Analytical Results from Samples Collected February 2008 at the Cactus Flat Main Lake Depression, Nevada Test and Training Range

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prepared by

Desert Research Institute, Nevada System of Higher Education

prepared for

U.S. Bureau of Land Management

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INTRODUCTION

This report presents the analytical results from water, sediment, and soil samples collected during February 2008 at the Cactus Flat Main Lake depression on the Nevada Test and Training Range (NTTR). The NTTR is located in southern Nevada 130 km north of Las Vegas, and occupies 11,700 km^2. The U.S. Bureau of Land Management's (BLM) Nevada Wild Horse Range comprises nearly 1,900 km^2 within the northern portion of the NTTR; it is occupied by approximately 1,100 wild horses. Between July 20 and 25, 2007, 71 horses associated with a herd of 250 were found dead in the extreme northwest area of the NTTR near a previously excavated depression located in Cactus Flat at a dry lake bed approximately 5 km northeast of an airstrip managed by the NTTR (Figure 1a).

The Main Lake depression was excavated for a project by the U.S. Department of Energy. The Main Lake depression has been used by wildlife as a consistent source of drinking water, as normal precipitation has kept ample water in the depression. Because of recent drought conditions, the water was approximately 0.3 m deep when the dead horses were found (Ronald Lowndes, Sandia National Laboratories, personal communication, 2008).

Toxicology reports prepared by the California Animal Health and Food Safety (CAHFS) indicated that high levels of nitrate (NO_3^-) and nitrite (NO_2^-) are the most probable cause of death, primarily because tests for botulin, anatoxin-a, and microcystins, and GC/MS screening for organic compounds were all negative. Nitrate concentrations were reported at 3,670, 3,940 and 3,440 ppm for samples water-2, pond-6, and pond-8, respectively (California Animal Health & Food Safety Laboratory System, 2007); this report is provided in Appendix 1, see page "6 of 8" in the report for the nitrate data. Nitrite levels in these three waters were proportionally high, at approximately 50, 848, and 825 ppm, respectively (California Animal Health & Food Safety Laboratory System, 2007). [Note that nitrate concentrations can be converted to nitrate-as-nitrogen (NO_3-N) concentrations by multiplying them by 0.226; nitrate-as-nitrogen (NO_3-N) concentrations can be converted to nitrate concentrations by multiplying by 4.43.] Other ions were also present in markedly high concentration, with 2,100 mg/L of chloride, and 2,100 mg/L of sulfate (see Appendix 2).

The Cactus Flat Main Lake depression was commonly used by the herd, suggesting that their sudden mortality could have been caused by rapid contamination of this water supply. The concentration of nitrate and nitrite could also have been further increased by evaporation in the dry lake bed. However, precipitation since September 2007 has increased the water-level in the depression, altering the conditions from those when the horses died.

Nitrates are commonly found in desert environments (Walvoord *et al.*, 2003). Natural sources occur in precipitation as both dry and wet deposition, and through biological fixation of N_2 from the atmosphere. In desert soils, water flux beneath the root zone further concentrates salts, including nitrate (Tyler *et al.*, 1996; Hartsough *et al.*, 2001). Groundwater discharge and evaporation at terminal lakes also concentrates nitrates (Tyler *et al.*, 1997; Blank *et al.*, 1999). One important anthropogenic (man-made) source of nitrate in arid environments is agriculture return flow (McMahon *et al.*, 2006). The goal of this project is to measure nitrogen compound concentrations in various media (e.g., soil, water, sediment) in the vicinity of the depression and to evaluate whether these compounds originated from natural or anthropogenic sources.

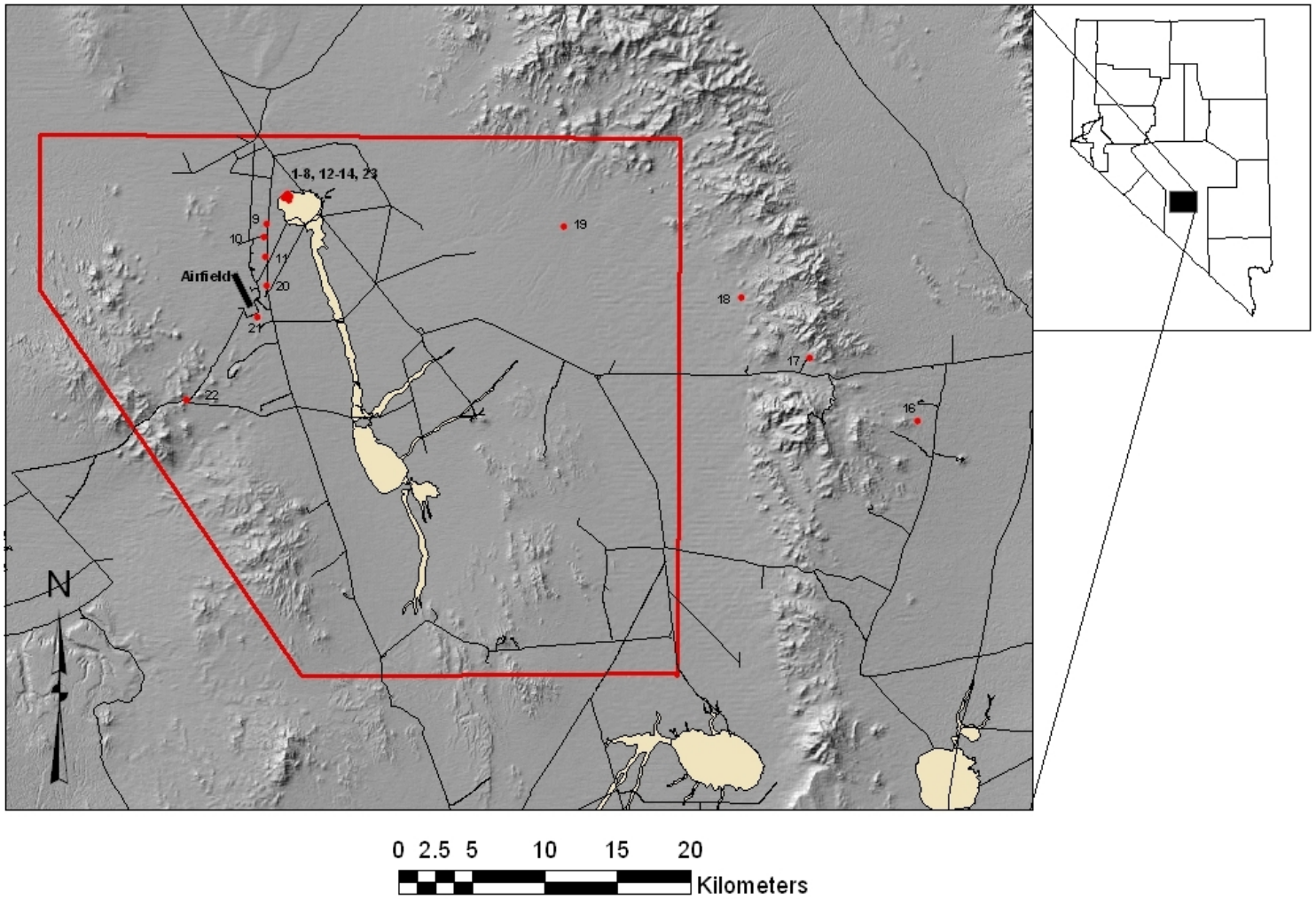

Figure 1a. Overview map showing the location of samples collected by the Desert Research Institute (DRI) on the NTTR in February 2008. Except for the airfield (labeled), black lines indicate locations of roads. The red polygon represents the boundary of the Tonopah Test Range (located within the NTTR).

SAMPLING

Samples were collected at 22 sites (Figure 1a, b, c). Of the 22 samples collected, seven were waters (five springs were sampled, and samples were collected from two depths in the depression), and the remaining 15 samples were sediments, with four obtained from the bottom of the Main Lake depression, and the remaining 11 collected from culverts or natural drainages (five from culverts and six from drainages). Of the 11 drainage/culvert samples, nine were collected from locations between the airstrip and the depression, with the remaining two samples collected northeast of the depression. Because analyses have different collection requirements, more than one sample was typically collected at each site. When water samples were collected, electrical conductivity (EC), pH, and temperature were measured in the field.

A list of the sample sites and the types of samples collected at each site is given in Appendix 3, along with analytical results and values for blank and duplicate samples [note that for these samples, a 'duplicate' sample is an independently-prepared sample from the same site rather than a second analysis of the same sample]. A description of the sample collection, storage, preparation, and analysis procedures for each type of sample is given below. All samples were tracked with chain-of-custody forms and a custody seal was placed on the sample container at the time of sampling, such that the sample container could not be opened without breaking the seal. Chain-of-custody documentation for all samples is provided in Appendix 2.

Water Samples

Water samples were analyzed for major-ion chemistry, trace element content, the isotopic composition of dissolved nitrogen compounds, glycols, petroleum hydrocarbons, and screened for semi-volatile organic compounds.

Samples for major-ion chemistry analysis were collected in two 500 mL poly bottles. The water placed in one of the two bottles was filtered through a 0.45 μm polyethersulfone (PES) filter and then acidified with 10 drops of reagent-grade nitric acid. The water in the second bottle was unfiltered and unacidified. In the field, samples were stored in insulated coolers to maintain a temperature as close to 4 °C as possible. After transport to Reno, Nevada, samples were stored in a refrigerator until transferred to the Desert Research Institute (DRI) Analytical Chemistry Laboratory for analysis.

Samples for trace element analysis were collected in pre-cleaned, acid-rinsed, 500 mL poly bottles after being filtered through a pre-cleaned 0.45 μm PES filter. Each sample had 5 mL of Seastar Baseline trace-metal-grade nitric acid added after collection. In the field, samples were stored in insulated coolers to maintain a temperature as close to 4 °C as possible. After transport to Reno, samples were stored in a refrigerator until transferred to the DRI Ultra-Trace Chemistry Laboratory for analysis. Samples from the Main Lake depression contained significant amounts of fine (<0.45 μm) sediment. Because addition of acid (standard metals sample preservation technique) to samples in the field could dissolve some of the suspended material, or release metals adsorbed on the suspended material into solution, aliquots of unfiltered, unacidified water were filtered through 0.1 μm polycarbonate membranes in the laboratory prior to acidification. The trace element concentrations measured in the laboratory filtered samples are more representative of actual dissolved trace

element concentrations; the concentrations measured in the field-filtered and acidified samples are more representative of the dissolved trace-element concentrations that might result from raw, unfiltered watering-hole water encountering the low-pH environment of a horse's stomach (see Merritt, 2003).

