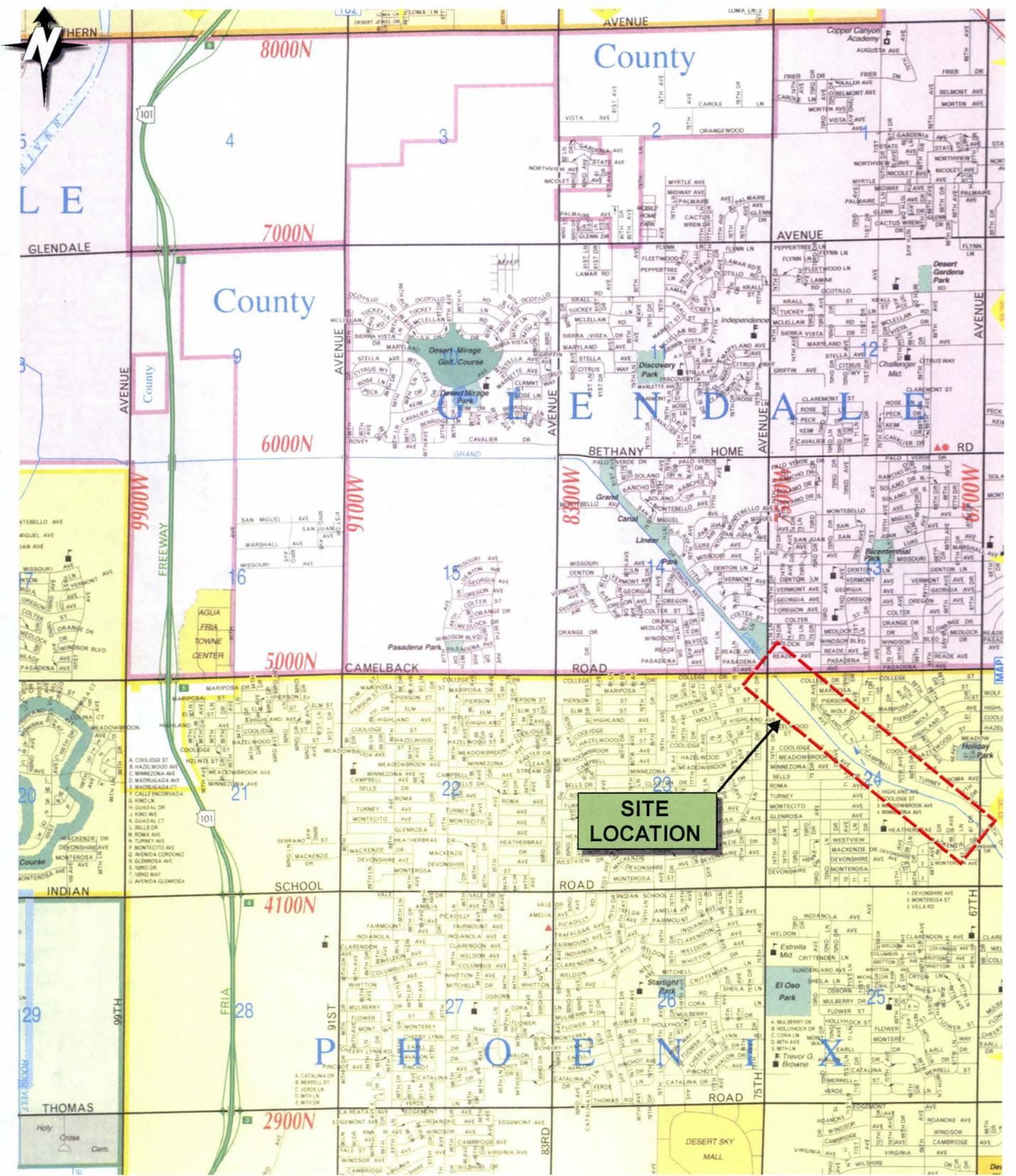
Attachments: Attachment A – Site Location and Boring Location Maps

Attachment B – Photographs

Attachment C – Analytical Report and Chain-of Custody Documentation

**ATTACHMENT A**

**SITE LOCATION AND BORING LOCATION MAPS**



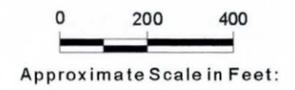
0 3333  
 Approximate Scale:  
 1 inch = 3333 feet

SOURCE: Phoenix Mapping Service, Phoenix Metro 2004.

