DOE/NV/10872-T35

ANALYTICAL LABORATORY and MOBILE SAMPLING PLATFORM

PROGRESS REPORT

JULY 1, 1995 to SEPTEMBER 30, 1995

DOE Cooperative Agreement
No. DE-FC 08-90NV10872

Klaus Stetzenbach

Harry Reid Center For Environmental Studies

University of Nevada - Las Vegas

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all

1. Amy Cross-Smiecinski: Harry Reid Center for Environmental Studies
2. Yucca Mountain Site Characterization Project
Harry Reid Center Quality Assurance Support
3. For the cooperative agreement quarters 7/1/95 through 9/30/95, HRC QA staff performed the following:
 - **Quality Assurance Program.** On 8/23/95 HRC received official signature on the memorandum of agreement with USGS for the YM/USGS Tracer Study. See attached.

On 8/9/95 the HRC Tracer Study was audited by Peter Rodriguez of YM/USGS. A report of his findings has not been received yet.

On 9/22 the Microbiology Division was audited for record keeping practices and completeness in the YM Fingerprinting Study. There were no major findings. The report is attached.

Review of six scientific notebooks was completed by the QA staff and the project manager during the quarter. Most of the notebooks were terminal and thus were archived.
 - **Certification.** State of NV audited HRC's Safe Drinking Water Act laboratory operations for certification 5/17-19. The audit report was expected at the end of July, but has not been received. Implementation of corrective actions suggest by the state of NV auditor is in progress.

HRC received the scores for the USGS Spring round-robin sample on 9/11/95. See attached tabulation. A corrective action memo for WS-035 analytes with "not acceptable" results was mailed to the NV coordinator on 7/13/95. See attached.

HRC submitted data for WS-036 on 8/18/95. In addition to the usual manner of preparing the WS- samples, they were prepared in tap water as requested by the state coordinator. GC-MS and ICP-MS detection limits were requested by the state coordinator and sent by HRC with the WS-036 data. HRC is awaiting the scores from the State of NV. HRC is still awaiting the scores for WP-034 from the state coordinator.
 - **Quality Control.** This quarter data reduction, verification, and reporting was performed for Tracer Study and Ground Water Fingerprinting data. Data sets were verified based on complete record keeping, software verification, and calculations spot-checks as noted in the verification checklists and/or SOPs. Data verified within this report period are listed.

Death Valley #6 - majors, trace metals, and rare earth elements
Ash Meadows #6 - majors, trace metals, and rare earth elements

Stonewall Spring - anions
 Spring Mtn. NE #1 - anions
 Lincoln #4 (formerly Hiko/Ash/Crystal) - majors
 Spring Mtn. NW #1 - anions and majors
 Las Vegas Shear Zone - anions and majors
 NTS Well J-13 #4 - anions
 NTS Well ER-30 #1 - majors, anions, trace metals, and rare earth elements
 Upper Spring Mtn. #1 - anions
 Virgin River Basin - anions
 Batch Reaction - anions

QA staff with student help performed sample control, safety inspection, and data management functions.

- **Safety.** Waste satellite areas are inspected weekly. The ICP-MS lab is wipe-tested monthly. The acid traps in the first-floor Environmental/Analytical Division lab have been opened and air samples collected by UNLV EH&S staff. The trap cannot be thoroughly evaluated until the internal lid can be removed. The screws securing the lid have become so corroded that they are not usable and cannot be opened. EH&S is correcting this situation with the facilities/management staff.

A memorandum of safety intent for HRC YM Tracer field test personnel was submitted August 10, 1995. See attached. Equipment and apparel specified has been obtained and prepared for that field test. Ms. Kathy Lao coordinated apparel and respirator fitting and purchase.

- **Upcoming quarter.**

State of NV WP-035 and the USGS Fall 95 Inorganic performance samples are expected to arrive within a month and will be analyzed and submitted during the quarter.

Audit reports are expected to arrive from the State of NV and YM/USGS momentarily. HRC's responses will probably be submitted to these agencies this quarter.

Verifications of YM/USGS Tracer data is ongoing. It is expected that FY95 groundwater data verifications will be complete within this quarter.

Harry Reid Center for Environmental Studies

**Quality Assurance Surveillance Report
of
Ground Water Fingerprinting Studies - Microbial Identification Task
Harry Reid Center for Environmental Studies
University of Nevada, Las Vegas**

**Yucca Mountain Site Characterization Project Office Cooperative Agreement
DE-FC08-90NV 10872**

Surveillance Date: September 22, 1995

Prepared By: _____ Date: _____
A.J. Cross-Smiecinski
QA Specialist
HRC QA Staff

Introduction

The purpose of this surveillance was to determine traceability of various pieces of the study to one another and to any standards that may be used; as well as record keeping quality, and the use of good laboratory practices. The specific goals of the surveillance were to assure that the scientific work be documented sufficiently that it could 1) be continued by another scientist in the absence of the originator; and 2) be repeated at another time with the same results. The results of the surveillance indicate that these goals are basically being met. Some concerns were raised by myself and were met with a positive attitude and eagerness to improve the study documentation. Actions required to improve the study record keeping and documentation are detailed in the Summary and listed in Corrective actions. A brief follow-up assessment will be scheduled to review the adequacy and effectiveness of the actions taken for this project.