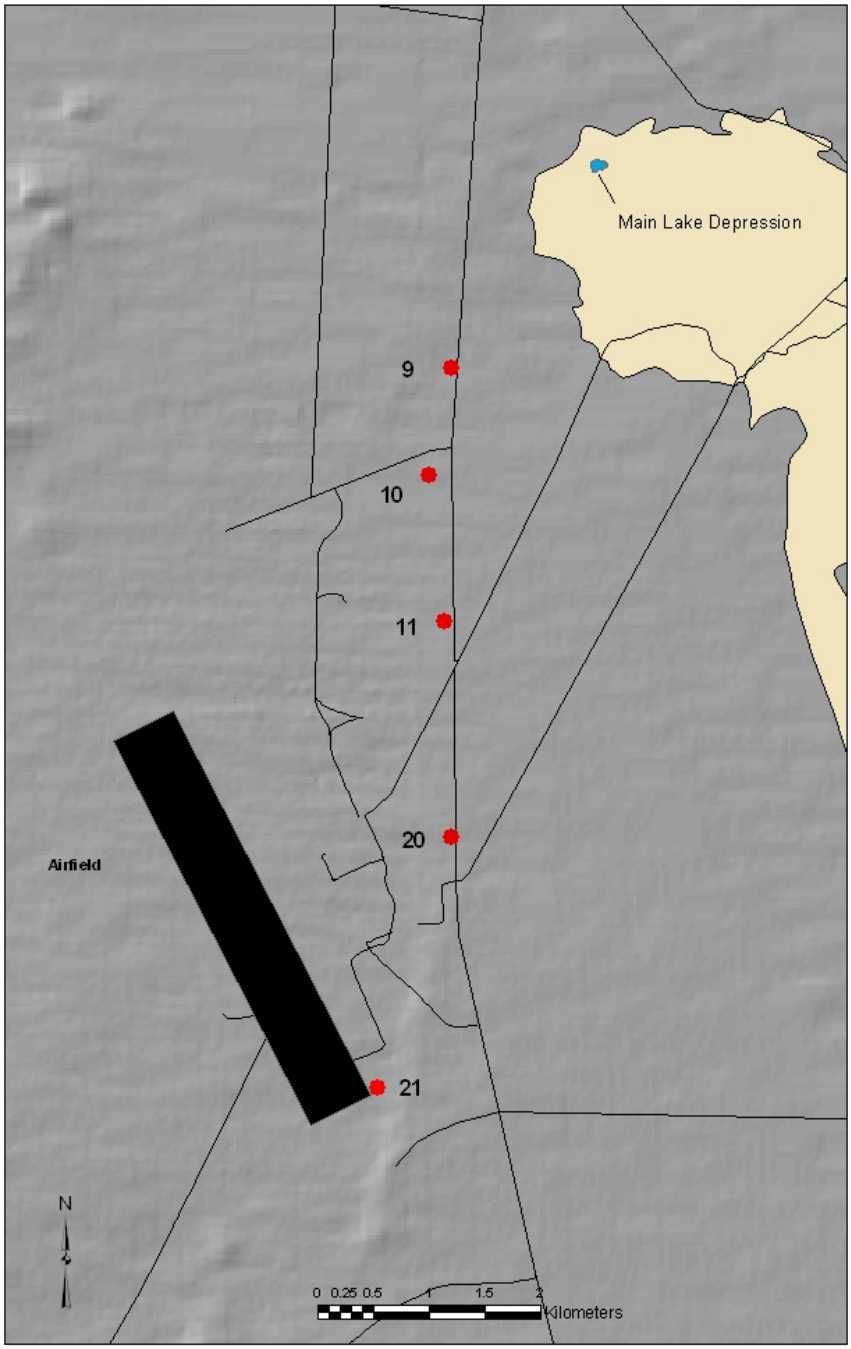

Figure 1b. Close-up view of a portion of the area shown in Figure 1a, focusing on the NTTR airfield and the playa and Main Lake depression to the northeast, with locations of samples collected by DRI in February 2008.

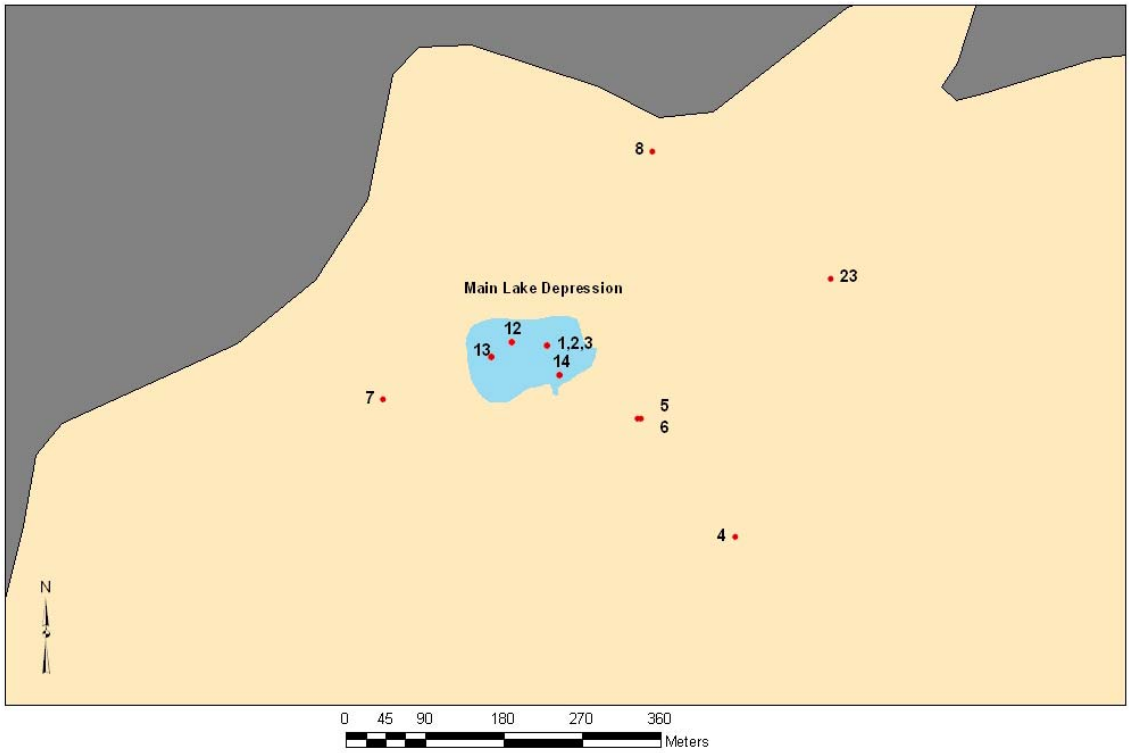

Figure 1c. Close-up view of the a portion of the area shown in Figure 1b, focused on the Main Lake depression and immediate vicinity, with locations of samples collected in and around the depression collected by DRI in February 2008.

Samples for nitrogen isotope analysis were collected in 7.6 L poly containers to obtain sufficient N to allow isotopic analysis. Most water was filtered through a 0.2 μm cartridge filter prior to collection; the two watering-hole water samples contained too much fine sediment for field filtration, so they were collected after filtration through a 0.45 μm cartridge filter. In the field, samples were stored in insulated coolers to maintain a temperature as close to 4 °C as possible. After transport to Reno, samples were stored in a refrigerator until transferred to the Purdue Stable Isotope (PSI) facility at Purdue University for analysis. Samples were conveyed to PSI in insulated coolers packed with ice, and shipped via overnight delivery service. PSI was notified of the fact that the two watering-hole water samples had not been filtered through 0.2 μm filters, and the decision was made for PSI to perform the filtration in the laboratory as part of their sample processing.

Samples for semi-volatile organic screening were collected in 1 L amber glass bottles. The remaining samples for organics analysis were collected in 40 mL volatile organic analysis (VOA) vials. Samples for total petroleum hydrocarbons extractable (TPH-E) and total petroleum hydrocarbons purgeable (TPH-P) were collected in individual VOA vials that had been pre-filled with hydrochloric acid. Vials were filled so as to eliminate headspace without overfilling (which could have caused some of the preservative acid to be lost). Samples for glycol analysis were collected in a VOA vial with no acidification. In the field, samples were stored in insulated coolers to maintain a temperature as close to 4 °C as possible. After transport to Reno, samples were stored in a refrigerator until transferred to

Alpha Analytical in Reno for analysis (glycol analyses were performed by Zalco Laboratories in Bakersfield, CA, under subcontract to Alpha Analytical; all other organics analyses were performed in-house at Alpha Analytical).

Soil/Sediment Samples

Collection

Samples of soil and sediment were analyzed for major-ion chemistry, trace element content, the isotopic composition of dissolved nitrogen compounds, glycols, petroleum hydrocarbons, and screened for semi-volatile organic compounds.

Two 0.95 L glass jars were filled with soil/sediment for major-ion chemistry analysis. In the field, samples were stored in insulated coolers to maintain a temperature as close to 4 °C as possible. After transport to Reno, samples were stored in a refrigerator until transfer to the DRI Soils Laboratory for preparation of soil extracts.

For trace element analysis, approximately 1 L of soil/sediment was placed in plastic bags; sampling was conducted to avoid contamination from metal implements. The Main Lake depression sediment samples were collected in a PVC sampler. In all other cases, the upper surface was frozen solid, so a rotary hammer was used to break up the frozen crust (approximately 15 cm thick). Once the upper layer was broken apart, the exposed material was soft, and plastic implements were used to scrape away several inches of the surface material in an effort to remove any soil that might have been in contact with the metal of the rotary hammer. In the field, samples were stored in insulated coolers to maintain a temperature as close to 4 °C as possible. After transport to Reno, samples were stored in a refrigerator until transfer to the DRI Ultra-Trace Chemistry Laboratory for preparation of soil extracts.

For nitrogen isotope analysis, four 1 L glass jars were filled with soil/sediment. In the field, samples were stored in insulated coolers to maintain a temperature as close to 4 °C as possible. After transport to Reno, samples were stored in a refrigerator until transferred to the PSI facility at Purdue University for analysis. Samples were conveyed to PSI in insulated coolers packed with ice, and shipped via overnight delivery service.

For organics analyses, two soil/sediment samples were collected in glass jars. Soil from one jar (collection volume 0.24 L) was used for the TPH-E and TPH-P analyses, as well as the semi-volatile screening. Soil from the second jar (collection volume 0.12 L) was used for glycol analysis. In the field, samples were stored in insulated coolers to maintain a temperature as close to 4 °C as possible. After transport to Reno, samples were stored in a refrigerator until transferred to Alpha Analytical in Reno for analysis (glycol analyses were performed by Zalco Laboratories in Bakersfield, CA, under subcontract to Alpha Analytical; all other organics analyses were performed in-house at Alpha Analytical).

Processing

Analysis of major-ion chemistry and trace elements were performed on soil extracts prepared at DRI; all other sample processing was carried out by the laboratory to which the samples were submitted. All soil extracts were made using a 1:10 soil:liquid ratio by weight.

For major-ion analyses, two types of extracts were prepared; one extract was prepared using deionized (DI) water, the other using a 0.5 M KCl solution. The DI water extract was used for the determination of pH, Ca^{2+}, Mg^{2+}, Na^{+}, K^{+}, Cl^{-}, HCO_3^{-}, SO_4^{2-}, NO_2^{-}, and NO_3^{-}. The KCl extract was used for the determination of NH_4^{+}, $O\text{-}PO_4$, and total dissolved P. These analyses were conducted by the DRI Analytical Chemistry Laboratory after preparation of the extracts. Soil/sediment was passed through a 2 mm sieve to integrate the sample, and approximately 4 g of the integrated sieved soil/sediment was collected, which was placed in a poly centrifuge tube. Forty milliliters of liquid were added to the tube, at which point the tube was capped and placed flat on a shaker table and agitated for 15 hr. Samples were centrifuged for 30 min at 3,500 rpm, and then filtered through a 0.45 μm filter. Low-nitrogen filters were used for samples destined for nitrogen analysis. The filtrate was transferred in a poly bottle to the DRI Analytical Chemistry Laboratory for analysis.