<b>Ninyo &amp; Moore</b>		SITE LOCATION MAP	
LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT BETHANY HOME OUTFALL CHANNEL MARICOPA COUNTY, ARIZONA			
PROJECT No: 600550001	FILE No: 550vmap1204	DATE: 12/04	<b>1</b>



**LEGEND**  
SS-1 ⊕ Approximate Boring Location.



NOTE: Basemap modified after FCDMC, 2004, aerial photo taken 2003.

<b>Ninyo &amp; Moore</b>		SOIL BORING LOCATION MAP	
LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT BETHANY HOME OUTFALL CHANNEL MARICOPA COUNTY, ARIZONA			FIGURE 2
PROJECT No: 600550004	FILE No: 550sb11204	DATE: 12/04	

**ATTACHMENT B**

**PHOTOGRAPHS**



**Photograph No. 1:** Grand Canal Swale, taken from sampling point SS-13 facing northwest.



**Photograph No. 2:** Grand Canal Toe, taken from sampling point SS-13 facing northwest.



**Photograph No. 3:** Grand Canal, taken from sampling point SS-11 facing west northwest.



**Photograph No. 4:** Grand Canal, taken from sampling point SS-9 facing west northwest.



**Photograph No. 5:** Grand Canal, taken from sampling point SS-1 facing west southeast.

**ATTACHMENT C**

**ANALYTICAL REPORT AND CHAIN-OF-CUSTODY DOCUMENTATION**



# Del Mar Analytical

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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

## LABORATORY REPORT

Prepared For: Ninyo & Moore  
3001 S. 35th St. Suite 6  
Phoenix, AZ 85034  
Attention: Holly Land

Project: 600550004

Sampled: 12/01/04  
Received: 12/01/04  
Issued: 12/10/04 14:04

AZ DHS #AZ0426

*The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of Del Mar Analytical and its client. This report shall not be reproduced, except in full, without written permission from Del Mar Analytical. The Chain of Custody, 1 page, is included and is an integral part of this report.  
This entire report was reviewed and approved for release.*

### CASE NARRATIVE

#### LABORATORY ID

PNL0030-14

#### CLIENT ID

GC-Comp

#### MATRIX

Soil

SAMPLE RECEIPT: Samples were received intact, at 2°C, on ice and with chain of custody documentation.  
HOLDING TIMES: All samples were analyzed within prescribed holding times and/or in accordance with the Del Mar Analytical Sample Acceptance Policy unless otherwise noted in the report.  
PRESERVATION: Samples requiring preservation were verified prior to sample analysis.  
QA/QC CRITERIA: All analyses met method criteria, except as noted in the report with data qualifiers.  
COMMENTS: No significant observations were made.  
SUBCONTRACTED: No analyses were subcontracted to an outside laboratory.

Reviewed By:

Del Mar Analytical - Phoenix  
Tonda Waugh  
Project Manager



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Ninyo & Moore  
 3001 S. 35th St. Suite 6  
 Phoenix, AZ 85034  
 Attention: Holly Land

Project ID: 600550004

Report Number: PNL0030

Sampled: 12/01/04  
 Received: 12/01/04

## SPLP METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
<b>Sample ID: PNL0030-14 (GC-Comp - Soil)</b>								
<b>Reporting Units: mg/l</b>								
SPLP Arsenic	EPA 1312/6010B	P4L0613	0.050	ND	1	12/6/2004	12/7/2004	

**Del Mar Analytical - Phoenix**  
 Tonda Waugh  
 Project Manager

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Ninyo & Moore  
 3001 S. 35th St. Suite 6  
 Phoenix, AZ 85034  
 Attention: Holly Land

Project ID: 600550004  
 Report Number: PNL0030

Sampled: 12/01/04  
 Received: 12/01/04

## TCLP METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	TCLP Limit	Date Extracted	Date Analyzed	Data Qualifiers
<b>Sample ID: PNL0030-14 (GC-Comp - Soil)</b>									
<b>Reporting Units: mg/l</b>									
TCLP Arsenic	EPA 1311/6010B	P4L0612	0.25	ND	5	5.0	12/6/2004	12/7/2004	

