GRCC

Trihydro CORPORATION

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DEC 20 2007
via email

December 11, 2007

Mr. Jim Lieb
Environmental Engineer
Giant Refining
Route 3 Box 7
Gallup, NM 87301

RE: Project Status Report, Tank 101 and 102 Soil Investigation, Giant Refining – Gallup Refinery

Dear Mr. Lieb:

This correspondence has been prepared to provide a brief summary of field activities associated with the Tank 101 and 102 Soil Investigation. The investigation of this area was conducted in response to a request by the Giant Refining Company, Gallup Refinery (Gallup). Gallup requested Trihydro to identify the source of two water seeps located down gradient of Tank 102 and to delineate the soil contamination associated with these seeps. The New Mexico Environmental Department (NMED) was verbally contacted by Gallup personnel as part of the project preparation activities and is aware of the seeps/soil contamination near Tanks 101 and 102. As a result NMED requested that a work plan be approved before field work commenced. A work plan, in letter format, was submitted to NMED on August 16, 2007 (Work Plan).

FIELD ACTIVITIES

Trihydro personnel were on-site during the week of August 20, 2007. Field activities associated with the Tank 101 and 102 Soil Investigation consisted of a site walk-through, an EM31-MK2 survey, surface water sampling, and soil sampling. These activities are described below.

Site Walk-Through

A site walk-through was conducted with Gallup personnel prior to commencing the EM31-MK2 survey. During this walk through the seeps were located and a plan was developed to conduct the EM31-MK2 survey. As a health and safety issue, Gallup and Trihydro personnel decided that the sage brush needed to be removed before the EM31-MK2 survey could commence (i.e. reducing the danger of rattlesnake bites). In accordance with the work plan the area was staked out in 15 feet intervals to assist the EM31-MK2 survey coverage. As the brush was being cleared the area was staked out using wooden 3 foot stakes. After the majority of the sage brush had been cleared a second site walk-through was conducted to look for any surface contamination. Some residuum was observed in and along the drainage ditch. These locations were logged with a global positioning system (GPS) and are included on Figure 1. Other features that had the potential interest to the EM31-MK2 survey were also logged (e.g. test pits, rebar, fence, roadways, and tank berms).

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EM31-MK2 Survey

An electromagnetic survey was performed on an area west of Tanks 101 and 102 which encompassed both seeps. The area was approximately 440 feet (north-south) by 625 feet (east-west) and is illustrated on Figure 1. The survey was performed with a Geonics EM31-MK2 ground conductivity meter.

The EM31-MK2 ground conductivity meter creates an electromagnetic induction field into the ground and measures two components of the return electromagnetic field which vary with changes in geology or other subsurface features. The two components are a quadrature-phase component and an in-phase component. The quadrature-phase component is a direct conductivity reading of subsurface geology measured in millisiemens per meter (mS/m). Since moisture content can affect conductivity of the subsurface geology, this phase may be useful in delineating soil contamination associated with the seeps. The in-phase component is a measurement of the magnetic susceptibility of subsurface features and is a good indicator of high-conductivity features such as metal objects and is measured as the ratio of the secondary to primary magnetic field in parts per thousand (ppt). This phase may be helpful in identifying metallic subsurface utilities. The effective depth of response is up to 9 ft bgs. Calibration of the EM31-MK2 ground conductivity meter was performed per the manufacturer's instruction.

Continuous measurement and recording of ground conductivity and metallic response was performed in conjunction with GPS navigation. The survey was completed on foot by Trihydro personnel with the EM31-MK2 and GPS units. The survey area was divided into a bi-directional grid with a grid spacing of approximately 15 feet. The boundaries of the survey area and the boundary/grid line intersects were staked prior to conducting the survey.

The EM31-MK2 data was plotted and mapped using Geosoft's OasisMontaj software. A color grid was generated using the "minimum curvature" algorithm within the program. The color grid was overlain on an existing contour map of the refinery to assist in analyzing the image. This is illustrated on Figure 1.

Surface Water Sampling

Surface water samples were collected from Seep 1 and Seep 2 and analyzed for Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), Diesel Range Organics (DRO), Gasoline Range Organics (GRO), Motor Oil Range Organics (MRO), and Resource Conservation and Recovery Act (RCRA) metals. Surface water samples were not collected from the West Ditch test pit because surface water was not present. Results are summarized in Table 1 and discussed below.

