



**STATE OF COLORADO
DEPARTMENT OF PUBLIC HEALTH
AND
ENVIRONMENT**

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**GEORGE E. DAVIS MILL REMEDIATION PROJECT
HMWMD-RAD-01**

GATEWAY, MESA COUNTY, COLORADO

PROJECT COMPLETION REPORT

PREPARED BY:

**MFG, INC.
3801 AUTOMATION WAY
FORT COLLINS, COLORADO 80525-5734**

AND

**FRONTIER ENVIRONMENTAL SERVICES, INC.
5171 WARD ROAD, UNIT 1
WHEAT RIDGE, COLORADO 80033-1940**

SEPTEMBER 2006

Original File Copy



**FRONTIER ENVIRONMENTAL
SERVICES, INC.**

5171 Ward Road, Unit 1
Wheat Ridge, Colorado 80033
Telephone: (303) 234-9350
Facsimile: (303) 234-9371

October 16, 2006

Mr. Robert W. Terry

State of Colorado
Department of Public Health and Environment (CDPHE)
HMWMD-RP-B2
4600 Cherry Creek Drive South
Denver, Colorado 80246-1530

Reference: CDPHE RFP Number HMWMD-RCP-01
Gateway, Colorado – Davis Mill Site Remediation

Subject: Transmittal of Final George E. Davis Mill Site Completion Report

Dear Mr. Terry:

Pursuant to the Terms and Conditions of the above reference project contract documents; please find enclosed twenty-five (25) copies of the Final George E. Davis Mill Site Remediation Completion Report.

Contained within each report is a Compact Disc (CD) copy of relevant project documents:

- Project Completion Report Text File
- Project Daily Field Reports
- Project Safety Meeting
- Project Photographs
- Project "Bills-Of-Lading"

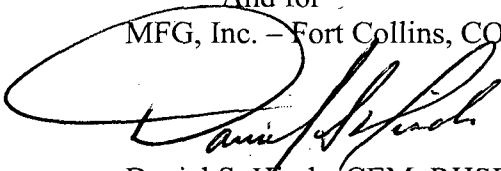
Contained in Attachment I of the Final Completion Report are the RESRAD Files.

Should you have any questions, you may contact us 303-234-9350.

Sincerely,

Frontier Environmental Services, Inc.

And for
MFG, Inc. – Fort Collins, CO


Daniel S. Hinds, CEM, RHSP
President

Cc: Robert Meyer, et. al; MFG, Inc. with Final Completion Report

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
Hazardous Materials and Waste Management Division
NRC Grant No. NRC-06-05-303 Formerly Licensed Sites

SA-1000 SITE CLEANUP REPORT

Licensee: Sinbad Uranium Company / Current owner: Katherine B. Willis
George E. Davis 43201 State Hwy 141
1017 Lakeside Court Gateway, Colorado 81522
Grand Junction, Colorado 81502

License Number: R-00215 (previously R-00170) license active 16-Dec-55 – 31-Jul-59
Docket Number: 40-1987

Purpose of report: NRC Grant No. NRC-06-05-303 site cleanup as followup to
NRC Grant No. NRC-06-04-301 site characterization and
NRC Grant No. NRC-06-01-301 scoping survey

I: Radionuclides used at site:

- A. Determined from files
Uranium ore (including carnotite)
- B. Determined from interviews with current or past employees and from site surveys
Interviews with John R. Willis, owner of adjacent property, son of current owner, and son and former employee of Robert Willis, previous owner and uranium miner/operator/broker
Uranium ore (including carnotite), Uranium, Thorium, Radium, related U and Th decay series radionuclides

II: Affected and unaffected areas (described in detail in the attached consultant's site characterization report)

- A. Affected areas (28,300 square meters, or about 6.98 acres, approximately 25% of property)
Hill where mill is located; hillsides; area around hill including adjacent pond
Equipment yard and outbuildings, areas where ore was piled for storage while awaiting sale
Areas used as rental property
- B. Unaffected areas (all remaining areas on site; site area is 111,026 square meters, or about 27.435 acres)
Hay field
Treed area at back of property, between hay field and river beaches
Sandy beaches along Dolores River and West Creek
Colo. Dept. of Transportation yard (portion of originally licensed site)

This Department has reviewed all of the measurement data and concurs with the contractor's findings regarding final (post-cleanup) status of the property.

III: Field measurements and dose evaluation

The contractor (Frontier Environmental and subcontractor MFG, Inc.) and their subcontractors performed extensive field and laboratory measurements before, during and after excavation. MFG analyzed the field data using the U.S. DOE RESRAD v6.22 mathematical model dosimetry program. Several estimates were made, based on combinations of likely assumptions. Details of data collection and analysis, and of MFG's findings, are provided in the attached consultant's project completion report.

MFG has estimated that, based on the current property use conditions and analysis by RESRAD, the radiation dose rate to the present on-site population probably does not exceed 25 mrem/yr *above background*. This Department has reviewed all of the survey data, and the input data and site use assumptions that were used in the models, and concurs with the consultant's findings.

However, because not all contaminated material could be removed within the limitations of the project budget, the State of Colorado will not be able to release the property for unrestricted use in its present condition.

As required by RH 4.61.3 of the State of Colorado *Rules and Regulations Pertaining to Radiation Control*, the Colorado Department of Public Health and Environment, working with the Colorado Department of Law (Office of the Attorney General), will request that the present property owner establish durable, legally enforceable institutional controls which provide reasonable assurance that the Total Effective Dose Equivalent (TEDE) from residual radioactivity that is distinguishable from background will not exceed 0.25 mSv per year (25 mrem/y) to an average member of the critical group (the present residential population).

The durable, legally enforceable institutional controls will take the form of restrictive covenants on the property, signed and agreed to by the property owner, that will be filed with the Mesa County (Colorado) Clerk and will be linked to all future titles and deeds to the property. Those restrictive covenants are presently being drafted. If the property owner fails to agree to the restrictive covenants, then this Department will issue a Radioactive Materials License to the property owner.