**Del Mar Analytical - Phoenix**  
 Tonda Waugh  
 Project Manager

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Phoenix, AZ 85034  
Attention: Holly Land

Project ID: 600550004  
Report Number: PNL0030

Sampled: 12/01/04  
Received: 12/01/04

## SPLP EXTRACTION FOR METALS (EPA 1312)

Analyte	Method	Batch	Extraction Start Date	Extraction End Date	Data Qualifiers
Sample ID: PNL0030-14 (GC-Comp - Soil) SPLP Extraction	EPA 1312	P4L0606	12/3/2004	12/6/2004	

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Phoenix, AZ 85034  
Attention: Holly Land

Project ID: 600550004

Report Number: PNL0030

Sampled: 12/01/04

Received: 12/01/04

## TCLP EXTRACTION FOR METALS

Analyte	Method	Batch	Extraction Start Date	Extraction End Date	Data Qualifiers
Sample ID: PNL0030-14 (GC-Comp - Soil) TCLP Extraction	EPA 1311	P4L0605	12/3/2004	12/6/2004	

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 Phoenix, AZ 85034  
 Attention: Holly Land

Project ID: 600550004  
 Report Number: PNL0030

Sampled: 12/01/04  
 Received: 12/01/04

## METHOD BLANK/QC DATA

### TCLP METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch: P4L0612 Extracted: 12/06/04</b>										
<b>Blank Analyzed: 12/07/04 (P4L0612-BLK1)</b>										
TCLP Arsenic	ND	0.050	mg/l							
<b>Blank Analyzed: 12/07/04 (P4L0612-BLK2)</b>										
TCLP Arsenic	ND	0.25	mg/l							
<b>Blank Analyzed: 12/07/04 (P4L0612-BLK3)</b>										
TCLP Arsenic	ND	0.25	mg/l							
<b>LCS Analyzed: 12/07/04 (P4L0612-BS1)</b>										
TCLP Arsenic	1.05	0.050	mg/l	1.00		105	80-120			
<b>LCS Dup Analyzed: 12/07/04 (P4L0612-BSD1)</b>										
TCLP Arsenic	1.05	0.050	mg/l	1.00		105	80-120	0	20	
<b>Matrix Spike Analyzed: 12/07/04 (P4L0612-MS1)</b>										
TCLP Arsenic	1.11	0.25	mg/l	1.00	0.054	106	75-125			
<b>Matrix Spike Dup Analyzed: 12/07/04 (P4L0612-MSD1)</b>										
TCLP Arsenic	1.14	0.25	mg/l	1.00	0.054	109	75-125	3	20	

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Ninyo & Moore 3001 S. 35th St. Suite 6 Phoenix, AZ 85034 Attention: Holly Land	Project ID: 600550004  Report Number: PNL0030	Sampled: 12/01/04 Received: 12/01/04
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**METHOD BLANK/QC DATA**

**SPLP METALS**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch: P4L0613 Extracted: 12/06/04</b>										
<b>Blank Analyzed: 12/07/04 (P4L0613-BLK1)</b>										
SPLP Arsenic	ND	0.050	mg/l							
<b>Blank Analyzed: 12/07/04 (P4L0613-BLK2)</b>										
SPLP Arsenic	ND	0.050	mg/l							
<b>LCS Analyzed: 12/07/04 (P4L0613-BS1)</b>										
SPLP Arsenic	1.09	0.050	mg/l	1.00		109	80-120			
<b>LCS Dup Analyzed: 12/07/04 (P4L0613-BSD1)</b>										
SPLP Arsenic	1.04	0.050	mg/l	1.00		104	80-120	5	20	
<b>Matrix Spike Analyzed: 12/07/04 (P4L0613-MS1)</b>										
SPLP Arsenic	1.05	0.050	mg/l	1.00	ND	105	75-125			
<b>Matrix Spike Dup Analyzed: 12/07/04 (P4L0613-MSD1)</b>										
SPLP Arsenic	1.07	0.050	mg/l	1.00	ND	107	75-125	2	20	

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 Phoenix, AZ 85034  
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Project ID: 600550004