Soil Sampling

The subsurface soil investigation of the area began the week of August 20, 2007. Three test pits were installed directly up-gradient of Tanks 101 and 102 inside the tank berm, three test pits were installed direction down-gradient of Tanks 101 and 102 inside the tank berm, one test pit was installed at Seep 1 (Seep 1 Test Pit), one test pit was installed in between Seep 1 and Seep 2 (Seep 2 Test Pit), and one test

pit was installed west of the drainage ditch located directly west of Seep 2 (West Ditch Test Pit). The test pit sampling and logging procedures were followed in accordance with the Work Plan and locations are shown on Figure 1.

The three test pits installed directly up-gradient of Tanks 101 and 102 were installed at the request of NMED to assist in determining if the source of the seeps was a result of these up-gradient tanks. The test pits are identified as TK 102_SE, TK Center, and TK 101_NE on Figure 1. These test pits were sampled at 2 and 8 feet below ground surface (ft bgs), 2 and 6 ft bgs, and 2 and 8 ft bgs respectively and analyzed for DRO and GRO. The samples were also field-screened using a photo-ionization detector (PID) as outlined in the Work Plan. The results were logged on field forms that will be included in the final report. No elevated PID readings were identified and soil samples were collected at each location in accordance with the Work Plan. As shown in Table 1, analytical results from each discreet interval were reported as non-detect.

The three test pits installed directly down-gradient of Tanks 101 and 102 were installed to determine any potential connection to the seeps with contamination within the tank berms. These are identified as TK 101_W, TK 102_W, and Tank 102_SW on Figure 1. These test pits were sampled at 2 and 5.5 ft bgs, 2 and 6 ft bgs, and 2 and 6 ft bgs respectively and analyzed for DRO and GRO. The samples were also field-screened using a PID. The results were logged on field forms that will be included in the final report. As with the previous set of test pits, no elevated PID readings were identified.

Seep 1, Seep 2, and West Ditch test pits were excavated to a water-bearing sand lens layer. Seep 1 test pit was located against an embankment and was excavated to a total depth of 3 ft bgs. During the excavation a black seam was encountered. Soil samples were collected from above and below the black seam, directly from the black seam, and from the water-bearing sand lens layer. The water-bearing sand lens layer is located at approximately 1.5 to 2 ft bgs. Seep 2 test pit was excavated to a depth of 7 ft bgs and sampled at 2 and 6 ft bgs. A water-bearing sand lens layer was encountered at 7 ft bgs. The test pit became unstable at 7 ft bgs due to the high moisture content making it impossible to collect a sample below the water-bearing sand lens layer. The West Ditch test pit was excavated to a depth of 9 ft bgs and sampled at 4, 8, and 9 ft bgs. A water-bearing sand lens layer was encountered at 8 ft bgs. As with the Seep 1 test pit, this test pit became unstable at this depth due to the high moisture content; therefore a sample was not collected below the water-bearing sand lens layer.

Photo Documentation

Field work was documented and recorded in Trihydro personnel's field log book in accordance with the Work Plan. Photos were taken at the test pits, residuum locations, and seeps. These photos will be included as part of the final report.

ANALYTICAL DATA

Samples were shipped to Hall Environmental located in Albuquerque, New Mexico for analysis. The surface water samples collected from the seeps were analyzed for VOCs by method 8260, SVOCs by 8270, DRO, GRO, MRO, and RCRA metals. The soil samples collected from the test pits were analyzed for DRO, GRO, MRO, and VOCs. The analytical detections reported for soil and surface water are illustrated on Figure 2 and summarized in Table 1. A detailed summary of the analytical data will be presented in the final report.

PATH FORWARD

In order to further determine if the seeps are related to the Tank 101 and 102 bermed area, Trihydro proposes to collect additional soil and/or water samples. The samples would be collected from the area of the test pits, TK 102 W, and TK 102 SW at deeper depths in order to try to connect the water-bearing sand lens layer to the seeps.

Additionally, the area north of Seep 1 and Seep 2 and the area west of Seep 1 would be soil sampled. These locations would be sampled in order to confirm the EM31-MK2 signals (i.e. contamination, water, or other).

The samples will be collected using the hollow stem auger drill rig procedures as described in the Work Plan. The analyses would consist of a PIANO analysis and/or an Isotope analysis, as well as, DRO and GRO. The PIANO analysis should provide a footprint of the hydrocarbon at each of the areas and Isotope analysis should give an age of the hydrocarbon.