IV: Burial or storage locations

There is no radioactive material that has been buried or stored on the site. All remaining radioactive material consists of contamination in the fabric of the mill buildings that the property owner did not wish to have destroyed, contaminated surface soil underneath the mill buildings, and contaminated soil that remains below the water table near the Dolores River. Contamination in the fabric of the mill buildings and of the soil underneath the mill buildings is minimal; however, contamination in the soil that remains below the water table near the Dolores River provides the greatest hazard, in the event that the ground in the contaminated area is used to cultivate crops for direct human consumption or that groundwater from wells in the contaminated area is used for consumption by humans or livestock, or for irrigation.

V: Photographs PROVIDED WITH CONTRACTOR'S FINAL REPORT

VI: Survey results

- A. Area surveys PROVIDED WITH CONTRACTOR'S FINAL REPORT
- B. 1. Contaminated areas PROVIDED WITH CONTRACTOR'S FINAL REPORT
- 2. Unaffected areas PROVIDED WITH CONTRACTOR'S FINAL REPORT
- C. Surface contamination sampling points PROVIDED WITH CONTRACTOR'S FINAL REPORT
- D. Soil/sediment sampling points PROVIDED WITH CONTRACTOR'S FINAL REPORT
- E. Maps and diagrams PROVIDED WITH CONTRACTOR'S FINAL REPORT
- F. Radionuclides detected and not detected PROVIDED WITH CONTRACTOR'S FINAL REPORT
 $\text{Nat U } ^{230}\text{Th } ^{226}\text{Ra}, \text{Nat Th}(^{232}\text{Th})$
- G. Concentrations measured PROVIDED WITH CONTRACTOR'S FINAL REPORT

VII: Site cleanup results

- A. Resident and worker populations within the remaining contaminated area None
- B. Accessibility of contaminated area to the public Residents, workers and visitors have unrestricted access to the property
- C. Average gamma surface dose rate in the contaminated area Less than 25 mrem/yr *above background*
- D. Estimate of contaminated area Reduced to Survey Units 3, 4 and 5 in the area described in the attached letter from Frontier Environmental Services, Inc., dated December 2, 2006, subject: Transmittal of Final Site Survey Drawing – Showing Legal Description of Post Remediation Zone/Unit Locations
- E. Estimate of the total volume of waste No longer applicable
- F. Percentage of contaminated area where the level of removable contamination exceeds permissible regulatory limits None (subject to covenants restricting use)

VIII: Discussion and evaluation of results

A. Additional information

Site was surveyed; map of survey results was made

Samples collected; sample analysis results were tabulated

Survey and analysis results provide specific information about the extent and degree of remaining Ra, U and Th contamination on site

Dose assessment was performed using RESRAD v6.22

B. Discussion and evaluation

Failure to properly terminate radioactive materials license R-00215 (previously R-00170), license active 16-Dec-55 – 31-Jul-59, following its expiration resulted in site use that is was not consistent with the radiation hazards that were present on the property prior to site cleanup

Site cleanup has made the condition of the site consistent with current site use

RECOMMENDATION: Terminate AEC/NRC license; State of Colorado will enforce restrictions on use of the property until future site cleanup and/or site characterization justify reduction or elimination of institutional controls

att: Supplemental CDPHE laboratory reports

MFG, Inc., and Frontier Environmental Services, Inc., *George E. Davis Mill Remediation Project Completion Report*, Project no. HMWMD-RAD-01, September 2006

Frontier Environmental Services, Inc., Transmittal of Final Site Survey Drawing – Showing Legal Description of Post Remediation Zone/Unit Locations, December 2, 2006

INDICATIONS FOR TERMINATION OF AEC/NRC LICENSE R-00215 (previously R-00170)

Identity and location of current site owner	Katherine B. Willis 43201 State Hwy 141 Gateway, Colorado 81522
Identity and location of original licensee	UNKNOWN/NOT TRACEABLE
Cleanup criterion	Endpoint not to exceed 25 mrem/yr

History of review of eligibility for CERCLA funding assistance

EPA ID COD980666358

Following a site inspection on 01-Sep-81 the Hazardous Ranking System package was made final on 01-Dec-1982

Site was not placed on the National Priorities List

Site is not a Federal Facility

Site is a Mines/Tailings site

No (zero) operable units have been assigned to the site, other than sitewide OU 00 used as reference in discovery/preliminary assessment, site inspection and preparation of the HRS package

att: Printout CERCLIS Hazardous Waste Sites Gateway Vanadium Mill Site Information

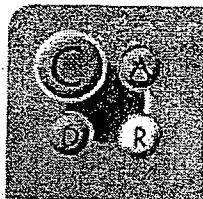
Printout CERCLIS Hazardous Waste Sites Gateway Vanadium Mill Actions

Printout CERCLIS Hazardous Waste Sites Gateway Vanadium Mill Aliases

Printout CERCLIS Hazardous Waste Sites Gateway Vanadium Mill Operable Units



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<u>OU Action Name</u>	<u>Qualifier</u>	<u>Lead</u>	<u>Actual Start</u>	<u>Actual Completion</u>
00 DISCOVERY		F		02/01/1980
00 PRELIMINARY ASSESSMENT	H	F		07/01/1981
00 SITE INSPECTION	N	F		09/01/1981
00 HRS PACKAGE		F		12/01/1982

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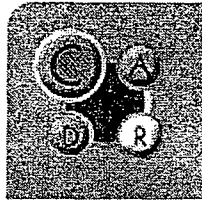
URL: <http://www.epa.gov/superfund/sites/cursites/c3co/a0800232.htm>

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GATEWAY VANADIUM MILL

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Site Name:GATEWAY VANADIUM MILL