Summary

James Meldrum was the subject of the surveillance, being the only employee on this segment of the study. After a brief introduction by myself to the goals of the surveillance and the procedure used Mr. Meldrum gave a brief introduction to his study. This was followed by the actual interview of Mr. Meldrum using a check sheet that addresses the goals of the surveillance. The surveillance took place in Mr. Meldrum's office and in the laboratory. Throughout the surveillance Mr. Meldrum was cooperative and eager to make improvements.

It is evident from the replies to the check sheet questions that Mr. Meldrum is aware of the scientific and quality objectives, deliverables, and reporting cycle for the study. Compliance to procedures and manuals is evident in Mr. Meldrum's records and attitude toward the study. It was suggested that the title and version of the laboratory protocols and manuals used, be recorded in the scientific notebook. A spiral notebook was formerly used for recording GC conditions and analyses. A hardbound scientific notebook was substituted for this and it is suggested that the two notebooks be made traceable to one another by noting in each "continued in ...", and "continued from...". Mr. Meldrum was able to show evidence of analytical standards traceability and acceptable instrument calibration. Computer data is prepared as hard copy and saved on the computer hard drives, but a general practice of backing up computer files on tape regularly was suggested to Mr. Meldrum. He agreed to provide tape copies to HRC QA for archival.

Evidence of sample receipt was presented in the form of log-in for each sample. Mr. Meldrum had been left out of the sample control loop for the project and did not always have the sample set names and control numbers. QA agreed to correct this by providing this information to him in the form of sample analysis listings and a listing of official sample set and site names; and by changing the "system" to see that micro analyses are included. In addition it was suggested that Mr. Meldrum use ink in completing the sample log-in sheets or copy the sheets as they are produced. Pencil is not normally used in laboratories that have a QA program.

Mr. Meldrum was able to follow a randomly chosen field sample from log-in through lab procedures, analysis, and computer reduction. Lab duplicates are not routinely processed due to prohibitive cost. However precision, normally measured by the use of duplicates, is an important indicator of data quality. It is suggested that lab duplicates be performed at a frequency of 5% of the sample load if no field duplicates are collected.

Although not discussed during the surveillance, it occurred to me later that perhaps a

listing or flow chart of the order and where to record processes and data would add more assurance of the study's repeatability. In other ways the study is well recorded even to the smallest detail such as records of reagent lot numbers and MIDI library version.

Corrective Actions

Many of the suggestions listed were implemented during the surveillance. It is required that the remaining actions listed be implemented within 30 days or addressed in a memo detailing the reasons for noncompliance. A brief follow-up assessment will be scheduled to review the adequacy and effectiveness of the actions taken for this project.

The title and version of the laboratory protocols and manuals used, must be recorded in the scientific notebook.

The two notebooks must be made traceable to one another by noting in each "continued in ...", and "continued from..."

Computer files must be backed up for storage elsewhere (archival by the QA staff), preferably on tape. Mike Lei is available to help Mr. Meldrum with this.

QA agreed to provide past and future sample analysis listings and a listing of official sample set and site names to Mr. Meldrum.

Ink should be used in completing all records. However pencil can be used if records are photocopied as they are produced.

Lab duplicates must be performed more often than at present, preferably at a frequency of 5% of the sample load if no field duplicates are collected.

A listing, flow chart, or overall study procedure containing the order and where to record processes and data would add more assurance of the study's repeatability.

HRC PERFORMANCE IN USGS ROUND ROBIN STUDIES

		Fall '92	Spr '93	OLRs Fall '93	Spr '94	Fall '94	Spr '95
Trace Metals		T-121/T-123	T-125	T-127	T-129	T-131	T-135
	ICP-MS	2.9	3.7	3.3	3.5	3.6	3.2
	AA	2.8	2.3	3	2.8	AA+ICP-MS	AA+ICP-MS
	ICP-MS	3.7					
	AA	3.2					
Majors		M-124	M-126	M-128	M-130	M-132	M-134
		0.9	1.6	2.7	2.8	2.9	2.1
Nutrients-nonpreserved			N-38	N-40	N-42	N-44	N-45
			1.5	4	3	4	3
Nutrients-preserved		N-37	N-39	N-41			
		1	3.5	3.5			
Precipitation		P-19	P-20	P-21	P-22	P-23	P-24
		4	3	3.8	2.8	2.3	3
Mercury						Hg-19	
		0				3	
OWRs (inorganic)					3.1	3.2	2.9
Volatile Organics						VOC 5.94 2.9	
OLRs-overall laboratory ratings for that sample							
OWRs-overall weighted laboratory ratings for entire sample set							