For trace element analyses, extracts were prepared using deionized (DI) water. All extract preparation was performed wearing gloves and using nonmetallic laboratory equipment. Approximately 4 g of soil/sediment were removed from each sample container. This material was placed in a pre-cleaned, acid-rinsed, poly centrifuge tube. Forty milliliters of DI water were added to the tube, at which point the tube was capped and placed flat on a shaker table and agitated for 15 hr. Samples were centrifuged for 10 min at 2,500 rpm and then filtered through a pre-cleaned 0.45 μm filter into a pre-cleaned, acid-rinsed, poly centrifuge tube. Samples that were cloudy after the 0.45 μm filtration were filtered through a pre-cleaned 0.1 μm filter. After filtration, 400 μL of Seastar Baseline trace-metal grade nitric acid were added. A set of additional extracts were made using samples of sediment from the Main Lake depression. For these additional samples, 400 μL of Seastar Baseline trace-metal grade nitric acid were added to the sediment/DI water mixture prior to shaking. The acidified extracts were prepared because pH has a significant impact on metal solubility and mobility. As a result, metal uptake from the water in the low-pH horse stomach could differ from that predicted using a DI water soil extract. The acidified extracts were prepared to mimic the most acidic conditions that might be present in a horse stomach (see Merritt, 2003). Samples were then transferred to the DRI Ultra-Trace Chemistry Laboratory for analysis.

Analytical Results

Because not all analyses have been completed (i.e., nitrogen isotopes), and other analyses have only recently been completed, a detailed interpretation of the analytical results is not possible at this stage. A report with more detailed evaluation will be issued in the summer 2008; this section gives only a brief discussion of some of the more notable results from the chemical analyses.

Of first note is that dissolved solids concentrations in the Main Lake depression were much lower in the samples DRI collected in February 2008 (total dissolved solids [TDS] <1,000 mg/L; see Table 2A of Appendix 3) than that observed in summer 2007 (TDS > 31,000 mg/L). This difference in concentration is likely the result of evaporative concentration during the summer months affecting the earlier samples, while DRI's samples were collected at a time when evaporation was low and the depression had received dilute inflow of rainwater greatly increasing the volume of water in the depression (the water depth in February 2008 was approximately 2 m).

Organic Chemicals

Data for organic chemicals are given in Table 3 of Appendix 3. There were no positive results for glycols (components of aircraft de-icing agents), although many glycols undergo relatively rapid natural biodegradation, with laboratory half-lives of one to 12 days in aerobic water, and 0.2 to four days in soils (U.S. Environmental Protection Agency, 2000). There were also no semivolatile organic compounds identified, and gasoline-range hydrocarbons were not identified in any of the samples.

Five culvert sediment samples tested positive for low concentrations of oil-range organic chemicals (15 to 90 mg/kg), and one of the samples also contained low concentrations of diesel-range organic chemicals (13 mg/kg). These samples were collected in natural drainages between the airfield and the Main Lake depression. They were collected near roads for ease of access, but were collected up-elevation of the roads so that they would not be influenced by runoff from the roads. It is likely that these occurrences of organic chemicals are the result of runoff from the airfield that incorporates oil from small drips from vehicles (e.g., Lopes and Dionne, 1998; Bris *et al.*, 1999; Lau and Stenstrom, 2005). Neither the watering-hole water nor the watering-hole sediment tested positive for oil-range or diesel-range organic chemicals.

Inorganic Chemicals

As mentioned previously, the samples collected from the Main Lake depression in February 2008 are relatively dilute and do not now appear to contain dissolved concentrations of any individual compound sufficient to be acutely toxic to horses (results are given in Table 2 of Appendix 3).

The February 2008 nitrate concentrations in the watering-hole water samples (6.4 and 11.8 mg/L) are moderately high for natural waters. Nitrate concentrations (as N) in the extracts from sites 4, 7, and 8 (drainage channels near the Main Lake depression; concentrations were 130, 1,927, and 355 mg/kg, respectively) are higher than would be expected in a typical near-surface desert soil (Leatham *et al.*, 1983; Walvoord *et al.*, 2003; McMahon *et al.*, 2006), and bear further investigation. The forthcoming nitrogen isotope analyses will help to determine if the source of these high nitrate values is natural or anthropogenic. Although arsenic concentrations in the watering-hole water (25.4 and 24.6 μg/L) are above the drinking-water standard for humans of 10 μg/L, they are below the recommended level for livestock of 200 μg/L (Lopes and Dionne, 1998).

An issue complicating assessment of possible toxicity to horses is that the watering-hole water contains significant amounts of suspended solids. Even after field filtration through a 0.45 μm filter, the watering-hole water samples contained enough suspended sediment that they were opaque. Because metals tend to have positive charges and soil/sediment particles tend to have negatively charged surfaces, under typical conditions for natural waters, many metals tend to adsorb onto sediment particles preferentially to being dissolved in water. However, at low pH (as could be encountered in a horse stomach), the solubility of metals is greatly increased. As a result, introducing water with relatively low dissolved metals content, but with a high suspended sediment content, into the acidic environment of the stomach could lead to an in-stomach solution with greatly elevated dissolved metals levels. Watering-hole water subjected to acidification had aluminum

concentrations of 21.7 and 28.4 mg/L (see Table 4A of Appendix 3), above the recommended level for livestock of 5.0 mg/L (Soltanpour and Raley, 1993), but no assessment has been made as to whether or not these levels would be acutely toxic.

SUMMARY

Twenty-two samples were collected at the NTTR in February 2008 to help determine possible causes of the death of 71 horses in July 2007, including seven water samples and 15 samples of soil or sediment. This report provides a compilation of the data available to date, and a preliminary discussion of some analysis results of interest. Water in the Cactus Flat Main Lake depression was significantly less saline in February 2008 than in summer 2007, likely because of low evaporation and dilution by recent precipitation. Some sediment samples in drainage channels near the depression had higher-than-expected levels of nitrate, and some drainage channel sediments also tested positive for low levels of organic chemicals associated with motor oil (one sample also had a low level of diesel-type organic chemicals). However, the levels of nitrate in the Main Lake depression waters and sediments were lower than the anomalous concentrations observed in the drainages, and neither the waters nor the sediments from the depression contained detectable amounts of oil or diesel-type organic chemicals.

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APPENDIX 1. Final report of the California Animal Health & Food Safety Laboratory System regarding samples collected at the NTTR in July 2007. Samples were collected by the California Animal Health & Food Safety Laboratory System on behalf of the U.S. Bureau of Land Management; collection was concurrent with the sample described in Appendix 2).

Final Report Printed: 08/15/07

(This report supersedes all previous reports for this accession)

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* Emailed Copy. *
* A signed original is on file. *
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ACCESSION#:T0701789
District:
County: NEVADA
Case Coordinator: RMOELLER

Submitter
MARIAN VANDERSCHRAAF DVM
CALIF DEPT OF FOOD AND AG
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TULARE, CA 93274

Owner:
BUREAU OF LAND MANAGEMENT
LAS VEGAS FIELD OFFICE
4707 N TORREY PINES DR
LAS VEGAS, NV 89130

Agent or Collector:
Reference Number:

Species: NONAPPLICABLE
Herd/Flock ID:
Date Taken:
Date Received: 07/25/07

9 Specimens submitted: 5 pond, 2 dirt, and water-2

Approved by: Robert Moeller, DVM

L A B O R A T O R Y F I N D I N G S / D I A G N O S I S

1. Evaluation of environmental samples from Nellis Air Force Base:
- **a. Botulism toxin testing Dirt sample: negative for Botulinum toxin**
- **b. Anatoxin A testing (Water samples 1 and 2): Not detected.**
- **c. Microcystin testing (Water samples 1 and 2): not detected**
- **d. Salt screen (Water samples 1 and 2): see report, not significant**
- **e. Salt screen (Pond sample 5-9; pond scum): See report.**
- **f. Nitate/Nitrite levels Water sample 1: 5 ppm nitrate/not detected nitrite**
- **** g. Nitrate/Nitrite levels Water sample 2: 3670 ppm nitrate/50 ppm nitrite, probable toxic levels**
- **h. Extended heavy metal screen dirt samples (#3 & 4): See report**
- **i. Extended heavy metal screen on Pond samples 5-9: See report**
- **j. Organic compound screen on Water samples: Negative**
- **k. Nitrate screen on dirt(Sample 3 & 4) and pond scum (Sample 6 and 8):**
  - **Sample 6 pond scum: 3940 ppm nitrate and 848 ppm nitrite**
  - **Sample 8 pond scum: 3440 ppm nitrate and 825 ppm nitrite**
  - **Sample 4 Wet muck from edge at pond bank interface: 498 ppm nitrates**

A C C E S S I O N S U M M A R Y

Microcystin was not detected in the water samples. The salt screens of the water appear to have levels of the various elements at levels that would not be considered toxic. The pond scum samples (sample 5-9) have more elevated levels of the various elements but it is doubtful that the horse would be drinking a large amount of these samples. I am currently performing nitrate testing on the water samples (Sample 1 and 2), these results are pending.

08/03/07
The nitrate/nitrite levels in water sample 2 are very high. These levels are a concern and may be a factor in the deaths of the horses. The first water sample is low in nitrates, it is unknown why this has happened. I feel that this sample should be similar to the composite water sample. However it is possible that the nitrate may stratify in the water column resulting in the very high levels at various levels in the water. I would recommend that several water samples be taken at various depths in the pond to see if the water is stratifying. It is possible that the horses are coming to the pond and either mixing the water column or drinking at deeper depths that other animals are not drinking at which would result in the ingestion of possible toxic levels of nitrates. Water having this high of nitrates and nitrites would not be safe to drink for humans, cattle or sheep. Unfortunately, we known little about nitrates in horses and what would be toxic to them (I did a literature search (pubmed) and could not identify any articles dealing with nitrate toxicity in horses that have been written over the past 30 years). We are performing some organic screens on the water samples to see if we can identify a possible organic compound from which the nitrates could originate from.

08/08/07
The GC/MS screen was negative for possible organic compounds in the water.

08/15/07 Final report.

The pond muck (Sample 6 and 8) had very high nitrate and nitrite levels which could contribute to nitrate/nitrite toxicity. The dirt at the pond interface samples (Samples 4) contained 498 ppm nitrate and no nitrites. It is felt that these levels of nitrate and nitrite are toxic and may have contributed significantly to the death of the horses. From the samples submitted, I cannot determine the source of nitrates. It is possible that environmental conditions were just right to cause natural nitrogen fixing bacteria to multiply and elevate the levels of nitrates and nitrites in the water. It is possible that the poor water conditions and markedly depleted water hole may have had a high organic matter overload resulting in the production of nitrates and nitrites. I cannot also preclude nitrogen sources that could be manmade or natural. Further on the ground investigation for these sources will have to be performed to exclude these as possible sources of the nitrates and nitrites in the water. If a source is identified, please let me know since nitrate toxicity cases in horses are rare. If you wish more testing on some of the other samples please contact us as soon as possible.