Street:HWY 141

City / State / Zip:GATEWAY, CO 81522

EPA ID:COD980666358

EPA Region:08

County:MESA

NPL Status:Not on the NPL

Non-NPL Status:NFRAP

Federal Facility Flag:Not a Federal Facility

Incident Category:Mines/Tailings

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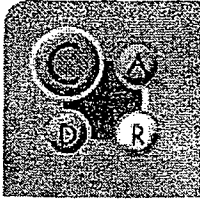
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Alias ID	Alias Name / Street / City / State / Zip
101	GATEWAY VANADIUM SITES HWY 141 GATEWAY, CO

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**STATE OF COLORADO
DEPARTMENT OF PUBLIC HEALTH
AND
ENVIRONMENT**

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**GEORGE E. DAVIS MILL REMEDIATION PROJECT
HMWMD-RAD-01**

GATEWAY, MESA COUNTY, COLORADO

PROJECT COMPLETION REPORT

PREPARED BY:

**MFG, INC.
3801 AUTOMATION WAY
FORT COLLINS, COLORADO 80525-5734**

AND

**FRONTIER ENVIRONMENTAL SERVICES, INC.
5171 WARD ROAD, UNIT 1
WHEAT RIDGE, COLORADO 80033-1940**

SEPTEMBER 2006

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Of
Public Health and Environment

George E. Davis Mill Remediation Project
Gateway, Mesa County, Colorado
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- PROJECT SITE PHOTOGRAPHS
- DAILY “BILL-OF-LADING” – LOAD TICKETS
- DAILY PROJECT FIELD REPORTS
- DAILY PROJECT SIGN-IN SHEETS
- DAILY SAFETY MEETING SUMMARY & SIGN-IN

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OF THE GEORGE E. DAVIS MILL
SITE REMEDIATION

**Colorado Department of
Public Health and Environment
George E. Davis Mill Remediation Project
Gateway, Mesa County, Colorado**

Final Project Completion Report

I. PROJECT DESCRIPTION

The original scope of work; and ensuing work plan, for the George E. Davis Mill Remediation Project (Project) provided for the design, radiological remediation oversight, and on-site construction for the complete remediation of the George E. Davis Mill Site; located at 43201 Highway 141 (Mile Post 111), Gateway, Mesa County, Colorado. The remediation work plan included and consisted of necessary site improvements for the excavation and transportation of radiological material contaminated soils to the UMETCO Minerals Corporation Uravan Site for disposal. The UMETCO Uravan facility is accessed off of Colorado Highway 141 approximately 38-miles south of Gateway; and is located in Montrose County Colorado. A separate contract was completed between the Colorado Department of Public Health and Environment (CDPHE) and UMETCO for the on-site management and disposal of project excavated and transported materials by UMETCO. Frontier Environmental Services, Inc. (FESI) of Wheat Ridge, Colorado was the selected design build contractor which performed the on-site remediation activities at the George E. Davis Mill Site. On-site remediation activities at the Davis Mill Site included partial building decontamination and/or demolition, regrading, site reclamation, residence area remediation, and other work as may be required to meet the objectives of the Project's work plan scope.

A. Site History and Background:

As part of an on-going regulatory administrative process; the U.S. Nuclear Regulatory Commission (NRC) is closing old radioactive materials license files that have not been properly terminated by the licensees. The George E. Davis Mill Site ("Site") in Gateway, Colorado, is one such site. The NRC has been mandated by the United States Congress to facilitate a file closure program for about 150 radioactive materials licenses, most of which were issued by the Atomic Energy Commission in the 1950s and 1960s. The program, which is titled "Funding Assistance for Formerly Licensed Sites in Agreement States" provides grants to Agreement States for the purpose of reviewing files, conducting surveys, characterizing and remediating sites formerly licensed by the Nuclear Regulatory Commission. As part of Phase I of the NRC program, the CDPHE reviewed files for 12 sites in Colorado, and directed the NRC to close 11 of the files without further action. In fulfillment of Phase I of the program, the CDPHE conducted a scoping survey of the George E. Davis Mill Site. Based on the results of the scoping survey, on April 30, 2004 CDPHE submitted a proposal to the NRC to conduct characterization of the Site. On September 16, 2004, the NRC awarded a grant to the CDPHE for the "Site Characterization of the George E. Davis (Gateway, Colorado) Mill Site." The initial scoping survey and the site characterization were Phases I and II of a

three phase project. The site remediation was partially completed by the full implementation of the Project's Work Plan. Implementation of the Project's Work Plan was Phase III of a three-phase CDPHE project that was administrated by the U.S. Nuclear Regulatory Commission Funding Assistance for Formerly Licensed Sites in Agreement States SA-1000.

Phase I of the project was completed under U.S. NRC Grant no. NRC-06-01-301 for File Reviews and Initial Surveys of Eleven NRC Formerly Licensed Sites. The Site Characterization, Phase II, was completed under U.S. NRC Grant no. NRC-06- 04-301 for Site Characterization of the George E. Davis (Gateway, Colorado) Mill Site. Phase III was awarded and contracted to FESI by CDPHE and was funded by U.S. NRC Grant Number NRC-06-05-303 for Site Remediation of the George E. Davis (Gateway, Colorado) Mill Site. Phase III was partially completed in July 2006. Areas not fully remediated are those radiological contaminated soils found beneath the Davis Mill Site mill building and two mill support buildings; non-excavatable radiological soils found in direct contact with localized site ground water; and radiological affected soils found deep (in excess of 6-feet) beneath specific site residence mobile home foot-prints.

