ANALYTICAL LABORATORY and MOBILE SAMPLING PLATFORM

PROGRESS REPORT

OCTOBER 1, 1994 to DECEMBER 31, 1994

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No. DE-FC 08-90NV10872

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ROCK ANALYSIS

Preliminary results from the Canadian Certified Reference Materials Project (CCRMP) analysis were received. When the results are finalized, this sample will become a CCRMP certified reference material.

Determination of the best microwave digestion method for tuff samples was begun. Three methods are being compared and the best method will be applied to the tuff samples. Two of the digestion methods have been completed. The third method is in progress. Once the third digestion method has been completed, the samples will be analyzed by ICP-MS to determine the method which provides the best recovery. A total of 21 samples are being analyzed. These include: 10 unknowns from Nevada Bureau of Mines and Geology, 8 Standard Reference Materials from the USGS, one soil sample from NIST, one CCRMP reference material, and one tuff sample from the Yucca Mountain area.

Method 1

- 0.5 g of sample
- 6 ml HNO₃
- 3 ml HCl
- 2 ml HF

Digest for 15 min. at 80 psi. Followed by the addition of 50 ml saturated boric acid solution which is then digested for 5 min.

Method 2

- 0.1 g of sample
- 3 ml HNO₃
- 3 ml HCl
- 4 ml HF

Digest for 20 min. at 120 psi. Followed by boric acid digestion as in method 1 above.

Method 3

- 0.2 g of sample
- 3 ml HNO₃
- 1 ml HCl
- 7 ml HF

Digestion for 10 min. at 100 psi. Followed by boric acid digestion as in method 1 above.

VAPOR TRACERS

No activity during this quarter.

SOIL GAS SURVEY

Sampling the soil gases can be accomplished by taking a core sample from the site and bringing it back to the laboratory to desorb thermally onto a suitable trapping material. Then the sample can be extracted with the proper solvent. Sampling this way can be laborious and introduces several possible sources of contamination. Another way to sample is to create a headspace within the soil and removing the headspace with a vacuum source onto trapping material. The Harry Reid Center obtained such a device that replaced a laboratory-made device that was used in the previous quarter. The new soil gas sampler is lighter in weight and more durable than the old sampler. It also has a powerful hand pump that replaces the generator-driven electric vacuum pump. This made sampling much easier and we were able to carry the new soil gas sampler to places where a generator could not go.

The soil gas sampler was first tested in the laboratory to see if its performance was adequate then, samples were collected at the sites of the rain samplers on top of Yucca Mountain. Samples were also collected at Crystal Spring in Ash Meadows National Wildlife Refuge.

Procedure: The tip of the soil gas sampler is placed on the ground and a hammer cover is screwed on to the other end of the device. Using a coated twelve pound sledge hammer, the probe is driven into the ground as far as possible, up to one meter. The cover is removed and a metal tube, containing an Orbo tube sample collector is placed inside the probe. The metal tube has a rubber tubing that connects it to a hand pump. The probe is retracted about an inch to create a headspace beneath the ground for the probe to evacuate. The hand pump is squeezed 100 times as indicated by a counter on the pump. The pump sucks air from the headspace and through the Orbo tube trapping any volatile organic compound.

Once the suction is complete, the tube is retracted from the probe and the Orbo tube is removed. The Orbo tube is sealed and sent to the laboratory for analysis. The probe is extracted from the soil and readied for the next sampling site.

In the laboratory the Orbo tube is extracted by removing the trapping material from the tube and placing it in a seven milliliter extraction vial. Five milliliters of carbon disulfide are added to the vial and the vial is capped. The vial is shaken by

an automatic shaker for one minute and then the sample is ready for gas chromatography-mass spectrophotometry analysis (GCMS).

The conditions of the GCMS follow the guidelines of EPA method 524.2 with two exceptions. First, the temperature of the GC starts at thirty degrees centigrade and second, at the time of the carbon disulfide peak, the MS is shut off to prevent overloading of the electronics due to the large amount of solvent.

Results: None of the samples contained any volatiles. We did not expect to find any contaminants because the sampling sites have no history of contamination. However, we thought it possible to find naturally occurring volatile or semi-volatile compounds due to plants or bacteria. We are not sure if this was due to our methods or the season (i.e. late in the year).