T O X I C O L O G Y

Anatoxin-a was not detected in the submitted water samples at or above the indicated method detection limit. The samples were also negative for the listed microcystins.

The detected mineral contents of the various environmental samples are unremarkable. None of the metals included in our extended heavy metal screen are at sufficiently high concentrations to cause concern.

The detected nitrate/nitrite concentrations in water sample #2 (composite sample) would certainly be toxic for ruminants. The lack of data related to the toxicity of nitrates and nitrites to horses makes interpretation more problematic. Given the very high ocular fluid nitrate results and the rather high concentrations in the one water sample, nitrate/nitrite intoxication is possible in this case. Please note the higher nitrite concentrations detected in the "scum" samples. The relatively high nitrite concentrations re-enforce the suspicion of nitrate/nitrite intoxication.

No toxic compounds were detected using our gas chromatography - mass spectrometry (GC/MS) organic chemical screen for the two water samples. The GC/MS screen is designed to potentially detect a large number of organic compounds belonging to diverse chemical classes (pesticides, environmental contaminants, drugs and natural products).

Please note the pH values for the two water samples.

MDL = method detection limit (lowest concentration detectable by our test method).

HEAVY METALS- EXTENDED

Specimen Type WATER

Elements	As	Ba	Be	Cd
MDL	0.1 PPM	0.01 PPM	0.002 PPM	0.03 PPM
1-WATER	< 0.1 PPM	< 0.01 PP	< 0.002 P	< 0.03 PP
2-WATER	< 0.5 PPM	1.04 PPM	< 0.01 PP	< 0.15 PP

Elements	Co	Cr	Cu	Fe
MDL	0.03 PPM	0.03 PPM	0.01 PPM	0.02 PPM
1-WATER	< 0.03 PP	< 0.03 PP	< 0.01 PP	< 0.02 PP
2-WATER	< 0.15 PP	< 0.15 PP	0.07 PPM	53.2 PPM

Elements	Hg	Mn	Mo	Ni
MDL	0.1 PPM	0.004 PPM	0.04 PPM	0.03 PPM
1-WATER	< 0.1 PPM	< 0.004 P	< 0.04 PP	< 0.03 PP
2-WATER	< 0.5 PPM	1.81 PPM	1.0 PPM	< 0.15 PP

Elements	Pb	Tl	V	Zn
MDL	0.1 PPM	0.1 PPM	0.03 PPM	0.01 PPM
1-WATER	< 0.1 PPM	< 0.1 PPM	< 0.03 PP	< 0.01 PP
2-WATER	< 0.5 PPM	< 0.5 PPM	0.50 PPM	0.2 PPM

Specimen Type DIRT

Elements	As	Ba	Be	Cd
MDL	150 PPM	.5 PPM	.1 PPM	1.5 PPM
3-DIRT	< 150 PPM	132 PPM	1.4 PPM	< 1.5 PPM
4-DIRT	< 20 PPM	29 PPM	< .1 PPM	< 1.5 PPM

Elements	Co	Cr	Cu	Fe
MDL	1.5 PPM	1.5 PPM	.5 PPM	10 PPM
3-DIRT	< 1.5 PPM	18 PPM	12.0 PPM	17500 PPM
4-DIRT	< 1.5 PPM	< 1.5 PPM	3.6 PPM	1490 PPM

Elements	Hg	Mn	Mo	Ni
MDL	5 PPM	.2 PPM	10 PPM	1.5 PPM
3-DIRT	< 5 PPM P	368 PPM	< 10 PPM	14 PPM
4-DIRT	< 5 PPM	133 PPM	< 2 PPM	< 1.5 PPM

Elements	Pb	Tl	V	Zn
MDL	60 PPM	5 PPM	1.5 PPM	.5 PPM
3-DIRT	< 60 PPM	40 PPM	30 PPM	57.3 PPM
4-DIRT	< 15 PPM	< 5 PPM	< 1.5 PPM	6.2 PPM

Specimen Type WATER-POND

Elements	As	Ba	Be	Cd
MDL	2.5 PPM	0.25 PPM	0.05 PPM	0.75 PPM
5-POND	< 2.5 PPM	15.9 PPM	< 0.05 PP	< 0.75 PP
6-POND	< 5 PPM	43.6 PPM	0.4 PPM	< 1.5 PPM
7-POND	< 2 PPM	43.8 PPM	0.61 PPM	< 0.6 PPM
8-POND	< 5 PPM	80.5 PPM	1.0 PPM	< 1.5 PPM
9-POND	< 2 PPM	68.7 PPM	0.8 PPM	< 0.6 PPM

Elements	Co	Cr	Cu	Fe
MDL	0.75 PPM	0.75 PPM	0.25 PPM	0.5 PPM
5-POND	1.4 PPM	1.6 PPM	1.9 PPM	1560 PPM
6-POND	3.6 PPM	4.0 PPM	4.1 PPM	4160 PPM
7-POND	2.9 PPM	4.4 PPM	2.3 PPM	4460 PPM
8-POND	5.5 PPM	7.8 PPM	9.0 PPM	8330 PPM
9-POND	4.4 PPM	6.7 PPM	7.8 PPM	6970 PPM

Elements	Hg	Mn	Mo	Ni
MDL	2.5 PPM	0.1 PPM	1 PPM	0.75 PPM
5-POND	< 2.5 PPM	55.4 PPM	2 PPM	3.1 PPM
6-POND	< 5 PPM	162 PPM	< 2 PPM	6.6 PPM
7-POND	< 2 PPM	173 PPM	3 PPM	6.8 PPM
8-POND	< 5 PPM	300 PPM	5 PPM	12.5 PPM
9-POND	< 2 PPM	282 PPM	3.8 PPM	9.7 PPM

Elements	Pb	Tl	V	Zn
MDL	2.5 PPM	2.5 PPM	0.75 PPM	0.25 PPM
5-POND	< 2.5 PPM	5.1 PPM	4.0 PPM	6.2 PPM
6-POND	< 5 PPM	11 PPM	11.7 PPM	14.1 PPM
7-POND	< 2 PPM	11 PPM	8.7 PPM	20.0 PPM
8-POND	< 10 PPM	19 PPM	16.0 PPM	32.7 PPM
9-POND	< 10 PPM	15 PPM	12.8 PPM	28.3 PPM

ANATOXIN-A

Specimen Information Id	Type	Result	MDL
1-WATER	WATER	Not Detected	0.01 ppm
2-WATER	WATER	Not Detected	0.01 ppm

MICROCYSTINS

WATER SPECIMEN.ID	MDL	MICROCYSTIN LR	MICROCYSTIN LA	MICROCYSTIN YR	MICROCYSTIN RR
		1 ppb	1 ppb	1 ppb	1 ppb
1-WATER		Not Detected	Not Detected	Not Detected	Not Detected
2-WATER		Not Detected	Not Detected	Not Detected	Not Detected

NITRATE SCREEN

WATER SPECIMEN.ID	MDL	Nitrate	Nitrite
			1 ppm
1-WATER		Conf. Req'd	Not Detected
2-WATER		Conf. Rq'd	Conf. Req'd

DIRT SPECIMEN.ID	MDL	Nitrate	Nitrite
			10 ppm
4-DIRT		Conf. Req'd	Not Detected

WATER-POND SPECIMEN.ID	MDL	Nitrate	Nitrite
6-POND		Conf. Req'd	Conf. Req'd
8-POND		Conf. Req'd	Conf. Req'd

NITRATE CONFIRMATION

WATER		Nitrate	Nitrite
SPECIMEN.ID	MDL	1 ppm	1 ppm
1-WATER		5 ppm	Not Detected
2-WATER		3670 ppm	50 ppm

DIRT		Nitrate
SPECIMEN.ID	MDL	100 ppm
4-DIRT		498 ppm

WATER-POND		Nitrate	Nitrite
SPECIMEN.ID	MDL	1000 ppm	500 ppm
6-POND		3940 ppm	848 ppm
8-POND		3440 ppm	825 ppm

SALT SCREEN

Specimen Type WATER

Salts	Calcium	Magnesium	Phosphorus
MDL	0.05 PPM	0.05 PPM	0.05 PPM
1-WATER	23.0 PPM	1.70 PPM	< 0.05 PP
2-WATER	80.8 PPM	52.6 PPM	4.4 PPM

Salts	Potassium	Sodium	Sulfur
MDL	0.3 PPM	4 PPM	0.07 PPM
1-WATER	6.4 PPM	47 PPM	11.7 PPM
2-WATER	153 PPM	4800 PPM	624 PPM

Specimen Type WATER-POND

Salts	Calcium	Magnesium	Phosphorus
MDL	1 PPM	1 PPM	1 PPM
5-POND	2670 PPM	1050 PPM	79 PPM
6-POND	23800 PPM	2560 PPM	249 PPM
7-POND	7570 PPM	3230 PPM	227 PPM
8-POND	15600 PPM	5380 PPM	453 PPM
9-POND	13700 PPM	4790 PPM	358 PPM

Salts	Potassium	Sodium	Sulfur
MDL	6 PPM	80 PPM	1.4 PPM
5-POND	1110 PPM	6000 PPM	645 PPM
6-POND	2530 PPM	4130 PPM	369 PPM
7-POND	3170 PPM	6150 PPM	474 PPM
8-POND	5230 PPM	7290 PPM	477 PPM
9-POND	4500 PPM	6040 PPM	385 PPM

pH

Specimen Information ID	Type	Results
1-WATER	WATER	7.57
2-WATER	WATER	8.77

ORGANIC COMPND BY REQUEST

WATER SPECIMEN.ID	MDL	GC-MS Screen
1-WATER		Negative
2-WATER		Negative

B A C T E R I O L O G Y

CLOSTRIDIUM BOTULINIUM - TOXIN TESTING (T)

Specimen Information ID	Type	Results
4-DIRT	DIRT	Negative for Botulinum toxin

C L I N I C A L H I S T O R Y

Water samples from Nellis Air Force Base where horse die off has occurred.
Sample #1 Pond water sample
Sample #2 Composite water sample (top, middle, and bottom layers)
Sample #3 Dirt from lake bed
Sample #4 Wet muck at water/bank interface
Sample #5 Water (pond) scum
Sample #6 Pond water scum
Sample #7 Pond water scum
Sample #8 Pond water scum
Sample #9 Pond water scum
Request a mineral screen on water samples and dirt. Blue/green algae evaluation on water samples and pond scum.