B. Scope of Work:

In order to achieve a timely and cost effective remediation of the Gateway - Davis Mill Site Remediation site, CDPHE had a portion of the contaminated soils located at the Gateway - Davis Mill Site removed and disposed of off-site at the UMETCO Uravan Facility. FESI provided the environmental professionals necessary to execute the environmental remediation plan describing this Project's site remediation. In April 2006 FESI initiated the implementation of the work plan with the excavation and disposal of approximately 17,200 cubic yards of contaminated soils as the bulk of the cleanup. The original project volume estimate of radiological contaminated soils at the Davis Mill Site was 14,000 cubic yards. The project's scope of work included all ancillary or peripheral tasks necessary to implement the scope of work; and as such the temporary relocation of selected residences and decontamination, to the extent practicable, of selected site radiological contaminated buildings. The project included post cleanup verification surveys and calculation and presentation of any post cleanup site risk that might still remain. The results of post site remediation verification radiological surveys are found in Attachment A of this Completion Report. All deliverables for this project will be submitted to the Nuclear Regulatory Commission (NRC) by the State of Colorado - CDPHE. Final acceptance by the CDPHE will be subject to approval and acceptance of this Project Completion Report by the NRC and the State of Colorado. A design-build method of construction was selected in an attempt to maximize project budget for the timely and cost effective implementation of the Remediation Work Plan for the Gateway - Davis Mill Site. CDPHE had previously engaged consulting services to conduct a site characterization/planning study, which resulted in the Preliminary Cleanup Plan Report, dated March 25, 2005, and the Site Characterization Summary Report, dated March 25, 2005, that contain more detailed information about the site and desired remediation of the site. This information was used in the development of the Project Work Plan.

C. Design-Build Concept:

CDPHE selected a Design-Build concept to provide professional design, management and construction services for the design and construction of the Gateway - Davis Mill Site remediation. The Design-Build concept centers on utilization of a Design-Build Entity (FESI) who has assembled and leads a team composed of the Professional Engineers and Health Physicists from MFG, Inc. and other supporting consultants as required; and transporter(s) all under contract to FESI. In a client and owners representative role, CDPHE representatives are a part of the Design Build Team. During the pre-construction/design phase, FESI provided the required planning and documents and utilized the skills and knowledge of remediation and construction and managed the design and provided pre-construction services (i.e., develop schedules, prepare construction plans and specifications, subcontract work, etc.). During the remediation/construction phase, FESI coordinated with its Team Partners to assure proper implementation of the Project work plan objectives as well as provided remediation/construction services and management of the project (including the timely procurement and management of all trade contracts throughout the construction/remediation phase). It was the responsibility of the Project Team to provide the necessary services/work which included, but are not limited to the following:

1. Development of a complete project design and provide all required services in accordance with the RFP, CDPHE standards, and all applicable codes and regulations;
2. Provide all design and construction services necessary to implement the goals of the project, including but not limited to health physics protocols; engineering (civil, structural, environmental and safety design services) and any required specialty design consultants as required; construction services included scheduling, construction administration and management;
3. Oversee the complete design and remediation/construction processes;
4. Develop work schedules and coordinate project activities to meet project timelines;
5. Coordinate/communicate the activities of the Project Team throughout the design and remediation/construction process;
6. Construct the project as contracted;
7. Design and remediate/construct the project within the total modified contracted project budget. This includes design, planning, construction administration, excavation and transportation of the contaminated soils, building cleanup and demolition, temporary residence equipment and livestock relocation, regrading and reclamation, verification surveys, and any construction fees, and other soft costs.

The Davis Mill Site Remediation Project Team and lines of responsibility are illustrated on **Figure 2** and can be found as an attachment to this completion report.

In support of project completion report; daily project activities were summaries and documented by means of various daily reports; safety briefings; sign-in sheet and project photographs. Electronic copies of daily project documentation are attached to this Completion Report as compact disc files. These electronic files can be found in:

Compact Disc – Archive Files listed as:

George E. Davis E. Davis Mill Site RESRAD Files
Project Site Photographs
Daily “BILL-OF-LADING” – Load Tickets
Daily Project Field Reports
Daily Project Sign-In Sheets
DAILY SAFETY MEETING SUMMARY & SIGN-IN

II. LOCATION:

The remediation work shall be located at the George E. Davis Mill Site located at 43201 Highway 141 (Mile Post 111), Gateway, Mesa County, Colorado. The UMETCO Uravan facility is located off Highway 141 approximately 38-miles south on Colorado Highway 141 of Gateway, Colorado; and located in the town of Uravan, Montrose County, Colorado. See Figure 1 for an illustration of the George E. Davis Mill Site; Gateway, Mesa County, Colorado.

III. PROJECT OBJECTIVES:

The objectives for the project were to:

- Remove soils that exhibit radioactivity above the background range and dispose of them at UMETCO Minerals, Uravan, Colorado site. The UMETCO facility is located approximately 38-miles south of Gateway, Colorado on Colorado Highway 141.
- Perform the Project expeditiously and within allotted timeframe and as necessary to complete disposal of the contaminated materials by July 31, 2006 (revised closure date for the UMETCO facility).
- Perform the project in compliance with all state and federal laws and regulations, including compliance with state Radiation Control Program requirements and federal Nuclear Regulatory Commission (NRC) requirements.
- Perform the remediation of the Project in a manner that is acceptable to the property owner of the site (Mrs. Kathryn Willis) and includes appropriate coordination with the owner and the actions needed to temporarily relocate persons and animals as necessary during the cleanup.
- Regrade and complete the cleanup in a manner that completes the remediation activities with appropriate site grades and configuration.
- Prepare remediation plan to guide the implementation of the project and serve as documentation of the work performed.
- Perform verification surveys that demonstrate the condition of the completed site remediation, and provide as-built information documenting the project as implemented.
- Document and photograph daily field project activities. Specifically, document with a summary of daily site activities, including items of issue; daily project personnel attendance as witnessed by a daily project field personnel log-in and log-out time and personal radiological scan summary; and a daily project safety briefing summary report. **See project daily reports found on the attached compact disc.**