The new sampler was shown to work properly and much better than the previous sampler. In a laboratory experiment, the chloroform spiked on medium tuff was adsorbed onto the trapping material in the Orbo tube and identified by GCMS after extraction with carbon disulfide.

Our methods will be re-evaluated and more samples collected during the coming quarters.

Certification

USGS round-robin samples were analyzed for Ca, K, Mg, Na, Hg, pH, alkalinity and conductivity. EPA WP-33 samples were analyzed for Na, K, Ca, Mg, pH, alkalinity, conductivity, and TDS.

The results from the EPA WS-034 were received and are enclosed. The HRC laboratory can now be certified for primary metals and volatile organics in drinking water.

BOB MILLER
Governor

JERRY GRIEPENTROG-CARLIN
Director

YVONNE SYLVA
Acting Administrator

DONALD S. KWALICK, MD, MPH
State Health Officer

STATE OF NEVADA
DEPARTMENT OF HUMAN RESOURCES
HEALTH DIVISION
BUREAU OF LABORATORY SERVICES

December 13, 1994

MEMORANDUM

TO: PARTICIPANTS IN THE USEPA PERFORMANCE EVALUATION PROGRAM
FROM: ROBERT J. VICKS, CHEMISTRY CERTIFICATION OFFICER *RJV*
SUBJECT: USEPA WS034 RESULTS

Enclosed are your WS034 results. The USEPA had problems processing the WS034 data and the reports were delayed. Please determine, if possible, the reason for any data being outside the "ACCEPTABLE" range and report your findings to me.

For those laboratories in the Safe Drinking Water Act (SDWA) certification program, your certifications are being processed. These results are the basis for your certification in the State of Nevada for analysis of PRIMARY contaminants under the SDWA.

If you have any questions, please call me at (702) 688-1335.

RJV/wp (WS034.LTR)

Attachments (1)

Rec'd 1-4-95 240

Performance Evaluation Report
USEPA Water Supply Study WS034

Page: 1
Date: 19OCT94

Participant ID: NV00005

Type: OTHER

Requesting Office: NV

	Sample Number	Reported Value	True Value*	Acceptance Limits	Performance Evaluation
001 - TRACE METALS IN MICROGRAMS PER LITER:					
001-ARSENIC	001	132	140	117- 158	Accept.
002-BARIUM	002	336	859	730- 988	Accept.
003-CADMIUM	001	26.0	23.0	18.4- 27.6	Accept.
004-CHROMIUM	001	13.5	11.0	9.86- 13.3	Not Accept.
005-LEAD	001	25.9	27.0	18.9- 35.1	Accept.
007-SELENIUM	001	53.9	51.3	41.4- 62.2	Accept.
008-SILVER	002	40.4	38.1	33- 42.4	Accept.
091-COPPER	001	422	420	378- 462	Accept.
140-ANTIMONY	002	21.9	23.7	16.6- 30.8	Accept.
141-BERYLLIUM	001	5.58	5.33	4.53- 6.13	Accept.
142-NICKEL	001	259	270	230- 311	Accept.
143-THALLIUM	002	6.14	6.19	4.33- 8.05	Accept.
235-ALUMINUM	001	151	151	129- 172	Accept.
236-MANGANESE	001	657	590	546- 625	Not Accept.
237-MOLYBDENUM	002	20.5	24.0	17.9- 30.2	Accept.
002 - NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:					
009-NITRATE AS N	001	0.46	0.460	0.414-0.506	Accept.
010-FLUORIDE	001	1.08	1.10	0.99- 1.21	Accept.
092-NITRITE AS N	001	.693	0.680	0.578-0.782	Accept.
010 - TRIHALOMETHANES IN MICROGRAMS PER LITER:					
017-CHLOROFORM	001	42.6	42.9	34.3- 51.5	Accept.
018-BROMOFORM	001	13.6	14.4	11.5- 17.3	Accept.
019-BROMODICHLOROMETHANE	001	29.2	31.1	24.9- 37.3	Accept.