C O N T A C T L O G S U M M A R Y

Report	Date Reported
Preliminary 4	08/08/07-
Preliminary 3	08/03/07-
Preliminary 2	08/01/07-
Preliminary 1	07/30/07-

S P E C I M E N S U M M A R Y

Specimen Type	Breed	ID	Age	Sex	Qty
WATER	ENVIRONMENTAL	Multiple IDs			2
DIRT	ENVIRONMENTAL	Multiple IDs			2
WATER-POND	ENVIRONMENTAL	Multiple IDs			4
WATER-POND	ENVIRONMENTAL	Multiple IDs			5

APPENDIX 2. Excerpt of chemical data for a water sample collected from the Cactus Flat Main Lake depression on the NTTR in July 2007. Sample was collected on behalf of the U.S. Air Force; collection was concurrent with the samples described in Appendix 1.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

CSC Applied Technologies LLC
P.O. Box 569
Indian Springs, NV 89018
Attention: Cynthia Lang

Project ID: Gun Pit North End
Report Number: PQG0762

Sampled: 07/23/07
Received: 07/25/07

INORGANICS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: PQG0762-01 (NS070723-01,2,3,4 - Water)								
Reporting Units: mg/l								
Chloride	EPA 300.0	P7G2505	50	**2100**	100	7/25/2007	7/25/2007	
Fluoride	EPA 300.0	P7G2505	1.0	**5.0**	10	7/25/2007	7/25/2007	
Nitrate/Nitrite-N	EPA 300.0	P7G2505	20	**1000**	100	7/25/2007	7/25/2007	
Nitrate-N	EPA 300.0	P7G2505	10	**1000**	100	7/25/2007	7/25/2007	
Nitrite-N	EPA 300.0	P7G2505	10	**18**	100	7/25/2007	7/25/2007	
Sulfate	EPA 300.0	P7G2505	50	**2100**	100	7/25/2007	7/25/2007	
Total Dissolved Solids	SM2540C	P7G2801	200	**31000**	10	7/27/2007	7/27/2007	
Sample ID: PQG0762-01 (NS070723-01,2,3,4 - Water)								
Reporting Units: pH Units								
pH	EPA 150.1	P7G2521	NA	**8.95**	1	7/25/2007	7/25/2007	HTI
Temp. at time of pH Analysis (°C)	EPA 150.1	P7G2521	NA	**20.3**	1	7/25/2007	7/25/2007	HTI

TestAmerica - Phoenix, AZ

Carlene McCutcheon
Project Manager

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

CSC Applied Technologies LLC
P.O. Box 569
Indian Springs, NV 89018
Attention: Cynthia Lang

Project ID: Gun Pit North End
Report Number: PQG0762

Sampled: 07/23/07
Received: 07/25/07

METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: PQG0762-01 (NS070723-01,2,3,4 - Water)								
Reporting Units: mg/l								
Barium	EPA 200.7	7G27136	0.010	**0.66**	1	7/27/2007	7/29/2007	
Beryllium	EPA 200.7	7G27136	0.0020	**0.0070**	1	7/27/2007	7/29/2007	
Cadmium	EPA 200.7	7G27136	0.0050	ND	1	7/27/2007	7/29/2007	
Chromium	EPA 200.7	7G27136	0.0050	**0.053**	1	7/27/2007	7/29/2007	
Copper	EPA 200.7	7G27136	0.010	**0.12**	1	7/27/2007	7/29/2007	
Iron	EPA 200.7	7G27136	0.040	**71**	1	7/27/2007	7/29/2007	
Magnesium	EPA 200.7	7G27136	0.020	**59**	1	7/27/2007	7/29/2007	
Manganese	EPA 200.7	7G27136	0.020	**1.9**	1	7/27/2007	7/29/2007	
Mercury	EPA 245.1	7G26065	0.00020	ND	1	7/26/2007	7/26/2007	
Nickel	EPA 200.7	7G27136	0.010	**0.060**	1	7/27/2007	7/29/2007	
Selenium	EPA 200.7	7G27136	0.010	**0.076**	1	7/27/2007	7/29/2007	
Zinc	EPA 200.7	7G27136	0.020	**0.30**	1	7/27/2007	7/29/2007	
Sample ID: PQG0762-01 (NS070723-01,2,3,4 - Water)								
Reporting Units: ug/l								
Antimony	EPA 200.8	7G27145	40	ND	20	7/27/2007	8/1/2007	RL1
Arsenic	EPA 200.8	7G27145	20	**540**	20	7/27/2007	8/1/2007	
Thallium	EPA 200.8	7G27145	20	ND	20	7/27/2007	8/3/2007	RL1

TestAmerica - Phoenix, AZ

Carlene McCutcheon
Project Manager

APPENDIX 3. Chemical Data from samples collected by DRI at the NTTR in February 2008.

Table 1. General sample site descriptions for samples collected by DRI at the NTTR in February 2008.

Sample Number	Sample Description	Collection Date	Collection Time	UTM N (NAD 83)[1]	UTM E (NAD 83)[1]	Elevation (ft)	Elevation (m)
1	Main Lake depression water, 2 m depth	2/6/2008	9:20	522881	4188970	5,340	1,628
2	Main Lake depression water, 0.3 m depth	2/6/2008	10:45	522881	4188970	5,340	1,628
3	Main Lake depression sediment	2/6/2008	12:30	522881	4188970	5,340	1,628
4	Drainage sediment	2/6/2008	13:30	523095	4188751	5,317	1,621
5	Drainage sediment	2/6/2008	14:15	522984	4188885	5,316	1,620
6	Drainage sediment	2/6/2008	14:45	522987	4188885	5,316	1,620
7	Drainage sediment	2/6/2008	15:10	522692	4188908	5,310	1,618
8	Drainage sediment	2/6/2008	15:30	523000	4189191	5,328	1,624
9	Culvert sediment	2/6/2008	16:00	521543	4187128	5,343	1,629
10	Culvert sediment	2/6/2008	16:30	521365	4186168	5,361	1,634
11	Culvert sediment	2/6/2008	16:50	521491	4184865	5,418	1,651
12	Main Lake depression sediment	2/7/2008	7:30	522839	4188972	5,311	1,619
13	Main Lake depression sediment	2/7/2008	8:10	522815	4188961	5,317	1,621
14	Main Lake depression sediment	2/7/2008	9:25	522894	4188937	5,320	1,622
16	Cedar Wells Spring water	2/7/2008	11:30	566251	4173559	6,364	1,940
17	Rose Spring water	2/7/2008	13:00	558836	4177875	7,145	2,178
18	Corral Spring water	2/7/2008	14:45	554177	4182033	6,596	2,010
19	Silverbow Spring Tank water	2/7/2008	16:30	541960	4186893	5,965	1,818
20	Culvert sediment	2/8/2008	7:15	521555	4182892	5,476	1,669
21	Culvert sediment	2/8/2008	8:30	520887	4180677	5,474	1,668
22	Cactus Spring water	2/8/2008	11:15	516060	4174979	6,274	1,912
23	Drainage sediment	2/8/2008	12:20	523204	4189046	5,341	1,628

Note that there is no sample number 15

[1]UTM: Universal Transverse Mercator coordinate system
(N = northing, E = easting; NAD 83 = North American Datum of 1983)

Table 2A. Major-ion chemical data for water samples collected by DRI at the NTTR in February 2008.

Sample Number	Sample Description	Field pH	Lab pH	Field EC[1] (µS/cm)	Lab EC[1] (µS/cm)	Field DO[2] (mg/L)	Temperature (°C)	SiO_2 (mg/L)	HCO_3^- (mg/L)	CO_3^{2-} (mg/L)	Cl^- (mg/L)	SO_4^{2-} (mg/L)	NO_3^- (as N) (mg/L)	NO_3^- (mg/L)	Na^+ (mg/L)	K^+ (mg/L)	Ca^{2+} (mg/L)	Mg^{2+} (mg/L)	F^- (mg/L)	Br^- (mg/L)	NO_2^- (as N) (mg/L)	NH_3 (as N) (mg/L)	PO_4^{3-} (as P) (mg/L)	Dissolved P (mg/L)	Total P (mg/L)
1	Main Lake depression water, 2 m depth	8.47	8.69	1209	1210	0.47	4.5	-	550	NA	65	58	6.4	28.4	274	13.4	13.3	1.4	0.65	0.03	1.54	0.45	0.490	0.73	6.0
2	Main Lake depression water, 0.3 m depth	8.69	8.59	1139	1210	9.2	1.1	-	559	NA	46	39	11.8	52.2	259	12.7	12.3	1.2	0.75	0.02	0.091	0.36	0.512	0.84	4.9
16	Cedar Wells Spring water	7.55	7.93	702	715	5.56	11.3	-	325	NA	28	76	1.9	8.6	58.7	0.8	85.6	12.9	0.50	0.29	0.001	0.005	0.006	NA	0.010
17	Rose Spring water	7.22	7.85	634	649	4.47	12.8	-	316	NA	24	55	0.9	4.2	44.4	1.9	85.1	11.4	0.35	0.29	<0.001	0.003	0.008	NA	0.013
18	Corral Spring water	7.07	7.75	665	677	3.56	5.5	-	268	NA	37	83	0.1	0.4	76.1	2.8	67.8	7.0	0.95	0.40	<0.001	0.005	0.007	NA	0.010
19	Silverbow Spring Tank water	7.33	7.93	430	440	10.4	1.2	-	205	NA	22	33	0.3	1.2	45.2	2.0	43.2	7.8	0.36	0.20	<0.001	0.005	0.008	NA	0.016
22	Cactus Spring water	7.2	7.80	560	565	0.8	15.5	-	222	NA	26	76	0.0	0.0	56.3	2.6	59.5	7.6	0.71	0.17	<0.001	0.008	0.001	NA	0.002

NA: not applicable

[1]EC: electrical conductivity

[2]DO: dissolved oxygen

Table 2B. Major-ion chemical data for soil/sediment samples collected by DRI at the NTTR in February 2008.

