

SRCC92



rcvd from SA's  
file

3/93

~~File: SRC 3/92~~

Route 3, Box 7  
Gallup, New Mexico  
87301

505  
722-3833

The report is in the  
library: Red three-ring  
binder

November 11, 1992

Mr. Steven M. Alexander  
Hazardous and Radioactive Materials Bureau  
New Mexico Environment Department  
1190 St. Francis Drive  
Santa Fe, New Mexico 87502

re: Ciniza's LTA, BTZ Sampling Results

Dear Mr. Alexander:

Giant Refining Company is submitting the enclosed report in connection with the special sampling program performed at the Ciniza Refinery's, Land Treatment Area. Please contact me if you have any questions concerning the report.

Respectfully Submitted,

Zeke Sherman  
Environmental Manager  
Giant Refining Company

REPORT ON SPECIAL SAMPLING ACTIVITIES  
at  
GIANT REFINING COMPANY  
CINIZA REFINERY

by  
Zeke Sherman  
Environmental Manager

November 11, 1992

## TABLE OF CONTENTS

Section		Page
1.0	Introduction . . . . .	1
2.0	Site Survey . . . . .	2
3.0	Sampling Activities . . . . .	2
	3.1 Soil Samples . . . . .	3
	3.2 Lysimeter Samples . . . . .	3
4.0	Laboratory Analysis . . . . .	3
	4.1 Project Quality Assurance . . . . .	4
	4.2 Data Summary . . . . .	4
5.0	Statistical Analysis . . . . .	7
6.0	Summary and Conclusions . . . . .	7
<b>Appendices</b>		
A	Daniel B. Stephens & Associates Report	
B	ENSECO Project QA Document	
C	RMAL Raw Data	

## 1.0 INTRODUCTION

This report summarizes the results of the special sampling activities conducted at Ciniza's hazardous waste treatment unit (HWTU). These sampling activities were conducted in response to the Bureau's concerns about analytical results obtained from soil cores and lysimeters indicating contamination beneath the specified treatment zone.

Soil cores obtained from the land treatment area (LTA) on October 10, 1990 and October 17, 1991 apparently contained 570 ppm and 1.4 ppm respectively of m & p - Cresol. The soil cores were obtained under conditions where the samples may have been cross contaminated. It is also likely that the soil cores were obtained from within the specified treatment zone instead of beneath it.

Soil pore moisture obtained from lysimeters installed within the LTA on October 10, 1990 apparently contained several organic compounds. The following is a list those compounds and their concentrations:

Compound	Lysimeter #1	Lysimeter #2
Acetone	40 ppb	24 ppb
Carbon Disulfide	28 ppb	75 ppb
Carbon Tetrachloride	23 ppb	N.D.
1,1,1-Trichloroethane	N.D.	9.8 ppb

Once again, the samples were obtained under conditions where cross contamination may have occurred. Samples retrieved from the lysimeters were accumulated in a polyethylene Erlmeyer flask that was intended for volume measurement only. This flask had been stored with other maintenance equipment and may have been contaminated by common shop cleaning and degreasing sprays.

The above analytical results were submitted to the Bureau on March 4, 1992 at their request. On April 16, 1992 when Giant Refining Company met with the Bureau to discuss pending modifications to the permit for the HWTU, it was decided that Giant would conduct a special sampling program. The sampling program was to determine whether or not hazardous waste constituents had migrated beneath the treatment zone of the LTA.

The following report discusses the sampling activities and presents the analytical data. The report also presents statistical analysis of the inorganic constituents and interprets the results of the organic analysis. Finally, the report summarizes and develops conclusions based on the analytical data, sampling protocol, and site geology.

## 2.0 SITE SURVEY

In reviewing the original soil core data exhibiting low levels of contamination, it was determined that these soil cores had been retrieved at approximately five feet beneath the present surface elevation. Typically, soil samples are retrieved from just beneath the treatment zone which is defined by the permit as beginning at the original surface elevation and terminating five foot below. But over time, as wastes are incorporated into the surface of the LTA, the surface elevation is raised. After ten years of operation, the Ciniza HWTU surface elevation has risen approximately half a foot to one and a half feet above the original surface elevation. Meaning, that samples taken now at a depth of five feet will be within the treatment zone and not beneath it as prescribed by the permit.

To insure that samples taken during this special sampling event and all subsequent soil core sampling events would come from beneath the treatment zone, a survey was conducted to determine the elevation of the original land farm surface and the elevation of the existing surface. The survey data have previously been submitted to your office.