* Based on theoretical calculations, or a reference value when necessary.

Performance Evaluation Report
USEPA Water Supply Study WS034

Page: 2
Date: 19OCT94

Participant ID: NV00005

Type: OTHER

Requesting Office: NV

Sample Number	Reported Value	True Value*	Acceptance Limits	Performance Evaluation
020-CHLORODIBROMOMETHANE				
001	20.3	22.9	18.3- 27.5	Accept.
011 - VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:				
032-VINYL CHLORIDE				
001	15.9	14.1	8.46- 19.7	Accept.
034-1,1-DICHLOROETHYLENE				
001	7.92	7.64	4.58- 10.7	Accept.
035-1,2-DICHLOROETHANE				
001	12.6	12.1	9.68- 14.5	Accept.
036-1,1,1-TRICHLOROETHANE				
001	5.75	5.73	3.44- 8.02	Accept.
037-CARBON TETRACHLORIDE				
001	6.47	6.27	3.76- 8.78	Accept.
038-TRICHLOROETHYLENE				
001	8.73	8.89	5.33- 12.4	Accept.
039-BENZENE				
001	5.02	4.94	2.96- 6.92	Accept.
040-TETRACHLOROETHYLENE				
002	14.3	16.5	13.2- 19.8	Accept.
041-1,4-DICHLOROBENZENE				
001	5.23	5.78	3.47- 8.09	Accept.
042-T 1,2 DICHLOROETHYLENE				
002	4.33	6.77	4.06- 9.48	Accept.
043-C 1,2 DICHLOROETHYLENE				
002	7.60	9.41	5.65- 13.2	Accept.
044-1,2 DICHLOROPROPANE				
002	12.5	12.3	9.84- 14.8	Accept.
047-TOLUENE				
002	15.5	15.6	12.5- 18.7	Accept.
048-ETHYLBENZENE				
002	7.23	7.41	4.45- 10.4	Accept.
049-CHLOROBENZENE				
002	6.55	6.41	3.85- 8.97	Accept.
053-STYRENE				
002	12.5	14.7	11.8- 17.6	Accept.
054-1,2 DICHLOROBENZENE				
002	6.76	6.98	4.19- 9.77	Accept.
055-DICHLOROMETHANE				
001	16.6	18.4	14.7- 22.1	Accept.
061-1,1,2-TRICHLOROETHANE				
001	7.64	8.50	5.1- 11.9	Accept.
063-1,1,1,2TETRACHLOROETHANE				
003	13.5	14.4	11.5- 17.3	Accept.
064-1,2,3-TRICHLOROPROPANE				
003	20.5	20.5	16.4- 24.6	Accept.
076-1,2,4-TRICHLOROBENZENE				
002	23.2	22.9	18.3- 27.5	Accept.

* Based on theoretical calculations, or a reference value when necessary.

Performance Evaluation Report
USEPA Water Supply Study WS034

Page: 3
Date: 19OCT94

Participant ID: NV00005

Type: OTHER

Requesting Office: NV

Sample Number	Reported Value	True Value*	Acceptance Limits	Performance Evaluation
081-HEXACHLOROBUTADIENE				
003	16.7	17.2	13.8- 20.6	Accept.
090-TOTAL XYLENES				
002	14.2	13.1	10.5- 15.7	Accept.
152-C 1,3 DICHLOROPROPENE				
003	7.57	19.7	15.8- 23.6	Not Accept.
153-T 1,3 DICHLOROPROPENE				
003	18.9	7.89	4.73- 11	Not Accept.
014 - MISCELLANEOUS ANALYTES:				
026-PH-UNITS				
001	9.15	9.12	8.86- 9.27	Accept.
027-ALKALINITY (MG. CaCO3/L)				
001	32.7	33.0	30.7- 37.2	Accept.
145-SULFATE (MILLIGRAMS PER LITER)				
001	418	400	364- 435	Accept.

***** END OF DATA FOR NV00005 *****

NOTE: FOR LIMITS AND TRUE VALUES, ASSUME THREE SIGNIFICANT DIGITS.

***** END OF REPORT FOR NV00005 *****

* Based on theoretical calculations, or a reference value when necessary.