IV. DESCRIPTION OF THE CONTAMINATED MATERIAL

The volume and weight of material based on data presented in the Site Characterization Summary Report for the George E. Davis (Gateway) Mill Site dated March 25, 2005, is estimated to be approximately 10,300 cubic meters (13,444 cubic yards) of material which exhibits radioactivity above the background concentration. The purpose of this project is to remove this in-place material and transport it to the UMETCO Uravan facility for management and disposal. FESI's Scope of Work and contract with the CDPHE was based on the rounded number of 14,000 in place (or bank) cubic yards; with a Phase II Study calculated density of 1.4 tons per cubic bank-yard. Loose cubic yards or compacted cubic yards as placed in the disposal location were not to be used as a means of calculating amount of work performed or payable. As an interim means to calculate radiological material excavated; soil density conversions were used to determine approximate bank yards excavated; i.e. 1.4 tons per cubic bank-yard. Based on a conversion factor of 1.5 grams per cubic centimeter for sandy loam, the estimated dry weight of the material is 15,450 metric tons (17,000 short tons). Based on the presence of an estimated additional 10 percent by weight moisture, the total weight to transport is estimated at 17,000 metric tons (18,700 short tons).

As a result of actual field excavation methodology and the use of front-end loader equipped with a load-cell to assure transport vehicle weight management for highway access and to provide an interim method of calculating daily cubic bank-yard excavated and managed; the actual soil density was calculated to be 1.27 tons per bank-yard. Specifically; 936-loads (21,844 tons) were transported from the Davis Mill Site to the UMETCO Facility site in Uravan, Colorado; with a final fill/cut topographical survey volume of approximately 17,200 cubic-yards

The Radionuclide Activity of the material based on data presented in the Site Characterization Summary Report for the George E. Davis (Gateway) Mill Site dated March 25, 2005, has an estimated average radionuclide activity of: U-238 decay chain radioisotopes: 33 picoCuries per gram each x 14 isotopes = 462 pCi/g, U-235 decay chain radioisotopes: 1.5 pCi/g each x 11 isotopes = 16.5 pCi/g Th-232 decay chain radioisotopes: 1 pCi/g each x 10 isotopes = 10 pCi/g Therefore, the estimated average total activity is 489 pCi/g. Other contaminated materials include portions of the Mill building and associated sheds. Materials other than soils must be properly sized to conform to UMETCO's license requirements.

V. SCHEDULE

Project completion time was of the essence. CDPHE initially required that site remediation tasks be completed by June 30, 2006. However and due to UMETCO site access issues, and UMETCO Site remediation activities; the Project transportation and completion schedule was affected. In summary the project schedule is:

- Contract Signed by FESI on March 6, 2006 and by the State of Colorado on March 28, 2006
- Notice to Proceed Issued by CDPHE on March 29, 2006
- Preconstruction/Design Complete March 31, 2006
- Field Mobilization of Project Equipment and Personnel; March 22, 2006
- Relocated Property Owner Equipment & Livestock; March 27, 2006 to April 23, 2006.
- Began Excavation and Stock Piling of Radiological Impacted Site Materials & Soil; April 24, 2006.
- Initial Shipment of Radiological Material Transported to UMETCO; May 2, 2006
- Excavation and Transport of Radiological Impacted Materials with Last Shipment for Disposal at the UMETCO Uravan, Colorado Facility; June 21, 2006
- Reclamation and Physical Remediation/Construction Completed June 27, 2006
- Project Closeout reports October 15, 2006

Other contracts related to the project and/or site activities were pursued independently by CDPHE. CDPHE has contracted directly with UMETCO Minerals Corporation for receipt and disposal of the contaminated solids. No other contracts were issued by CDPHE.

The project schedule included regularly established job coordination meetings participated with FESI, its Subcontractors, UMETCO and CDPHE. Once the project was initiated with the remediation phase; job coordination meetings were held in Gateway, Colorado on a need be basis. Daily meeting were held with FESI Staff and MFG, Inc.

CDPHE and State Buildings Programs representatives may conduct routine inspections on the project site during the course of remediation/construction. The CDPHE project manager (Mr. Robert W. Terry; CDPHE Radiation Management Program) served as the liaison between the Project Team and CDPHE for the day-to-day coordination.

Contract plans, drawings and specifications were approved by the CDPHE and State Buildings Programs prior to the start of remediation/construction. The Project Team was responsible for obtaining all the necessary approvals and/or permits.

The completion end date for the project was amended to October 15, 2006 with the issuance of this Completion Report. Site remediation/construction activity was completed with off-site disposal on June 21, 2006, even though CDPHE's arrangement with UMETCO provided that disposal at the UMETCO facility was to be complete before or on June 30, 2006.

VI. DAVIS MILL REMEDIATION WORK PLAN

A. Design and Project Planning:

FESI and MFG, Inc. completed the development of the following project documents and site specific remediation/construction plans. A copy of each was included as part of the Project Specific Work Plan as its own stand-alone set of Project Documents.