Initially, forty equally spaced sampling locations were surveyed. The original surface elevation and the present surface elevation were determined for each location. This information was tabulated and a contour drawing was made based on the original elevations with the existing elevations superimposed. This was the basis for determining how deep each sampling location must be drilled to insure the soil samples were taken beneath the treatment zone based on the original surface elevation.

After reconsidering the magnitude of the original sampling program, it was determined that the project objectives could be achieved with an abbreviated program. Only eight soil sampling locations were utilized in connection with the data presented later in this report. The locations straddled in pairs, each of the two previous soil core sampling sites and lysimeters where contamination was seen.

## 3.0 SAMPLING ACTIVITIES

Giant Refining Company retained the services of Daniel B. Stephens & Associates and Precision Engineering, Inc. for the special sampling program. A report prepared by Mr. Todd Stein of D.B.S. & A. is included as Appendix A. Mr. Stein performed the sample preparation, documentation, and field quality assurance. His report is a brief description of the field investigation which was conducted on July 30 and July 31, 1992.

Mr. William Kingsley, P.E., of Precision Engineering, Inc. supervised the drilling operations, coring, and equipment decontamination. His activities are included in Mr. Stein's report.

Mr. Lynn Shelton, of Giant Refining Company was the companies' site representative and assisted Mr. Stein in the sampling and shipping activities. No discrepancies or problems in either the sampling protocol or the decontamination protocol were encountered during the site work.

1. This determination has never been absolutely determined to have occurred.
2. An increase of 1.5 ft over the approx. 5 acres of active LTA equals approx. 14,700 tons or 1,470  $\frac{\text{ton}}{\text{year}}$

### SOIL SAMPLES 3.1

In performing the soil sampling, great care was taken to remove the contaminated zone of incorporation, exposing the original land farm surface. The hollow stem auger was advanced from the elevation of the original land farm surface to a five foot depth. This measurement is accurate to within three inches. Once the auger was at total depth, the auger insert was withdrawn and the stainless steel coring device was inserted. The coring device was advanced through the sampling zone or from five feet to six and one half feet. Both the auger flights and the core barrels were thoroughly decontaminated and visually inspected before each sampling. Samples of the rinse water from each decontaminated the core barrel were taken and documented.

The samples consisted of a reddish brown clay. The clay appeared to be very tight and of low permeability. No hydrocarbon odor was detected during sample preparation. There were no visual signs of staining or contamination on any of the soil samples.

### LYSIMETER SAMPLES 3.2

Giant's land farm has two lysimeter implacements. Each site has two vacuum type soil pore moisture samplers and one glass brick. Reagent grade water supplied by Rocky Mountain Analytical Laboratory was introduced into each of the soil pore moisture samplers and glass brick at each site. The reagent grade water was withdrawn within five minutes from each device and delivered to an Erlynmeyer flask to be dispensed to a sample container. No hydrocarbon odor was detected during sampling and none of the samples exhibited any visual signs of contamination.

### LABORATORY ANALYSIS 4.0

All the samples were analyzed at Rocky Mountain Analytical Laboratory in Arvada, Colorado. The samples were analyzed for all of the organic constituents listed in 40 CFR Part 264, Appendix IX. Only cadmium, chromium, and lead were analyzed for from the Appendix IX inorganic subset.

The following methods were used in analyzing the soil and water matrix:

SW-842 Method 8240, Volatile Organic Compounds  
SW-842 Method 8270, Semivolatile Organic Compounds  
SW-842 Method 6010, Total Metals by ICP

No correction was made to the data for moisture although the per cent moisture was determined for the sample after metal analysis.

PROJECT QUALITY ASSURANCE 4.1

A "Laboratory Quality Assurance Project Plan" has been developed for this sampling event. The project quality assurance plan outlines the quality assurance and quality control procedures to be followed by the laboratory in analyzing the soil and water samples.

DATA SUMMARY 4.2

The following table summarizes the organic sample constituents identified by laboratory analysis:

**SOIL**

Giant I.D.# BTZC-6-1/BTZC-6-1A		LAB I.D.# 024235-002-SA
<sup>1</sup> Methylene chloride	1.6 ug/kg	Reporting Limit 5.0 ug/kg J Flag
Giant I.D.# BTZC-7-1/BTZC-7-1A		LAB I.D.# 024235-003-SA
<sup>2</sup> Acetone	8.5 ug/kg	Reporting Limit 10 ug/kg J Flag
<sup>1</sup> Methylene chloride	1.7 ug/kg	Reporting Limit 5.0 ug/kg J Flag
Giant I.D.# BTZC-5-1/BTZC-5-1A		LAB I.D.# 024235-001-SA
<sup>2</sup> Acetone	9.9 ug/kg	Reporting Limit 10 ug/kg J Flag
<sup>1</sup> Methylene chloride	1.8 ug/kg	Reporting Limit 5.0 ug/kg J Flag
<sup>3</sup> 4-Nitrophenol	41 ug/kg	Reporting Limit 1600 ug/kg J Flag
Giant I.D.# BTZC-8-1/BTZC-8-1A		LAB I.D.# 024235-004-SA
<sup>2</sup> Acetone	4.9 ug/kg	Reporting Limit 10 ug/kg J Flag
<sup>3</sup> Methapyrilene	35 ug/kg	Reporting Limit 330 ug/kg J Flag
Giant I.D.# BTZC-3-1/BTZC-3-1A		LAB I.D.# 02435-007-SA
<sup>2</sup> Acetone	6.5 ug/kg	Reporting Limit 10 ug/kg J Flag
Giant I.D.# BTZC-4-1/BTZC-4-1A		LAB I.D.# 024235-008-SA
<sup>2</sup> Acetone	3.2 ug/kg	Reporting Limit 10 ug/kg J Flag
<sup>1</sup> Methylene chloride	1.1 ug/kg	Reporting Limit 5.0 ug/kg J Flag
Giant I.D.# BTZC-1-R		LAB I.D.# 024235-009-SA
<sup>1</sup> Methylene chloride	1.2 ug/kg	Reporting Limit 5.0 ug/kg J Flag

**LYSIMETER**

Giant I.D.# LYSC1-PC1		LAB I.D.# 024235-002-SA
<sup>4</sup> bis(2-Ethylhexyl)phthalate	21 ug/kg	Reporting Limit 10 ug/kg
Giant I.D.# LYSC1-PC2		LAB I.D.# 024235-003-SA
<sup>1</sup> Methylene chloride	2.0 ug/kg	Reporting Limit 5.0 ug/kg J Flag
<sup>4</sup> bis(2-Ethylhexyl)phthalate	3.0 ug/kg	Reporting Limit 10 ug/kg J Flag

(1,2) GRC attributes to lab contamination.

(3,) No explanation as to source other than migration or ~~metabolic~~ intermediate metabolic end product

4 GRC attributes to plastic rinse bottle

5 Used in PVC solvent to join pipe (GRC)

Giant I.D.# LYSC2-GB		LAB I.D.# 024235-004-SA
* Acetone	5.0 ug/kg	Reporting Limit 10 ug/kg J Flag
5 2-Butanone (MEK)	4.7 ug/kg	Reporting Limit 10 ug/kg J Flag
4 bis(2-Ethylhexyl)phthalate	18 ug/kg	Reporting Limit 10 ug/kg
Giant I.D.# LYSC1-GB		LAB I.D.# 024235-001-SA
Benzyl alcohol	1.2 ug/kg	Reporting Limit 10 ug/kg J Flag
4 bis(2-Ethylhexyl)phthalate	32 ug/kg	Reporting Limit 10 ug/kg
Giant I.D.# LYSC2-PC1		LAB I.D.# 024235-005-SA
* Acetone	6.4 ug/kg	Reporting Limit 10 ug/kg J Flag
bis(2-Ethylhexyl)phthalate	20 ug/kg	Reporting Limit 10 ug/kg
Giant I.D.# LYSC2-PC2		LAB I.D.# 024235-006-SA
Ethylbenzene	1.3 ug/kg	Reporting Limit 5.0 ug/kg J Flag
4 bis(2-Ethylhexyl)phthalate	10 ug/kg	Reporting Limit 10 ug/kg
Giant I.D.# TRIP BLANK		LAB I.D.# 024235-009-SA
1 Methylene chloride	2.8 ug/kg	Reporting Limit 5.0 ug/kg J Flag
Giant I.D.# FIELD BLANK		LAB I.D.# 024235-007-SA
4 bis(2-Ethylhexyl)phthalate	2.8 ug/kg	Reporting Limit 10 ug/kg J Flag

#### DISCUSSION OF SOIL DATA

**Methylene chloride** which is a common lab contaminant, was detected in several of the soil analysis shown above. Concentrations of Methylene chloride ranged from 1.1 to 1.8 ug/kg(ppb). These concentrations were J flagged to denote the fact that they are "detected below the reporting limit or is an estimated concentration." Methylene chloride was also detected in one of the Method Blanks (QC Lot 06 AUG 92-H) associated with the following samples listed above; 024235-0002, 0003, 0004, 0005. It is felt that the presence of Methylene chloride in the individual soil samples analysis is attributable to laboratory contamination.