Report Number: PNL0030

Sampled: 12/01/04

Received: 12/01/04

**METHOD BLANK/QC DATA**

**TCLP EXTRACTION FOR METALS**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Data Qualifiers
<b>Batch: P4L0605 Extracted: 12/03/04</b>									
<b>Blank Analyzed: 12/06/04 (P4L0605-BLK1)</b>									
TCLP Extraction	ND	0.050	None						
<b>Blank Analyzed: 12/06/04 (P4L0605-BLK2)</b>									
TCLP Extraction	ND	0.050	None						

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Ninyo & Moore  
3001 S. 35th St. Suite 6  
Phoenix, AZ 85034  
Attention: Holly Land

Project ID: 600550004

Report Number: PNL0030

Sampled: 12/01/04  
Received: 12/01/04

## DATA QUALIFIERS AND DEFINITIONS

**ND** Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.  
**RPD** Relative Percent Difference

**Del Mar Analytical - Phoenix**  
Tonda Waugh  
Project Manager

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**PNL0030 <Page 9 of 10>**



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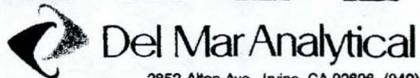
### Certification Summary

#### Del Mar Analytical - Phoenix

Method	Matrix	AZ
EPA 1311/6010B	Water	X
EPA 1311	Soil	X
EPA 1312/6010B	Water	X
EPA 1312	Soil	X

**Del Mar Analytical - Phoenix**  
Tonda Waugh  
Project Manager

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# CHAIN OF CUSTODY FORM

Page 1 of 1

Client Name/Address: <b>Ninjo and Moore</b>		Project/PO Number: <b>60055004</b>				Analysis Required							
Project Manager: <b>Holly Land</b>		Phone Number: <b>(602) 243-1600</b>				Arsenic EPA 1311 (TCLP)	Arsenic EPA 1312 (SPLP)						
Sampler: <b>Holly Land</b>		Fax Number:											
Sample Description	Sample Matrix	Container Type	# of Cont.	Sampling Date/Time	Preservatives							Special Instructions	
SS-13	Soil	4oz Glass	2	12/1/04 0822	NA	1	1					PNL 6030-01 Hold	
SS-12	Soil	4oz Glass	2	12/1/04 0900	NA	1	1					-02 Hold	
SS-11	Soil	4oz Glass	2	12/1/04 0945	NA	1	1					-03 Hold	
SS-10	Soil	4oz Glass	2	12/1/04 1015	NA	1	1					-04 Hold	
SS-9	Soil	4oz Glass	2	12/1/04 1100	NA	1	1					-05 Hold	
SS-8	Soil	4oz G	2	12/1/04 1145	NA	1	1					-06 Hold	
SS-7	Soil	4oz G	2	12/1/04 1205	NA	1	1					-07 Hold	
SS-6	Soil	4oz Glass	2	12/1/04 1245	NA	1	1					-08 Hold	
SS-5	Soil	4oz Glass	2	12/1/04 1310	NA	1	1					-09 Hold	
SS-4	Soil	4oz Glass	2	12/1/04 1335	NA	1	1					-10 Hold	
SS-3	Soil	4oz glass	2	12/1/04 1350	NA	1	1					-11 Hold	
SS-2	Soil	4oz Glass	2	12/1/04 1420	NA	1	1					-12 Hold	
SS-1	Soil	4oz Glass	2	12/1/04 1440	NA	1	1					-13 Hold	
GC-Comp	Soil	4oz Glass	2	12/1/05/ 1450	NA	1	1					-14 Analyze*	
Relinquished By: <b>Holly Land</b>		Date /Time: <b>12/1/04 / 1557</b>		Received by:		Date /Time:		Turnaround Time: (Check)					
Relinquished By:		Date /Time:		Received by:		Date /Time:		same day _____ 72 hours _____					
Relinquished By:		Date /Time:		Received in Lab by:		Date /Time:		24 hours _____ 5 days _____					
Relinquished By:		Date /Time:		Received in Lab by:		Date /Time:		48 hours _____ normal <input checked="" type="checkbox"/>					
Relinquished By:		Date /Time:		Received in Lab by:		Date /Time:		Sample Integrity: (Check)					
Relinquished By:		Date /Time:		Received in Lab by:		Date /Time:		intact <input checked="" type="checkbox"/> on ice <input checked="" type="checkbox"/> 2.3°C					

Note: By relinquishing samples to Del Mar Analytical, client agrees to pay for the services requested on this chain of custody form and any additional analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 30 days.