1. FESI obtained written permission from property owner to enter the Site and conduct the work. A copy of this written agreement is presented in **Attachment A** of the Work Plan.
2. FESI submitted to CDPHE-WQCD an application for construction stormwater permit. A Colorado Discharge Permit System – Stormwater Certification COR-039 754, Mesa County; Gateway – Davis Mill Remediation was issued on March 28, 2006. A copy of this permit and the Davis Mill Remediation Stormwater Management Plan are presented in **Attachment B** of the Work Plan.
3. FESI prepared project and site specific planning documents for the project, these include a project schedule; an remediation/construction plan (indicating who will do what, responsibilities, and indicating how communications will be handled) – contained and described in the Work Plan; and a Radiation Health and Safety Plan (RHSP). A copy of the RHSP is included as **Attachment C** of the Work Plan.
4. FESI submitted to the State of Colorado Department of Transportation – Grand Junction Region; an application for Special Use Permit for highway access and neighboring CDOT site yard access. On April 3, 2006 CDOT issued a Special Use Permit (Permit Number 12,996) to FESI pertaining to Colorado Highway 141 access; and the associated work at the Davis Mill Site with access to the CDOT Gateway facility yard. A copy of the Special Use Permit is attached to the Work Plan as **Attachment D**.
5. FESI prepared a Traffic Control Plan for the Davis Mill Remediation Project. The Traffic Control Plan was developed in accordance with the project scope of work and to meet the conditions of the CDOT Special Use Permit discussed in paragraph VI.4 of the Work Plan. A copy of the project Traffic Control Plan is included in the Work Plan as **Attachment E**.
6. On April 12, 2006; FESI met with UMETCO and RECON personnel to discuss project schedule and the project's transportation plan and traffic schedule. Representatives of CDPHE (Robert W. Terry), MFG, Inc. (Janet Johnson, Randy Whicker, and Craig Little) and Sutherland Brothers, Inc. (Bob Sutherland; Transporter) were in attendance at this meeting. A project specific Bill of Lading was developed for transport custody control and material transfer information. The actual average number of transport-loads was 28-loads per day of site material transported to the UMETCO facility each work day utilizing an average of 7-transport vehicles. A copy of the project specific Bill-of-Lading is included in the Work Plan as **Attachment F**.
7. FESI prepared project specific design documents as discussed in the Work Plan. FESI's sub-contractor Inter-Mountain Engineering, LTD provided site specific topographical surveys for cut and fill calculations and a corresponding site drawing. The site topographical drawing (0.5-foot contour interval) was presented as

Attachment G to the Work Plan. This topographical survey data along with the post-remediation survey data was used to calculate cut volumes for materials removed from the Davis Mill Site as a result of implementation of the scope of work objectives.

8. MFG, Inc. performed a site specific radiation survey as a reference of pre-remediation activity. A copy of the site radioactivity scan survey is illustrated in **Attachment H** of the Work Plan.
9. MFG, Inc. developed a Davis Mill Site specific sampling and analysis Plan (SAP) which outlines the methods that will be used to evaluate remediation activities of performance meeting the project objectives. A copy of the SAP is presented as **Attachment I** to the Work Plan.

The above described planning documents were transmitted with the Work Plan to CDPHE for approval. On March 23, 2006 the site Work Plan was approved by CDPHE.

B. Site Remediation

The following project tasks were implemented as described below:

1. Frontier Environmental Services, Inc. (FESI) provided for project mobilization of construction equipment; site security control; establishment of a field office; decontamination trailer; temporary electrical power; personnel and tools. FESI established decontamination facilities, equipment areas, site management and field laboratory facilities for MFG, Inc. The project office/laboratory complex was outfitted with temporary sanitary facilities. Site communications was provided for by satellite telephone and local telephone service. The project decontamination trailer was equipped with lockers for storage of "street clothing".
2. FESI made provisions with the agreement of the property owner (Mrs. Kathryn Willis) for the relocation of persons, livestock and equipment located in the areas requiring cleanup to other areas on the property.
3. FESI provided for the survey of the pre-excavation post-excavation topography of the site by a professional land surveyor (Duane Fehringer, PLS, PE of Inter-Mountain Engineering, LTD.) and establishment of background radiation levels and soil radionuclide concentrations by a qualified radiation specialist (Randall Whicker of MFG, Inc.). Site survey control was "tied" to existing survey control located adjacent to the site; i.e., CDOT survey monument (Highway 141) and USGS Dolores River Gauging Station survey monument. See **ATTACHMENTS C and D**, respectively.
4. FESI provided equipment and personnel to implement the remediation of the Davis Mill site including selected areas surrounding residences and other site structures. Physical cleaning of the Mill building and associated sheds was partially accomplished concurrent with site remediation activities.
5. FESI mobilized earth moving equipment [CAT 330 Excavator; CAT 950 Front-End Loader(s) and CAT-D6-N Dozer] for the systematic excavation and seven (7) transport vehicles per day; even though ten (10) over-the-road transport vehicles were contracted for; were made available for the off-site shipment of elevated radionuclide soil materials. All cleanup activities were overseen by FESI and MFG, Inc. and who

monitored the work methods and progress. Silt fences and other erosion protection devices were installed as required by the planning documents (Stormwater Management Plan). FESI staked the outlines of the areas where soil was to be removed, highlighting where removal to different depths expected to be required to reach the cleanup criterion. Dust control procedures were implemented to control exposure. Standard dust control measures typical to the construction industry were anticipated, i.e. spraying with water. Prior to leaving the Project Site, transport trucks were inspected and if necessary decontaminated for highway access. Qualified FESI and/or MFG, Inc. radiation personnel verified status of decontamination of transport trucks or equipment that left the Project Site.

6. FESI provided for the efficient loading of transport vehicles at a specially managed loading and decontamination/inspection pad. A bill-of-lading for the materials being transported was issued for each load. Each transport vehicle was radiologically scanned and if necessary decontaminated prior to departure from the site. See **Compact Disc Record File containing "Bills-of-Lading" (BOL)**.
7. FESI and Inter-Mountain Engineering, LTD (Duane Fehringer; PLS, PE) prepared the post-excavation topographic survey of the site for purpose of establishing quantities transported and disposed. In addition, FESI outfitted the CAT 950G Front-End Loader with a load-cell, which allowed for the routine tare of each transport vehicle loaded. This weight was used to evaluate the day-to-day amount of material excavated and transport in relation to the overall expected materials to be managed by the Project scope of work.
8. FESI provided equipment and personnel that facilitated the final Site grading including fill of on-site areas. Initial site topographical and post-remediation surveys will be used to establish final site grading to promote site stormwater drainage similar to pre-remediation drainage patterns. The impacted areas that are subject to erosion were managed consistent with the Stormwater Management Plan and Permit to prevent erosion and result in an acceptable finally stabilized site.
9. FESI has repaired and/or replaced of disturbed or temporarily removed fences concurrent with the property owner.
10. FESI managed on-site generated cleanup and disposal of wash water and miscellaneous materials with the materials excavated and removed from the site. Decontamination water was allowed to evaporate in containment basins down-gradient of the Mill Structure. Residues from decontamination activities were managed with other materials designated for transport to the UMETCO facility in Uravan, Colorado.
11. FESI provided for the unconditional release decontamination and demobilization of remediation/construction equipment and decommissioning of the field facilities by the systematic cleaning and radiological scanning of site specific remediation equipment. Residues from equipment decontamination were managed with other materials transport to the UMETCO facility in Uravan, Colorado.
12. FESI provided for the relocation of persons and livestock back to the Davis Site in the approximate pre-remediation location(s).