If you have any questions, please feel free to contact us at (307) 745-7474.

Sincerely,
Trihydro Corporation

for Eric Worden
Business Unit Manager-Petrochemical Services

Chelsea Neuman
for Regina Allen
Project Manager

697-007-001

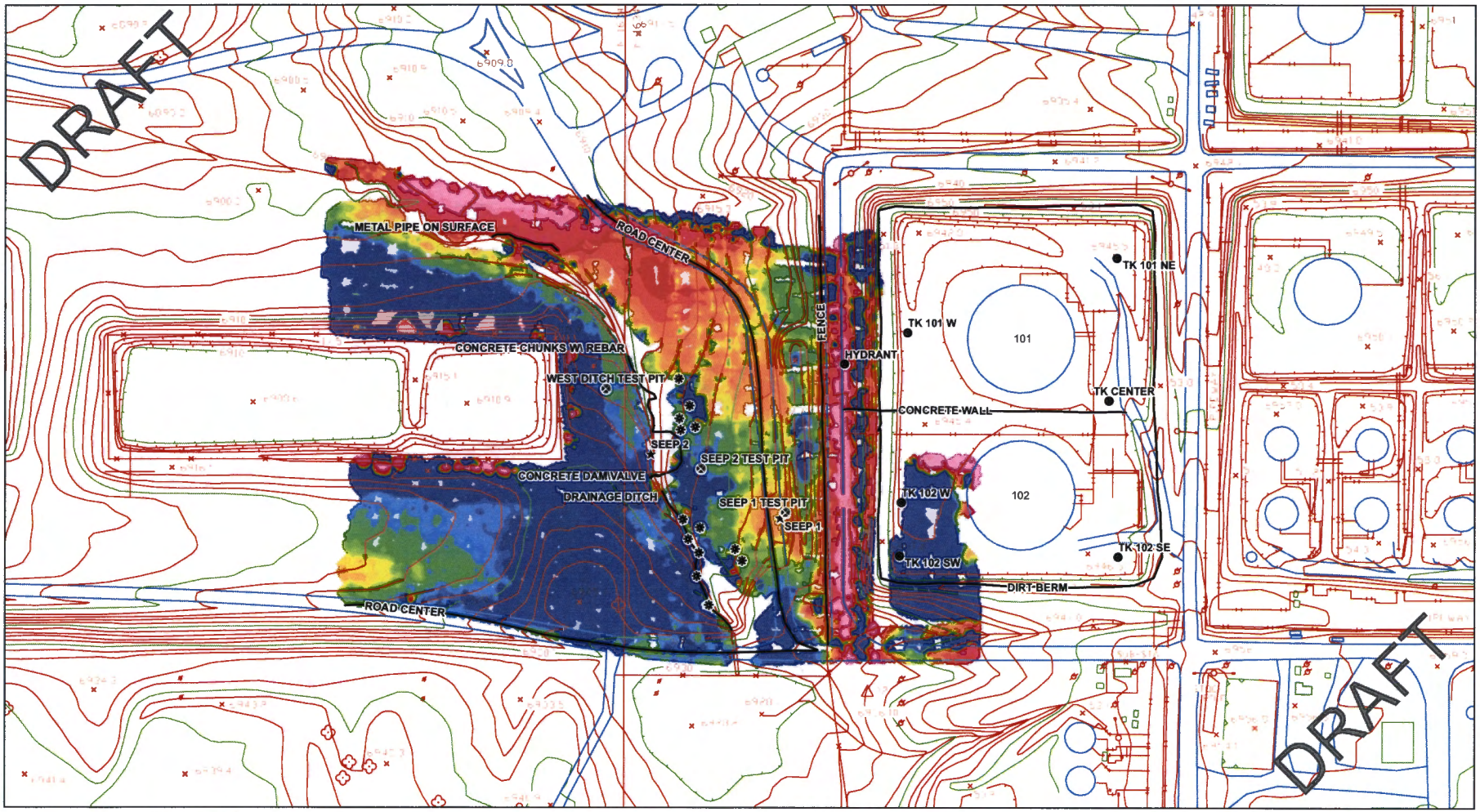
cc: Ed Riege, Giant Refining

TABLE 1. TANK 101 AND 102 SOIL SAMPLE RESULTS,
GALLUP REFINERY, GIANT REFINING ARIZONA INC., GALLUP, NEW MEXICO

Location	Constituent	Seep 1	Seep 2	Units	Seep 1 under (3)	Seep 1_above (1)	Seep 1 Zone (1.5)	Black Seam (0.5)	Seep 2_2	Seep 2_6	West Ditch_4	West Ditch_8	West Ditch_9	Units
Seep 1														
	DRO	13.0	ND(1.0)	mg/L	ND(10.0)	ND(10.0)	ND(10.0)	3600	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	mg/kg
	MRO	ND(5.0)	ND(5.0)	mg/L	ND(50.0)	ND(50.0)	ND(50.0)	ND(1000)	ND(50.0)	ND(50.0)	ND(50.0)	ND(50.0)	ND(50.0)	mg/kg
	GRO	0.31	5.5	mg/L	ND(5.0)	ND(5.0)	ND(5.0)	ND(100)	ND(5.0)	90	ND(5.0)	ND(5.0)	ND(5.0)	mg/kg
	Mercury	ND(0.0002)	ND(0.0002)	mg/L	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	
	Total RCRA Metals				Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	
	Barium	0.15	1.1	mg/L										
	SVOCs			µg/L	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	
	Phenanthrene	42.0	ND	µg/L										
	VOCs				All ND	All ND	All ND		All ND	All ND	All ND	All ND	All ND	
	Benzene	ND	240	µg/L				ND(0.25)						mg/kg
	Ethylbenzene	4.5	190.0	µg/L				ND(0.25)						mg/kg
	MTBE	33.0	210.0	µg/L				ND(0.25)						mg/kg
	1,2,4-Trimethylbenzene	ND(1.0)	170.0	µg/L				ND(0.25)						mg/kg
	1-Methylnaphthalene	110.0	ND(40.0)	µg/L				13.0						mg/kg