Sample Number	Sample Description	Lab pH	Lab EC[1] (µS/cm)	SiO_2 (mg/kg)	HCO_3^- (mg/kg)	CO_3^{2-} (mg/kg)	Cl^- (mg/kg)	SO_4^{2-} (mg/kg)	NO_3^- (as N) (mg/kg)	NO_3^- (mg/kg)	Na^+ (mg/kg)	K^+ (mg/kg)	Ca^{2+} (mg/kg)	Mg^{2+} (mg/kg)	F^- (mg/kg)	Br^- (mg/kg)	NO_2^- (as N) (mg/kg)	NH_3 (as N) (mg/kg)	PO_4^{3-} (as P) (mg/kg)	Dissolved P (mg/kg)
3	Main Lake depression sediment	9.51	456	412	1438	501.4	80.4	110	3.3	14.4	1005	54	11	2	15	<0.2	0.0	3.6	7.7	8.2
4	Drainage sediment	7.70	968	313	352	NA	145	3379	128	567	1399	158	489	19	4	0.2	0.4	1.1	0.4	0.6
5	Drainage sediment	7.89	797	333	451	NA	14.2	3024	11.8	52.3	1241	152	271	8	3	<0.2	1.1	25.0	0.6	0.8
6	Drainage sediment	9.18	335	371	1044	200.0	34.9	227	27.6	122	670	53	30	1	11	<0.2	0.2	1.2	3.9	4.1
7	Drainage sediment	7.31	2850	282	242	NA	1940	3802	1901	8416	3802	279	1862	74	5	0.6	0.2	1.8	0.1	0.3
8	Drainage sediment	8.43	966	314	666	14.8	461	1872	351	1552	1911	123	74	3	10	0.2	0.1	0.4	0.7	0.8
9	Culvert sediment	8.44	180	346	652	13.8	30.7	78.6	33.5	148	293	46	66	4	18	<0.2	0.1	0.3	3.7	4.0
10	Culvert sediment	8.52	150	345	668	21.7	3.8	77.1	7.0	31.0	265	46	48.8	3	18	<0.2	0.1	1.0	3.7	4.0
11	Culvert sediment	7.89	78	207	399	NA	3.8	9.0	4.9	21.8	80	46	58	4	2	<0.2	0.0	0.7	2.6	2.9
12	Main Lake depression sediment	9.43	414	364	1399	386.1	79.3	133.0	1.5	6.5	929	52	9	1	13	1.4	0.1	8.2	7.5	8.0
13	Main Lake depression sediment	9.29	436	364	1586	311.3	109	200	3.4	15.3	980	53	8	1	12	<0.2	0.1	12.7	6.5	7.1
14	Main Lake depression sediment	8.97	286	275	1290	131.0	21.2	83.6	9.0	39.7	636	53	15.3	2	8.9	0.2	0.7	7.0	4.8	5.2
20	Culvert sediment	7.74	159	198	408	NA	50.1	85.4	54.2	240	175	81	90	7	3	<0.2	0.1	0.9	3.6	3.9
21	Culvert sediment	7.83	106	191	587	NA	7.3	10.3	0.1	0.4	87	65	95	9	2	<0.2	0.2	4.8	2.6	3.3
23	Drainage sediment	9.25	304	377	1202	232.5	13.8	96.2	6.1	27.0	686	51	14	1	12	<0.2	0.1	0.6	4.2	4.5

NA: not applicable

All values reported were measured on soil extracts made with a 10:1 ratio (by mass) of deionized water:soil, and are converted to show mass in the soil

[1]EC: electrical conductivity

Table 3A. Organic chemical data for water samples collected by DRI at the NTTR in February 2008.

Sample Number	Sample Description	TICs[1] (semivolatile)	TPH-E[2,3] (DRO)[4] mg/L	TPH-E[2,3] (ORO)[5] mg/L	TPH-P[2,6] (GRO)[7] mg/L	Diethylene glycol[8]	Ethylene glycol[8]	Propylene glycol[8]	Triethylene glycol[8]
1	Main Lake depression water, 2 m depth	none found	ND	ND	ND	ND	ND	ND	ND
2	Main Lake depression water, 0.3 m depth	none found	ND	ND	ND	ND	ND	ND	ND

Note that organic analyses were not performed on spring waters (samples 16, 17, 18, 19, and 22)
ND: non detect
[1]TICs: Tentatively identified compounds, analyzed by EPA Method SW8270; detection limit is 20 μg/L
[2]TPH: Total petroleum hydrocarbons, analyzed by EPA Method SW8015B
[3]-E: extractable
[4]DRO: diesel range organics, detection limit is 0.5 mg/L
[5]ORO: oil range organics, detection limit is 0.5 mg/L
[6]-P: purgable
[7]GRO: gasoline range organics, detection limit is 0.5 mg/L
[8]Analyzed by EPA Method 8015B, detection limit is 5 mg/L

Table 3B. Organic chemical data for soil/sediment samples collected by DRI at the NTTR in February 2008.

Sample Number	Sample Description	TICs[1] (semivolatile)	TPH-E[2,3] (DRO)[4] mg/kg	TPH-E[2,3] (ORO)[5] mg/kg	TPH-P[2,6] (GRO)[7] mg/kg	Diethylene glycol[8]	Ethylene glycol[8]	Propylene glycol[8]	Triethylene glycol[8]
3	Main Lake depression sediment	none found	ND	ND	ND	ND	ND	ND	ND
4	Drainage sediment	none found	ND	ND	ND	ND	ND	ND	ND
5	Drainage sediment	none found	ND	ND	ND	ND	ND	ND	ND
6	Drainage sediment	none found	ND	50	ND	ND	ND	ND	ND
7	Drainage sediment	none found	ND	ND	ND	ND	ND	ND	ND
8	Drainage sediment	none found	ND	ND	ND	ND	ND	ND	ND
9	Culvert sediment	none found	13	90	ND	ND	ND	ND	ND
10	Culvert sediment	none found	ND	50	ND	ND	ND	ND	ND
11	Culvert sediment	none found	ND	32	ND	ND	ND	ND	ND
12	Main Lake depression sediment	none found	ND	ND	ND	ND	ND	ND	ND
13	Main Lake depression sediment	none found	ND	ND	ND	ND	ND	ND	ND
14	Main Lake depression sediment	none found	ND	ND	ND	ND	ND	ND	ND
20	Culvert sediment	none found	ND	15	ND	ND	ND	ND	ND
21	Culvert sediment	none found	ND	24	ND	ND	ND	ND	ND
23	Drainage sediment	none found	ND	ND	ND	ND	ND	ND	ND

ND: non detect
[1]TICs: Tentatively identified compounds, analyzed by EPA Method SW8270; detection limit is 1,300 μg/kg
[2]TPH: Total petroleum hydrocarbons, analyzed by EPA Method SW8015B
[3]-E: extractable
[4]DRO: diesel range organics, detection limit is 10 mg/kg
[5]ORO: oil range organics, detection limit is 10 mg/kg
[6]-P: purgable
[7]GRO: gasoline range organics, detection limit is 10 mg/kg
[8]Analyzed by EPA Method 8015B, detection limit is 15 mg/kg

Table 4A. Trace element data for water samples collected by DRI at the NTTR in February 2008.

Sample Number	Sample Description	Be (ppb)	Al (ppb)	V (ppb)	Cr (ppb)	Mn (ppb)	Fe (ppb)	Co (ppb)	Ni (ppb)	Cu (ppb)	Zn (ppb)	Sr (ppb)	Mo (ppb)	Ag (ppb)	Cd (ppb)	Sn (ppb)	Sb (ppb)	Ba (ppb)	Tl (ppb)	Pb (ppb)	U (ppb)	As (ppb)	Se (ppb)
1	Main Lake depression water, 2 m depth, centrifuged, lab filtered 0.1 μm, acidified	<10	52.6	32.2	<10	1.6	15.7	<10	<10	15.6	1.2	94.0	50.9	<10	<10	<10	1.8	13.3	<10	<10	5.1	25.4	<20
1A	Main Lake depression water, 2 m depth, field filtered 0.45 μm, acidified, centrifuged, lab filtered 0.1 μm	4.8	21674	52.2	2.0	955.3	2034	9.1	6.8	54.2	41.4	495.9	22.8	<10	1.2	<10	5.7	418.8	<10	46.3	6.8	30.3	<20
2	Main Lake depression water, 0.3 m depth, centrifuged, lab filtered 0.1 μm, acidified	<10	94.0	34.7	<10	3.1	30.5	<10	<10	10.2	1.1	76.0	26.8	<10	<10	<10	1.3	11.0	<10	<10	3.4	24.6	<20
2A	Main Lake depression water, 0.3 m depth, field filtered 0.45 μm, acidified, lab filtered 0.1 μm	5.4	28381	51.2	5.8	1172	6803	11.2	17.8	60.2	68.1	406.3	6.1	<10	<10	<10	<10	399.3	<10	53.6	5.7	23.5	<20
16	Cedar Wells Spring water	<1	<1	6.1	<1	1.7	<1	<1	<1	<1	1.4	1230	2.4	<1	<1	<1	<1	56.4	<1	<1	8.9	2.6	<5
17	Rose Spring water	<1	<1	<1	<1	<1	<1	<1	<1	<1	6.5	1110	1.6	<1	<1	<1	<1	4.2	<1	<1	13.5	1.1	<5
18	Corral Spring water	<1	<1	1.6	<1	<1	<1	<1	<1	<1	4.1	595.1	14.7	<1	<1	<1	<1	4.7	<1	<1	24.3	9.8	<5
19	Silverbow Spring Tank water	<1	1.5	4.0	<1	<1	10.9	<1	<1	2.1	1.5	316.4	1.1	<1	<1	<1	<1	34.6	<1	<1	3.5	14.9	<5
22	Cactus Spring water	<1	<1	<1	<1	143.4	387.5	<1	<1	<1	<1	983.8	12.1	<1	<1	<1	<1	35.8	<1	<1	9.2	<1	<5

Table 4B. Trace element data for soil/sediment samples collected by DRI at the NTTR in February 2008.

Sample Number	Sample Description	Be (ppb)	Al (ppb)	V (ppb)	Cr (ppb)	Mn (ppb)	Fe (ppb)	Co (ppb)	Ni (ppb)	Cu (ppb)	Zn (ppb)	Sr (ppb)	Mo (ppb)	Ag (ppb)	Cd (ppb)	Sn (ppb)	Sb (ppb)	Ba (ppb)	Tl (ppb)	Pb (ppb)	U (ppb)	As (ppb)	Se (ppb)
3	Main Lake depression sediment	<10	2629	666	<10	89.9	1018	<10	<10	76.9	48.1	114	67.1	<10	<10	<10	<10	56.1	<10	<10	15.0	178	<50
3A	Main Lake Depression sediment, 1% HNO_3 extract	308	1641192	1294	176	146857	58561	1155	786	322	1791	65050	<100	<100	137	<100	<100	33314	<100	1565	196	656	<2000
4	Drainage sediment	<10	57.1	142	<10	<10	16.0	<10	<10	15.0	<10	4250	214	<10	<10	<10	<10	67.1	<10	<10	<10	62.3	<50
5	Drainage sediment	<10	42.0	358	<10	50.9	27.4	<10	<10	71.6	32.1	324	223	<10	<10	<10	<10	97.9	<10	<10	<10	134	<50
6	Drainage sediment	<10	231	512	<10	33.2	92.3	<10	<10	63.1	33.7	110	53.7	<10	<10	<10	<10	39.7	<10	<10	<10	151	<50
7	Drainage sediment	<10	16.2	315	<10	<10	<10	<10	<10	15.3	12.9	14096	288	<10	<10	<10	<10	164.2	<10	<10	<10	153	314
8	Drainage sediment	<10	980	1051	<10	23.9	396	<10	<10	47.5	<10	224	137	<10	<10	<10	<10	28.5	<10	<10	<10	335	<50
9	Culvert sediment	<10	62.5	323	<10	36.7	38.7	<10	<10	32.3	30.1	179	<10	<10	<10	<10	<10	56.3	<10	<10	<10	77.1	<50
10	Culvert sediment	<10	1424	643	<10	26.1	819	<10	<10	16.5	27.3	134	<10	<10	<10	<10	<10	14.8	<10	<10	<10	135	<50
11	Culvert sediment	<10	158	39.2	<10	34.9	55.1	<10	<10	29.1	20.6	120	<10	<10	<10	<10	<10	39.1	<10	<10	<10	11.1	<50
12	Main Lake depression sediment	<10	156	544	<10	117	109	<10	<10	97.9	58.0	268	56.8	<10	<10	<10	<10	98.6	<10	<10	16.4	142	<50
12A	Main Lake depression sediment, 1% HNO_3 extract	550	2270388	239	231	90832	80957	820	968	297	2153	55731	<100	<100	130	<100	155	34864	<100	1697	263	487	<2000
13	Main Lake depression sediment	<10	2486	677	<10	81.0	487	<10	<10	64.3	34.1	147	65.8	<10	<10	<10	<10	59.9	<10	<10	15.1	159	<50
13A	Main Lake depression sediment, 1% HNO_3 extract	458	2035221	1323	215	121865	75591	874	882	346	2042	63521	<100	<100	135	<100	<100	33198	<100	1751	234	552	<2000
14	Main Lake depression sediment	<10	176	756	<10	61.9	160	<10	<10	65.4	39.0	134	69.5	<10	<10	<10	12.7	56.6	<10	<10	14.5	272	<50
14A	Main Lake depression sediment, 1% HNO_3 extract	320	1465462	2694	153	196881	529978	1354	744	508	2611	82914	<100	<100	124	<100	<100	31909	<100	1519	183	743	<2000
20	Culvert sediment	<10	192	96.8	<10	41.3	81.5	<10	<10	44.5	40.5	141	<10	<10	<10	<10	<10	43.6	<10	<10	<10	50.0	<50
21	Culvert sediment	<10	54.9	75.8	<10	30.8	150	32.2	15.3	47.1	122	200	10.7	<10	<10	<10	<10	47.6	<10	<10	<10	21.9	<50
23	Drainage sediment	<10	1040	496	<10	55.3	517	<10	<10	75.4	76.3	157	39.8	<10	<10	<10	10.1	50.7	<10	<10	<10	141	<50