C. Sequence of the George E. Davis Mill Site Remediation

FESI implemented the Project scope of work in a sequenced manner which facilitated the effective and efficient removal of radiological materials of concern at the Davis Mill Site.

The sequence of site activities was:

1. To provide the initial site radiological scan to validate initial site characterization results and to establish remedial areas and their delineation from non-remediation areas;
2. To construct off-site stormwater control features pursuant to the CDPHE Stormwater Permit;
3. To construct temporary access/egress through the Gateway, Colorado CDOT Facility Yard;
4. To relocate property owner materials and equipment to designated non-remediation areas;
5. To construct temporary livestock pins and fenced areas for the relocation of livestock by the property owner during site remediation;
6. To construct decontamination retention catches for equipment decontamination and Davis Mill structure pressure wash water collection;
7. To excavate and consolidate Davis Mill Site radiological containing materials for transport material load-out and transport;
8. To decontaminate by pressure washing the interior portions of the Davis Mill Structure and associated out-buildings;
9. To relocate resident property materials and equipment from remedial areas to temporary locations to facilitate site remediation surrounding residences, and;
10. To excavate residential soils and re-location of resident's property.
11. To collect and analyze site remediation verification soil samples for final site status assessment.
12. To perform final site radiological scan and topographical surveys and report on the completion status and land use limitations as a result of the implementation of the Project Work Plan.

VII. FINAL SITE REMEDIATION COMPLETION REPORT

A. INTRODUCTION – FINAL PROJECT COMPLETION REPORT

FESI and MFG, Inc. have prepared this Completion Report and Final Site Completion Report using criteria specified by CDPHE. The final report summarizes the final remediation radiological status of the George E. Davis Mill Site soils and building features.

This section of the overall Project Completion Report to the Colorado Department of Public Health and Environment concerning remedial activities at the George E. Davis Mill Site, Gateway, CO, in the spring and early summer of 2006, presents general

background, methods, activities, and results related to radiological aspects of project HMWMD-RAD-01.

A. 1 Radiological Support Services for Remedial Activities

MFG Inc., of Fort Collins, CO provided sub-contracted radiological services for Frontier Environmental Services, Inc (FESI) of Wheat Ridge, CO in support of the 2006 cleanup of the Davis Mill Site in Gateway, CO. This support included authorization for FESI and its sub-contractors to conduct remedial activities involving radioactive materials in the State of Colorado under MFG's radioactive materials license with the Colorado Department of Public Health and Environment (CDPHE). In accordance with the terms of MFG's radioactive materials license and the project Work Plan (FESI 2006), MFG provided radiological oversight for the Davis Mill Site cleanup including implementation of a radiation health and safety protection program. Consistent with the scope of work described in the project Work Plan, MFG also provided 1) radiation detection and measurement instrumentation, 2) guidance with respect to radiological aspects of the cleanup, and 3) verification of the results of the cleanup with a final radiological status survey after completion of remedial activities.

A.2. Radiological Cleanup Criteria

As detailed and justified in Attachment I of the Work Plan (FESI 2006), the site-specific cleanup criterion for remedial activities at the Davis Mill Site was a net (above background) Ra-226 concentration of 2.6 pCi/g. This criterion, known as the derived concentration guideline level (DCGL_w) in MARSSIM, the Multi-Agency Radiation Survey and Site Investigation Manual (NRC, 2000), was derived from a RESRAD analysis as the average site Ra-226 concentration expected to equal the specified dose-based release criterion of 25 mrem/yr above background (excluding the radon pathway) under a rural residential land use scenario. The analysis assumed that all uranium decay series radionuclides are in equilibrium. Based on the 2005 characterization survey conducted by Carter & Burgess, Inc. (Carter & Burgess, 2005), the upper range of background for Ra-226 based on gamma-spectroscopy measurements was 2.8 pCi/g. This resulted in a gross cleanup criterion of 5.4 pCi/g Ra-226. This criterion was used as a benchmark in guiding remedial activities.

As described in Attachment I of the Work Plan, the protocol for evaluation of results stated that if all final status survey soil sampling measurements in a given survey unit fell below this criterion, the survey unit would qualify for unrestricted release from the existing radioactive materials license attached to the site. If some samples did not meet this criterion, then in accordance with guidelines found in MARSSIM, the Wilcoxon Rank Sum Test (WRS) would be used as specified to evaluate whether or not the median *gross* concentration in the survey unit was statistically greater than the median of background plus the *net* DCGL_w (i.e. background reference area median + 2.6 pCi/g).