HRC PERFORMANCE IN USGS ROUND ROBIN - VOCs

Analytes	Fall '94 VOC 5.94	HRC/MPV*	True Expected
	scores		values
trichlorofluoromethane		NR/.95	1.1
vinyl Chloride	4	8.31/7.4	8.3
1,1,1-trichloroethane	4	10.9/10.5	11
1,1-dichloroethane		NR/1.06	1.1
1,1-dichloroethene	4	8.29/8.24	8.7
dichloromethane	3	1.83/1.50	1.2
chloroform	4	11.7/11.8	12
carbon tetrachloride	3	11.1/10	10
benzene	3	11.3/10.9	11
1,2-dichloroethane	3	11.5/11.0	11.2
trichloroethene	4	12.1/11.4	11.5
1,2-dichloropropane	2	1.39/1.20	1.1
bromodichloromethane	4	10.6/10.3	11
toluene		0.27/0	0
dibromochloromethane	3	11.9/10.9	10.6
chlorobenzene	1	1.47/1.12	1.2
xylene		0.57/0	0
bromoform	3	9.63/8.92	9.5
tetrachloroethene	2	1.29/1.06	1.1
1,1,2-trichloroethane	0	1.51/1.19	1.1
1,4-dichlorobenzene	3	11.7/10.8	10.9
1,2-dichlorobenzene		0.51/0	0
mean**	2.9		

* "most probable value" = median of all reported values

** mean is based on values reported; not penalized for missed compounds or extra compounds

HRC PERFORMANCE IN USGS ROUND ROBIN - Majors

	Fall '92 M-124*		Spr '93 M-126*	Fall '93 M-128*		
	scores	HRC/MPV**	scores	HRC/MPV**	scores	HRC/MPV**
Alkalinity						
B						
Ca	2	165/154	1	8.48/7.62	3	81.7/78.9 mg/l
Chloride	2	79.5/82.8	2	19.4/20.7	4	98.1/98.2 mg/l
DSRD						
Fluoride	0	.73/.93	0	.93/.59	1	1/1.18 mg/l
K	0	17.7/13.9	2	2.88/2.62	3	8.97/9.44 mg/l
Mg	0	65.5/58.4	2	1.72/1.62	3	18/17.4 mg/l
Na	2	159/166	0	14.8/17.8	1	134/126 mg/l
P-total					3	1.34/1.39 mg/l
pH						
SiO2						
SO4	0	673/621	4	5.9/6.06	3	212/206 mg/l
Sp cond						
Sr					2	752/705 ug/l
V					4	3/2.6 ug/l
	OLR 0.9		OLR 1.6	OLR 2.7		
	Spr '94 M-130*		Fall '94 M-132*	Spr '95 M-134*		
	scores	HRC/MPV**	scores	HRC/MPV**	scores	HRC/MPV**
Alkalinity			NR	90.5/94.0 mg/l	0	59.0/62.9 mg/l
B						
Ca	3	21.7/21.2 mg/l	3	38.9/38.0 mg/l	2	46.5/43.8 mg/l
Chloride	3	22.4/21.4 mg/l	4	55.0/55.7 mg/l	3	66.1/65.0 mg/l
DSRD						
Fluoride	3	1.18/1.23 mg/l	0	.350/.480 mg/l	4	0.563/0.561 mg/l
K	4	2.93/3.00 ug/l	4	2.04/2.00 ug/l	4	2.30/2.40 mg/l
Mg	4	6.02/5.90 mg/l	4	8.60/8.49 mg/l	2	10.20/9.75 mg/l
Na	3	37.0/35.8 mg/l	4	48.3/47.9 mg/l	3	62.6/60.7 mg/l
P-total						
pH	2	8.17/8.02	2	8.31/8.09	0	6.44/7.72
SiO2						
SO4	3	55.4/58.0 mg/l	2	56.3/60.0 mg/l	3	76.2/78.0 mg/l
Sp cond	0	436/335 uS	3	500/493 uS	0	659/615 uS
Sr						
V						
	OLR 2.8		OLR 2.9	OLR 2.1		
OLR-overall lab rating						
* performance ratings: 0=poor, 1=questionable , 2=satisfactory , 3=good , 4=excellent						
** USGS most probabl						