	Acetone	12.0	ND(100)	µg/L				ND(3.8)						mg/kg
	1,1-Dichloroethane	10.0	190.0	µg/L				ND(0.50)						mg/kg
	1,1-Dichloroethene	1.3	20.0	µg/L				ND(0.25)						mg/kg
	Isopropylbenzene	7.0	13.0	µg/L				0.44						mg/kg
	n-Butylbenzene	1.6	ND(10.0)	µg/L				0.49						mg/kg
	n-Propylbenzene	1.3	31.0	µg/L				ND(0.25)						mg/kg
	sec-Butylbenzene	1.9	ND(10.0)	µg/L				0.34						mg/kg
	1,1,1-Trichloroethane	2.1	50.0	µg/L				ND(0.25)						mg/kg
	Vinyl chloride	ND(1.0)	30.0	µg/L				ND(0.25)						mg/kg
	Xylenes, Total	ND(1.5)	20.0	µg/L				ND(0.50)						mg/kg

TABLE 1. TANK 101 AND 102 SOIL SAMPLE RESULTS,
GALLUP REFINERY, GIANT REFINING ARIZONA INC., GALLUP, NEW MEXICO

TK 102_SE_2	TK 102_SE_8	TK Center_2	TK Center_6	TK 101_NE_2	TK 101_NE_8	TK 101_W_2	TK 101_W_5.5	TK 102_W_2	TK 102_W_6	TK 102_SW_2	TK 102_SW_6	Units
ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	60.0	ND(10.0)	13000.0	970.0	mg/kg
ND(50.0)	ND(50.0)	ND(50.0)	ND(50.0)	ND(50.0)	ND(50.0)	ND(50.0)	ND(50.0)	120.0	ND(50.0)	14000.0	710.0	mg/kg
ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	ND(5.0)	mg/kg
Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	
Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	
Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	Not analyzed	
All ND	All ND	All ND	All ND	All ND	All ND	All ND	All ND	All ND	All ND	All ND	All ND	



EXPLANATION

SOIL SAMPLE LOCATIONS

- SOIL SAMPLE
- RESIDUUM
- TEST PIT
- SEEP

- BERMS, WALLS, PIPING
- ROAD EDGE
- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- TANK

CONTOUR INTERVAL: INDEX = 10', INTERMEDIATE = 2'

N

0 100'