**Acetone** which is also a common lab contaminant, was detected in several of the soil analysis listed above. Concentrations of Acetone ranged from 3.2 to 9.9 ug/kg(ppb). These concentrations were also J flagged for the same reason stated above. Acetone was also detected in the following Method Blanks (QC LOT 03 AUG 92-D, 04 AUG 92-J) associated with the following samples listed above; 024235-0001, 0002. It is felt that the presence of Acetone in the individual soil samples analysis is attributable to laboratory contamination.

The constituent **4-Nitrophenol** was detected at 41 ug/kg in sample 024235-001-SA. This concentration is J flagged. The Method Blank associated with this sample (QC LOT 03 AUG 92-D) listed 4-Nitrophenol as not detected (ND). The Matrix Duplicate sample (024235-0001-DU) listed 4-Nitrophenol as not detected.

\* Quantified in lys. #1 & #2 from 100d90 sampling event.

1. How else show this is lab contaminate?  
2. Ditto



The constituent **Methapyrilene** was detected at 35 ug/kg in sample 024235-0004-SA. This concentration is also J flagged. The Method Blank associated with this sample (QC LOT 04 AUG 92-2A) listed Methapyrilene as not detected (ND).

#### DISCUSSION OF LYSIMETER DATA

**Methylene chloride** was detected in one of the lysimeter samples shown above at 2.0 ug/kg. It was also detected in the Trip Blank at 2.8 ug/kg. These concentrations were J flagged. Methylene chloride was not detected in any of the Method Blanks associated with the samples.

**Acetone** was detected in two of the lysimeter samples shown above. The concentrations were 5.0 and 6.4 ug/kg. These concentrations were J flagged. Acetone was not detected in any of the Method Blanks associated with the samples.

The constituent **2-Butanone (MEK)** was detected in one sample at 6.4 ug/kg. This constituent was J flagged. It was not detected in the Method Blank associated with the sample. It was not detected in the Trip Blank or Field Blank or Reagent Blank.

The constituent **Benzyl Alcohol** was detected in one sample at 1.2 ug/kg. This constituent was J flagged. It also was not detected in the Method Blank, Trip Blank, Field Blank or Reagent Blank.

The constituent **Ethylbenzene** was detected in one sample at 1.3 ug/kg. This constituent was J flagged. It was not detected in the Method Blank, Trip Blank, Field Blank or Reagent Blank.

The constituent **Di(2-Ethylhexyl)phthalate** was detected in several of the lysimeter samples. It ranged in concentration from 3.0 to 32 ug/kg (ppb). It was also detected in the Field Blank at 2.8 ug/kg. It was not detected in the Method Blank or Reagent Blank.

The following table summarizes the inorganic data from the soil analysis. The lysimeter fluid analysis for ~~metals~~ were all non detects.

Sample #	(PPM)	Cd	Cr	Pb
BTZC-1-1/BTZC-1-1A, 024235-0005-SA		ND	10.0	11.0
BTZC-2-1/BTZC-2-1A, 024235-0006-SA		ND	12.1	11.2
BTZC-3-1/BTZC-3-1A, 024235-0007-SA		ND	10.4	11.3
BTZC-4-1/BTZC-4-1A, 024235-0008-SA		ND	8.8	9.8
BTZC-5-1/BTZC-5-1A, 024235-0001-SA		ND	11.6	8.6
BTZC-6-1/BTZC-6-1A, 024235-0002-SA		ND	14.8	11.9
BTZC-7-1/BTZC-7-1A, 024235-0003-SA		ND	14.3	8.3
BTZC-8-1/BTZC-8-1A, 024235-0004-SA		ND	13.0	11.5

## 5.0 STATISTICAL ANALYSIS

The chromium and lead data were statistically evaluated using the Student t-Test per 40 CFR, Part 265, Appendix IX-Cochran's Approximation to the Behrens-Fisher Students' T-Test.

The table on the following page shows the results of the evaluation. Half of the background samples for lead analysis were reported as non-detected (ND). For those samples, one half of the laboratory reporting limit was used in lieu of zero or no evaluation for non-detected. All data was compared 0.05 level of significance from the standard (one-tailed) table.

In comparing the means of the background set against the monitoring set, both ~~chromium~~ and lead evaluations indicated that, "...there most likely has been a significant increase in this specific parameter."