HRC PERFORMANCE IN USGS ROUND ROBIN - Trace Metals

	Fall'94 T-131* scores	AA HRC/MPV**	ICP-MS HRC/MPV**	Spr '95 T-135 scores	AA HRC/MPV*
Ag	4		1.20/1.26 ug/l	3	
Al	3		119/132 ug/l	4	
As	4		55.5/56.6 ug/l	4	
B					
Ba	0		5/507 ug/l	4	
Be	4		12.0/12.2 ug/l	3	
Ca	4	1.1/30.6 ug/l		0	12.1/10.4
Cd	4		6.15/6.10 ug/l	4	
Co	3		25.2/24.6 ug/l	4	
Cr	4		19.1/18.6 ug/l	4	
Cu	4		20.8/20.2 ug/l	3	
Fe					
K	4	2.46/2.39 m		4	0.94/0.96
Li	4		16.9/17.0 ug/l	4	
Mg	3	8.27/8.00 m		2	1.90/2.00
Mn	4		38.0/37.8 ug/l	0	
Mo	4		113/112 ug/l	4	
Na	3	22.1/21.4 m		3	31.9/30.8
Ni	3		58.7/56.3 ug/l	4	
Pb	4		17.4/18.1 ug/l	3	
Sb	4		55.8/56.2 ug/l	4	
Se	4		11.1/11.2 ug/l	3	
SiO2					
Sr	4		293/295 ug/l	4	
V	3		36.1/34.2 ug/l	2	
Zn	3		67.7/72.0 ug/l	4	
	OLR 3.6			OLR 3.2	
OLR-overall lab rating					
* performance ratings: 0=poor, 1=questionable, 2=satisfactory, 3=good, 4=excellent					
** most probable value					

HRC PERFORMANCE IN USGS ROUND ROBIN - Nutrient

Nonpreserved Nutrients	Fall '94		Spr '95	
	N-44*score	HRC/MPV**	N-45*score	HRC/MPV**
NH3 as N				
NH3+Org N as N				
NO3 + NO2 as N	4	.810/.800 mg/l	2	0.296/0.286 mg/l
total P as P				
PO4 as P			4	0.115/0.12 mg/l
OLR-overall lab rating	OLR 3.0		OLR 4.0	
*performance ratings: 0=poor, 1=questionable, 2=satisfactory, 3=good, 4=excellent				
** most probable value				

July 13, 1995

Mr. Robert J. Vicks
NV State Health Lab
1660 N. Virginia Street
Reno, NV 89503

Dear Mr. Vicks,

Regarding the WS-035 "not acceptable" results obtained by HRC for Cu, Mn, 1,1-dichloroethylene, trans 1,2-dichloroethylene, 1,3-dichloropropane, 1,2,3-trichloropropane, and alkalinity, the reasons for failure and the implemented corrective actions are listed.

Cu: The reference material values did not indicate a problem in reporting the average of the external standard determined-value and the method of standard additions (MSA) determined-value. However when looking at the WS-035 results it appears that there was a matrix effect and in the future the MSA value will be reported for Cu.

Mn: The recovery of Mn in the undiluted sample was 92 ppb; the recovery of reference material analyzed with the dilute sample was 103%; the dilute sample value was reported because it was in the standard range and because the reference value was good. There seems to be a contamination problem or an isobaric interference for Mn that HRC has not been able to resolve. Therefore, the corrective action for Mn is to pursue the contamination problem as well as to report the undiluted sample Mn value when possible.

VOCs: The analyst feels that the volatile analytes were influenced by a contaminated water and by the fact that an analysis using chlorinated solvents for another study was being conducted in the lab space with the PAT GC-MS. The corrective action includes repair of the water system and scheduling of projects in a manner that prevents cross-contamination. FYI: the nonconforming trap in the GC-MS was replaced with the proper one.

Alkalinity: The analyst did not subtract the alkalinity of the water used to prepare the WS-035 sample. Corrective action includes the subtraction of the prep water alkalinity; and search for an alkalinity reference material to use as additional verification of sample analyses.

Sincerely,

Amy J. Smiecinski, QA

cc: Kathy Lao
Gary Coates
Caixia Guo

B. William Distel
Woodward-Clyde
101 Convention Center Dr., Suite 540
Las Vegas, NV 89109

Through: Klaus J. Stetzenbach

Dear Mr. Distel:

HRC employees have participated in the UNLV Right-to-know safety training course and the Yucca Mountain Site Characterization Project (YMSCP) General Employee Training and passed written exams for each. During the upcoming C-well Tracer test, HRC has planned to provide safety supplies to its employees in the event that there is a chemical spill or other accident. These include a container of water and soap for wash-up and a container for the waste water, two respirators, a portable eye wash, chemical spill kits, and a first-aid kit. If you have further questions or concerns, please let us know.

Sincerely,

A.J. Smiecinski
QA Staff
phone: 895 1420

cc: M.J. Umari