Except as noted, all values reported were measured on soil extracts made with a 10:1 ratio (by mass) of deionized water:soil, and are converted to show mass in the soil

Table 5. Duplicate sample data for major-ion analyses.

Sample Description	Lab pH	Lab EC[1] (µS/cm)	SiO_2 (mg/kg)	HCO_3^- (mg/kg)	CO_3^{2-} (mg/kg)	Cl^- (mg/kg)	SO_4^{2-} (mg/kg)	NO_3^- (as N) (mg/kg)	NO_3^- (mg/kg)	Na^+ (mg/kg)	K^+ (mg/kg)	Ca^{2+} (mg/kg)	Mg^{2+} (mg/kg)	F^- (mg/kg)	Br^- (mg/kg)	NO_2^- (as N) (mg/kg)	NH_3 (as N) (mg/kg)	PO_4^{3-} (as P) (mg/kg)	Dissolved P (mg/kg)
6-Drainage sediment	9.18	335	371	1044	200	35	227	28	124	670	53	30	1.0	11	<0.2	0.2	1.2	3.9	4.1
6D-Drainage sediment	9.12	306	333	1103	172	29	198	20	89	672	49	14	1.4	9.9	<0.2	0.2	0.4	3.9	4.2
10-Culvert sediment	8.52	150	345	668	21.7	3.8	77.1	7.0	31	265	46	48.8	3.0	18	<0.2	0.1	1.0	3.7	4.0
10D-Culvert sediment	8.57	143	303	688	26.6	3.5	19.1	6.7	30	288	29	14.3	1.1	20	<0.2	0.1	0.2	4.7	5.1
14-Main Lake depression sediment	8.97	286	275	1290	131	21	84	9.0	40	636	53	15.3	2.1	9.00	0.2	0.7	7.0	4.8	5.2
14D-Main Lake depression sediment	8.95	270	255	1313	121	13	51	1.6	7	601	48	14.0	1.3	9	<0.2	0.7	7.0	4.9	5.4

All values reported were measured on soil extracts made with a 10:1 ratio (by mass) of deionized water:soil, and are converted to show mass in the soil
[1]EC: electrical conductivity

Table 6. Duplicate sample data for trace element analyses.

Sample Description	Be (ppb)	Al (ppb)	V (ppb)	Cr (ppb)	Mn (ppb)	Fe (ppb)	Co (ppb)	Ni (ppb)	Cu (ppb)	Zn (ppb)	Sr (ppb)	Mo (ppb)	Ag (ppb)	Cd (ppb)	Sn (ppb)	Sb (ppb)	Ba (ppb)	Tl (ppb)	Pb (ppb)	U (ppb)	As (ppb)	Se (ppb)
5-Drainage sediment	<10	42	358	<10	51	27	<10	<10	72	32	324	223	<10	<10	<10	<10	98	<10	<10	<10	134	<50
5D-Drainage sediment	<10	96	288	<10	80	71	<10	<10	85	45	642	187	<10	<10	<10	<10	117	<10	<10	<10	115	<50
20-Culvert sediment	<10	192	97	<10	41	81	<10	<10	45	41	141	<10	<10	<10	<10	<10	44	<10	<10	<10	50	<50
20D-Culvert sediment	<10	186	71	<10	42	71	<10	<10	36	30	124	<10	<10	<10	<10	<10	39	<10	<10	<10	37	<50

All values reported were measured on soil extracts made with a 10:1 ratio (by mass) of deionized water:soil, and are converted to show mass in the soil

APPENDIX 4. Chain-of-Custody Forms for Samples Collected at the NTTR by DRI in February 2008.

DRI
Desert Research Institute

Division of Hydrologic Sciences
755 E. Flamingo Road
Las Vegas, NV 89119
702-895-0450

2215 Raggio Parkway
Reno, NV 89512
775-673-7362

CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	TTR Nitrate samples	

Samplers (signature)

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	TAG NUMBERS	ANALYSIS REQUESTED: ORganics	ANALYSIS REQUESTED: Glycols	SAMPLE TAG VERIFICATION	REMARKS
1	3/6/08	09:20	1 - Pond - 6	3	DR10802126-01	X			
2	3/6/08	10:45	2 - Pond - 1	3	02	X			

Alpha Analytical Sample Receipt

Security Seal? YES (NO)

Frozen Ice? YES (NO)

Temperature 12 °C

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
	3/11/08	12:00					
Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received for lab. by (signature)
			KM				

Form of Shipment	Date	Time	Remarks

Signature	Date

Billing Information :

CHAIN-OF-CUSTODY RECORD

Alpha Analytical, Inc.
255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

NV

WorkOrder : DRI08021127

Report Due By : 5:00 PM On : 25-Feb-08

,

Client:
Desert Research Institute
2215 Raggio Parkway

Reno, NV 89512

Report Attention	Phone Number	EMail Address
Sam Earman	(775) 673-7415 x	searman@dri.edu
Todd Mihevc	(775) 673-7362 x	mihevc@dri.edu

EDD Required : **No**

Sampled by : Todd Mihevc

PO :

Client's COC # : none Job : TTR Nitrate Sampling

Cooler Temp	Samples Received	Date Printed
12 °C	11-Feb-08	11-Feb-08

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles Alpha	Sub	TAT	Requested Tests								Sample Remarks
							TPH/E_W	TPH/P_W							
DRI08021127-01A	1-Pond-6 Ft.	AQ	02/06/08 09:20	6	0	10	TPH/E_N	GAS-N							
DRI08021127-02A	2-Pond-1 Ft.	AQ	02/06/08 10:45	6	0	10	TPH/E_N	GAS-N							

Comments: Samples brought in by client. No ice. :

	Signature	Print Name	Company	Date/Time
Logged in by:	K Murray	K Murray	Alpha Analytical, Inc.	2/11/08 1255

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.
The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.
Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

DRI
Desert Research Institute

Division of Hydrologic Sciences
755 E. Flamingo Road
Las Vegas, NV 89119
702-895-0450

2215 Raggio Parkway
Reno, NV 89512
775-673-7362

CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	TTR Nitrate Sampling	

Samplers (signature): Todd Mahrer

DRI08021140

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	TAG NUMBERS	Cl, Nitrate, SO4	Iphlex P	SVOC Screen	Glycols	REMARKS
3	2/6/08	12:30	3 - Pond - Sed	2	-01	X	X	X		
4	2/6/08	13:30	4 - Draw - Sed	2	-02					
5	2/6/08	14:15	5 - Draw - Sed	2	-03					
6	2/6/08	14:45	6 - Draw - Sed	2	-04					
7	2/6/08	15:10	7 - Draw - Sed	2	-05					
8	2/6/08	15:30	8 - Draw - Sed	2	-06					
9	2/6/08	16:00	9 - CUL - Sed	2	-07					
10	2/6/08	16:30	10 - CUL - Sed	2	-08					
11	2/6/08	16:50	11 - CUL - Sed	2	-09					
12	2/7/08	07:30	12 - Pond - Sed	2	-10					
13	2/7/08	08:10	13 - Pond - Sed	2	-11					
14	2/7/08	09:35	14 - Pond - Sed	2	-12					
20	2/8/08	07:15	20 - CULW - Sed	2	-13					
21	2/8/08	8:30	21 - CULW - Sed	2	-14					
23	2/8/08	12:20	23 - DRAW - Sed	2	-15					

SAMPLE TAG VERIFICATION

Security Seals? YES NO

Frozen Ice? YES NO

Temperature 10 °C

Alpha Analytical Sample Receipt

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
Todd Mahrer	2/11/08	1200	Jessica Edasa				
Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received for lab. by (signature)

Form of Shipment	Date	Time	Remarks

Signature	Date

DRI
Desert Research Institute

Division of Hydrologic Sciences
755 E. Flamingo Road
Las Vegas, NV 89119
702-895-0450

2215 Raggio Parkway
Reno, NV 89512
775-673-7362

CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	TTR Nitrate	

Samplers (signature): Jodi McKee

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	TAG NUMBERS	Organics	Sulfur Screen	REMARKS
1	2/6/08	09:20	1 - Pond 6'	2	DRI08021128-01			
2	2/6/08	10:45	2 - Pond 1'	2	02			

ANALYSIS REQUESTED

SAMPLE TAG VERIFICATION

Alpha Analytical Sample Receipt

Security Seal? YES (NO)

Frozen Ice? YES (NO)

Temperature 7 °C

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
Jodi McKee	2/6/08	12:00	Patricia Edson KM				
Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received for lab. by (signature)

Form of Shipment	Date	Time	Remarks

Signature	Date

Billing Information :

CHAIN-OF-CUSTODY RECORD

Alpha Analytical, Inc.
255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

NV

WorkOrder : DRI08021128

Report Due By : 5:00 PM On : 25-Feb-08

Client:
Desert Research Institute
2215 Raggio Parkway

Reno, NV 89512

PO :

Client's COC # : none Job : TTR Nitrate Sampling

Report Attention	Phone Number	EMail Address
Sam Earman	(775) 673-7415 x	searman@dri.edu
Todd Mihevc	(775) 673-7362 x	mihevc@dri.edu

EDD Required : **No**

Sampled by : Todd Mihevc

Cooler Temp	Samples Received	Date Printed
7 °C	11-Feb-08	**11-Feb-08**

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles Alpha	Sub	TAT	Requested Tests BNA_TIC_W								Sample Remarks
DRI08021128-01A	1-Pond 6 Ft.	AQ	02/06/08 09:20	2	0	10	X								
DRI08021128-02A	2-Pond 1 Ft.	AQ	02/06/08 10:45	2	0	10	X								