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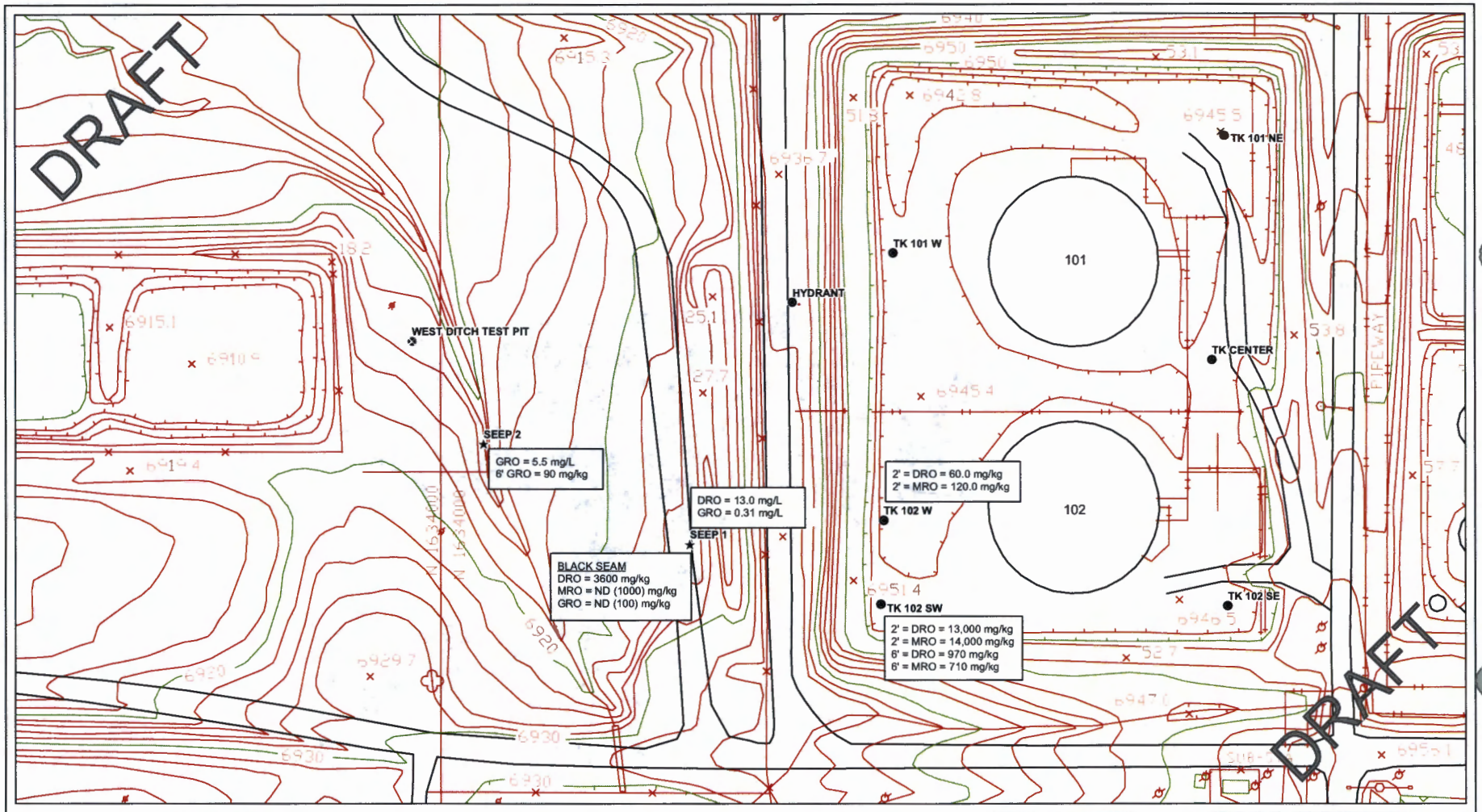
FIGURE 1

EM31 - MK2 DATA TANKS 101 & 102

GIANT REFINING COMPANY
GALLUP REFINERY
GALLUP, NM

Drawn By: BR	Checked By: RA	Scale: 1" = 100'	Date: 11/26/07	File: Ciniza_EM.mxd



EXPLANATION

SOIL SAMPLE LOCATIONS

- SOIL SAMPLE
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- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- TANK

CONTOUR INTERVAL: INDEX = 10', INTERMEDIATE = 2'

N

0 60'

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FIGURE 2

SAMPLE DATA TANKS 101 & 102

GIANT REFINING COMPANY
GALLUP REFINERY
GALLUP, NM

Drawn By: BR	Checked By: RA	Scale: 1" = 62.5'	Date: 12/3/07	File: Ciniza_samples.mxd