## 6.0 SUMMARY AND CONCLUSIONS

Soil samples were taken at a depth equal to five feet below the original surface elevation. Samples were analyzed for Appendix IX constituents. The following organic constituents were seen at concentrations less than the reporting limit or "J" flagged: methylene chloride, acetone, 4-nitrophenol, methapyrilene. The soil samples were also analyzed for cadmium, chromium, and lead. A student-t test statistical evaluation was performed on the metal data. The cadmium data were reported as non-detected. The chromium and lead data indicated a statistically significant increase over the background data.

The lysimeters were flushed with reagent grade water. The flush water samples were analyzed for Appendix IX constituents. The following organic constituents were seen at concentrations less than the reporting limit or "J" flagged: (~~bis(2-Ethylhexyl)phthalate~~ also seen at concentrations greater than the reporting limit), methylene chloride, acetone, 2-butanone, benzyl alcohol. The flush water samples were also analyzed for cadmium, chromium, and lead. All three of the metals were reported as non-detected.

The presence of ~~methylene chloride and acetone~~ in the soil samples is attributable to laboratory methods. The presence of 4-nitrophenol and ~~methapyrilene~~ in the soil samples at levels below the reporting limit may have different explanations. Both constituents could have migrated from the zone of incorporation. Or both could be intermediate metabolic end products from the soil microbial processes, either involving waste material in the zone of incorporation or the indigenous organic substrate.

The significance of the student-t test for ~~chrome~~ and lead is that the mean of the sample population was statistically greater than the mean of the background population. But the background data which was determined as part of the land treatment demonstration and by a different laboratory may be biased. If the background data is biased, then a new set of data should be

**MONITORING**

**BACKGROUND**

Chromium	Lead
10.000	11.000
12.100	11.200
10.400	11.300
8.800	9.800
11.600	8.600
14.800	11.900
14.300	8.300
13.000	11.500

Chromium	Lead
4.000	0.025
5.000	0.025
4.000	0.025
4.000	0.025
3.000	0.025
4.000	0.025
7.000	12.000
4.000	11.000
7.000	12.000
3.000	9.000
3.000	9.000
5.000	10.000

average	11.875	10.450	average	4.417	5.263
variance	4.425	1.894	variance	1.902	30.789
weighting	0.553	0.237	weighting	0.158	2.566
T-T Tables	1.895	1.895	T-T Tables	1.796	1.796

T-statistic	8.842	3.099
T-comparison	1.873	1.804
	$T^* > T_c$	$T^* > T_c$

collected and compared to the monitoring data. A change in the soil pH and oxidation/reduction potential may have caused mobilization of the natural lead and chromium compounds normally tightly bound in the clays that the treatment zone is composed of.

The presence of ~~bis(2-Ethylhexyl)phthalate~~ in the lysimeter water flush samples is attributed to the plastic container used to supply the rinse water. The field blank associated with the water flush samples contained bis(2-Ethylhexyl)phthalate.

The presence of ~~methylene chloride and acetone~~ in the water-flush samples is attributed to common laboratory contaminants. The trip blank associated with the lysimeter water flush samples contained methylene chloride.

The presence of ~~2-Butanone (MEK)~~ is attributed to the use of MEK as a solvent for joining PVC. While MEK did not appear in any of the quality assurance blanks, it more than likely is associated with laboratory or sampling methods.

The reason for the presence of ~~Benzyl alcohol and Ethylbenzene~~ in the water flush samples at concentrations less than the reporting limit is unclear. Neither are common laboratory or sampling related contaminants. Ethyl benzene is a typical constituent of the waste applied at the site, but none of the soil cores taken adjacent to each of the lysimeters exhibited detectable concentrations of either compound.

Several factors need to be taken into consideration in deciding what the appropriate response to this data should be. We are given the site conditions of a natural clay liner, low precipitation rates, high evaporation rates, depth to potable water, lack of potential receptors, miniscule concentrations, and minimal waste management operations. Additionally, there is the Environmental Protection Agency's willingness to consider migration of non-hazardous levels of constituents from land treatment units like Ciniza's. This comes from their August proposal to modify the "Land Ban" regulations.

We at Giant do not think that the significance of the few, "less than reporting limits" organic concentrations seen in the soil cores or lysimeters or the statistical analysis of the metals is sufficient to warrant corrective action or closure of Ciniza's Land Treatment Unit.

Certainly, an operational modification is in order as required by the permit to insure that all constituents are degraded and/or immobilized in the treatment zone. Giant has been anticipating several other modifications, principally to provide for administrative changes, but also to allow Giant to manage crude oil contaminated wastes from off site.

Giant stands ready to work in the spirit of cooperation with the Bureau in resolving this issue. Once the Bureau has reviewed this submittal, Giant would like the opportunity to discuss the report with the Bureau staff.