Comments: Samples brought in by client. No ice. See Roger and Randy prior to SVOC extraction. :

	Signature	Print Name	Company	Date/Time
Logged in by:	K Murray	K Murray	**Alpha Analytical, Inc.**	2/11/08 1310

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.
The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.
Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

DRI
Desert Research Institute

Division of Hydrologic Sciences
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Las Vegas, NV 89119
702-895-0450

2215 Raggio Parkway
Reno, NV 89512
775-673-7362

CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	TTR Nitrate	

Samplers (signature): Jordan Mathe

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	TAG NUMBERS	Organics	SVOC Screen	REMARKS
1	2/6/08	09:20	1 - Pond C'	2	DRI0802l128-01			
2	2/6/08	10:45	2 - Pond 1'	2	02			

ANALYSIS REQUESTED

SAMPLE TAG VERIFICATION

Alpha Analytical Sample Receipt

Security Seal? YES (NO)

Frozen Ice? YES (NO)

Temperature 7 °C

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
Jordan Mathe	2/6/08	12:00	Patricia Edasa				
Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received for lab. by (signature)
			KM				

Form of Shipment	Date	Time	Remarks

Signature	Date

DRI
Desert Research Institute

Division of Hydrologic Sciences
755 E. Flamingo Road
Las Vegas, NV 89119
702-895-0450

2215 Raggio Parkway
Reno, NV 89512
775-673-7362

CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	TTR Nitrate Sampling	

Samplers (signature): Todd Mahre

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	TAG NUMBERS	ANALYSIS REQUESTED: ORGANICS	Chloride	Nitrate	TDS	SAMPLE TAG VERIFICATION	REMARKS
1	2/6/8	09:20	1 - Pond - 6'	6	DRI08021127-01						
2	2/6/8	10:45	2 - Pond - 1'	6	02						

Alpha Analytical Sample Receipt

Security Seal? YES NO

Frozen Ice? YES NO

Temperature 12 °C

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
Todd Mahre	2/11/08	1200	Patricia Salazar				
Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received for lab. by (signature)
			PM				

Form of Shipment	Date	Time	Remarks

Signature	Date

Division of Hydrologic Sciences
755 E. Flamingo Road
Las Vegas, NV 89119
702-895-0450

2215 Raggio Parkway
Reno, NV 89512
775-673-7362

CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	TTR Nitrate Sampling	

Samplers (signature): [signature]

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	TAG NUMBERS	Trace anal	ANALYSIS REQUESTED					SAMPLE TAG VERIFICATION	REMARKS
1	2/6/08	09:20	1 - Pond - C	1									
2	2/6/08	10:45	2 - Pond - I	1									
16	2/7/08	11:30	16 - Spring - CW	1									
17	2/7/08	1315	17 - Spring - RS	1									
18	2/7	1450	18 - Spring - CS	1									
19	2/7/08	16:30	19 - Spring - SBT	1									
22	2/8/08	1115	22 - Spring - CH	1									

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
[signature]	2/22/08	12:37	[signature]	[signature]	2/22/08	3:00 pm	[signature]
[signature]	2/25/08	11:00 AM	[signature]				

Relinquished by (signature)	Date	Time	Received for lab. by (signature)

Form of Shipment	Date	Time	Remarks
			Relinquish Sample 142 on 2/28/08 to DHS water Lab (SE)

Signature	Date

DRI
Desert Research Institute

Division of Hydrologic Sciences
755 E. Flamingo Road
Las Vegas, NV 89119
702-895-0450

2215 Raggio Parkway
Reno, NV 89512
775-673-7362

CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	TTR Nitrate Study	

Samplers (signature): Todd Mihevc

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	TAG NUMBERS	Triple	ANALYSIS REQUESTED				SAMPLE TAG VERIFICATION	REMARKS
3	2/6/08	12:30										
3	2/6/08	1230	3 - Pond - Sed	1								
4	2/6/08	1330	4 - Drain - Sed	1								
5	2/6/08	1415	5 - Drain - Sed	1								
6	2/6/08	1445	6 - Drain - Sed	1								
7	2/6/08	1510	7 - Drain - Sed	1								
8	2/6/08	1530	8 - Drain - Sed	1								
9	2/6/08	1600	9 - Cul - Sed	1								
10	2/6/08	1630	10 - Cul - Sed	1								
11	2/6/08	1650	11 - Cul - Sed	1								

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
Todd Mihevc	2/12/08	0930			2/23	5:03pm	
Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received for lab. by (signature)

Form of Shipment	Date	Time	Remarks
			ONLY EXTRACTS RELINQUISHED ON 2/23; MOST SOIL STILL IN DRI CUSTODY

Signature	Date

Desert Research Institute

Division of Hydrologic Sciences
755 E. Flamingo Road
Las Vegas, NV 89119
702-895-0450

2215 Raggio Parkway
Reno, NV 89512
775-673-7362

SOP.SCGW
Version 2.1

CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	TTR Nitrate Study	

Samplers (signature): Jodel Mahe

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	TAG NUMBERS	ANALYSIS REQUESTED: Tritium	SAMPLE TAG VERIFICATION	REMARKS
12	2/7/08	0730	12 - Powd - Sed	1				
13	2/7/08	0810	13 - Powd - Sed	1				
14	2/7/08	0925	14 - Powd - Sed	1				

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
Jodel Mahe	2/22/08	09:30			2/23	5:03PM	
Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received for lab. by (signature)

Form of Shipment	Date	Time	Remarks
			ONLY EXTRACTS RELINQUISHED ON 2/23, MOST SOIL STILL IN DRI CUSTODY

Signature	Date

Desert Research Institute

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Las Vegas, NV 89119
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2215 Raggio Parkway
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775-673-7362

CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	TTR Netherly sampling	

Samplers (signature): Todd Mihevc

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	TAG NUMBERS	TRIP BLANK	ANALYSIS REQUESTED					SAMPLE TAG VERIFICATION	REMARKS
20	2/8/08	0715	20-CULV-Sed	1									
21	2/8/08	0830	21-CULV-Sed	1									
23	2/8/08	1220	23-DRAIN-Sed	1									

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
Todd Mihevc	2/27/08	0930			2/28	5:03PM	
Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received for lab. by (signature)

Form of Shipment	Date	Time	Remarks
			ONLY EXTRACTS RELINQUISHED ON 2/23; MOST SOIL STILL IN DRI CUSTODY

Signature	Date

DRI
Desert Research Institute

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2215 Raggio Parkway
Reno, NV 89512
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CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	TTR Nitrate Sampling	

Samplers (signature): [illegible]

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	TAG NUMBERS	Tracer mix	ANALYSIS REQUESTED					SAMPLE TAG VERIFICATION	REMARKS
1	2/6/08	09:20	1 - Pond - 6'	1									
2	2/6/08	10:45	2 - Pond - 1'	1									
16	2/7/08	11:30	16 - Spring - CW	1									
17	2/7/08	1315	17 - Spring - RS	1									
18	2/7/	1450	18 - Spring - CS	1									
19	2/7/08	16:30	19 - Spring - SBT	1									
22	2/8/08	1115	22 - Spring - CH	1									

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
[signature]	2/12/08	12:37	[signature]				
Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received for lab. by (signature)

Form of Shipment	Date	Time	Remarks
			Relinquish sample 142 on 2/28/08

Signature	Date

6306-646-8350

DRI
Desert Research Institute

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755 E. Flamingo Road
Las Vegas, NV 89119
702-895-0450

2215 Raggio Parkway
Reno, NV 89512
775-673-7362

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Version 2.1

CHAIN-OF-CUSTODY FORM

Project No.	Project Name	Purchase Order No.
	NTTR Nitrate sampling	

Samplers (signature): Todd Mihevc

STA No.	Date	Time	STATION DESCRIPTION	No. of Containers	DRI LAB TAG NUMBERS	ANALYSIS REQUESTED: Major Ions	SAMPLE TAG VERIFICATION	REMARKS
1	2/6/08	09:20	1 - Pond - 6'	3	67817			
2	2/6/08	10:45	2 - Pond - 1'	3	67818			
16	2/6/08	17:30	16 - Spring - CW	3	67819			
17	2/7/08	1315	17 - Spring - RS	3	67820			
18	2/7/08	1450	18 - Spring - CS	3	67821			
19	2/7/08	15:30	19 - Spring - SBT	3	67822			
22	2/8/08	1115	22 - Spring - CA	3	67823			

Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received by (signature)
Todd Mihevc	2/11/08	1109	Mary Miller				
Relinquished by (signature)	Date	Time	Received by (signature)	Relinquished by (signature)	Date	Time	Received for lab. by (signature)

Form of Shipment	Date	Time	Remarks

Signature	Date

1440 CAPITOL BLVD
RENO, NV 89502

Location: RNOA
Device ID: RNOA-POS2
Employee: 223675

FEDEX Express Package - Dropped Off
958920919812
958920919823
958920919764
958920919775
958920919786

Total Pieces: 5

Subject to additional charges. See FedEx Service Guide at fedex.com for details. All merchandise sales final.

Visit us at: fedex.com
Or call 1.800.GoFedEx
1.800.463.3339

February 11, 2008 5:19:01 PM

1440 CAPITOL BLVD
RENO, NV 89502

Location: RNOA
Device ID: RNOA-POS2
Employee: 223675

FEDEX Express Package - Dropped Off
958920919797
958920919801

Total Pieces: 2

Subject to additional charges. See FedEx Service Guide at fedex.com for details. All merchandise sales final.

Visit us at: fedex.com
Or call 1.800.GoFedEx
1.800.463.3339

February 11, 2008 5:16:22 PM

Track Shipments/FedEx Kinko's Orders

Summary Results

Printable Version Quick Help

Single piece shipments

Tracking number	Status	Date/Time	Destination	Service	Signature Proof Image	Signature Proof View
958920919812	Delivered	Feb 12, 2008 2:22 PM	WEST LAFAYETTE, IN	FedEx Express	Yes	☑
958920919823	Delivered	Feb 12, 2008 2:22 PM	WEST LAFAYETTE, IN	FedEx Express	Yes	☑
958920919764	Delivered	Feb 12, 2008 2:22 PM	WEST LAFAYETTE, IN	FedEx Express	Yes	☑
958920919775	Delivered	Feb 12, 2008 2:22 PM	WEST LAFAYETTE, IN	FedEx Express	Yes	☑
958920919786	Delivered	Feb 12, 2008 2:22 PM	WEST LAFAYETTE, IN	FedEx Express	Yes	☑
958920919797	Delivered	Feb 12, 2008 2:22 PM	WEST LAFAYETTE, IN	FedEx Express	Yes	☑
958920919801	Delivered	Feb 12, 2008 2:22 PM	WEST LAFAYETTE, IN	FedEx Express	Yes	☑

Account number

(Required for detailed Signature Proof of Delivery only)

Click here if you have more than one account number for these shipments.

View signature proof results | E-mail signature proof results | Track more shipments/orders