In addition to evaluations of each survey unit against the DCGL_w, any areas identified by gamma scans as having potential for elevated Ra-226 levels, would be sampled and

evaluated against a secondary "hot spot" criterion. To develop this secondary criterion, termed $DCGL_{EMC}$ in MARSSIM, RESRAD was used to calculate site-specific area factors for Ra-226. An example calculation of an area factor and $DCGL_{EMC}$ for the Davis Mill Site are as follows:

$$\begin{aligned} \text{Ra-226 Area Factor} &= 10000 \text{ m}^2 \text{ dose} / 100 \text{ m}^2 \text{ dose} \\ &= (24.18 \text{ mrem}) / (10.45 \text{ mrem}) \\ &= 2.3 \\ DCGL_{EMC} &= (\text{net } DCGL_W \times AF) + \text{background} \\ &= (2.6 \text{ pCi/g} \times 2.3) + 2.8 \text{ pCi/g} \\ &= 8.8 \text{ pCi/g} \end{aligned}$$

Thus, 8.8 pCi/g represents the average Ra-226 concentration within a 100 m² area that would result in an above background dose of 25 mrem/yr (assuming the surrounding area is below the $DCGL_W$). If calculations show that all hot spots in a survey unit, in combination with the general average concentration, result in a dose in excess of this criterion, the survey unit would fail the secondary requirement for unrestricted release.

As will be presented and discussed later in detail, the final status survey results revealed at least some individual measurements in each survey unit exceeded the 5.4 pCi/g gross $DCGL_W$ and in some cases "hot spots" exceeded $DCGL_{EMC}$ criteria as well. As a result, the "upper range" of background concept was abandoned in favor of the more conservative approach of using a mean value for background as actually measured by the on-site soils lab (2.1 pCi/g). All further statistical comparisons between survey units and background used mean or median values, measured by the same analytical system, in accordance with MARSSIM guidelines.

A.3 Radiological Measurements

A.3.1 Excavation Support: Gamma Surveys

Gamma survey instruments used to guide 2006 Davis Mill Site excavation activities involved 2×2" Ludlum Model 44-10 NaI detectors coupled to Ludlum Model 2350 rate meters. These survey instruments were used (without shielding) to verify the horizontal extent of areas on the Davis Mill Site requiring cleanup (as estimated both by the Carter & Burgess Characterization report and MFG's independent 2006 pre-cleanup gamma survey) and to guide the vertical extent (depth) of excavation required to achieve compliance with the cleanup criterion.

In 2005, a statistical correlation between Ra-226 concentration (pCi/g) and gamma exposure rate (uR/hr) was developed by MFG during cleanup of a uranium mill site in Washington State (using the same detector/meter system employed at the Davis Mill Site). Analysis of that relationship indicated that an unshielded gamma exposure rate

reading of 30 uR/hr at about 2 feet above the ground surface indicated a 95% probability that surface soils in the general vicinity below the detector would have Ra-226 concentrations less than 6 pCi/g (the gross cleanup criterion for that site).

In the absence of a site-specific correlation, a 30 uR/hr gamma “cut-off” reading was initially used to guide cleanup activities at the Davis Mill Site. Shortly after the cleanup began, however, a new cut-off value was established for site-specific field conditions at the site to better reflect soil Ra-226 concentrations expected to fall below 5.4 pCi/g. A cut-off with a 95% probability of compliance was estimated at about 18 uR/hr, however, such a low value could have resulted in a large amount of background level soils being cleaned up. Given budgetary limitations on the amount of soil that could be removed during the Davis Mill Site project, a new cut-off of 25 uR/hr was selected as a reasonable compromise. This is consistent with the literature value of 1.9 μ R/hr per pCi/g above background for the U-238 decay series in equilibrium (Huffert, 1995) and with a correction factor of 0.66 for energy dependence of NaI detectors.

Frontier Environmental Services personnel were instructed in the use of gamma detectors employed for remediation support. This included discussions of how to help distinguish between elevated gamma activities residing immediately below the detector versus “shine” (scattered gammas) from adjacent areas. All detector/meter pairings used for remediation support surveys were in current calibration with the manufacturer at the time of use. Daily QC measurements were not conducted for cleanup support detectors – the only detector/meter pairing subject to QC measurements before each use was that used for GPS-based gamma mapping surveys (backpack surveys) because backpack surveys comprised the permanent and official record of the site’s gamma status.

A.3.2 Verification: Gamma Mapping Surveys

In addition to the remedial action support surveys used to guide excavations on a daily basis, GPS-based gamma mapping surveys (backpack surveys) were periodically conducted using a data collection system that records UTM and gamma data simultaneously along with date and time (Figure 1). Backpack surveys are different from remedial action support surveys in that data are recorded and mapped to allow subsequent visual assessment of gamma exposure rate status at the time of the survey.

Gamma mapping surveys were conducted before, during, and after the cleanup to allow visual assessment of the effectiveness of the cleanup. Pre-cleanup gamma mapping surveys recorded the initial gamma exposure rate status of the site using the same equipment that used to conduct the final status survey. This pre-cleanup survey was also used help to further define areas requiring excavation.

Backpack scanning coverage was at or close to 100% in all survey units for pre-cleanup and final status gamma mapping surveys. Exceptions were made for any areas within a survey unit that posed an unacceptable safety



Figure 1. Photo of the GPS-based backpack scanning system

risk to scanning personnel (e.g. extremely rough terrain), or where scanning was not possible due to existing structures, large debris, or certain vegetation (e.g. trees, thick brush, etc.). Gamma mapping surveys were also conducted across areas of the site other than the survey units, but scanning coverage was not always maintained at 100% in these areas.

Daily QC measurements for the detector/meter pairing used in the backpack scanning system involved recording the average value of twenty 1-second exposure rate readings on a log sheet for both background and a check source (a Cs-137 button source). The QC measurement location and geometry was the same each day as initially established in developing respective control limits for this specific instrument pairing. A hand-held Garmin iQue PDA instrument, programmed by MFG to automatically calculate the mean and standard deviation of 20 successive readings, was used to simplify the daily QC procedure and reduce the potential for human error. Readings within ± 3 standard deviations from the mean of at least 10 initial control chart measurements indicated that instruments were working properly. However, as MFG has experienced at other site cleanup projects, fluctuations in ambient Rn-222 levels due to climatic variability (e.g. barometric pressure changes) or a general reduction in background radiation as the cleanup progresses due to source term material being removed from the site, can lead to readings outside control limits even though the instruments are functioning properly. Instrument control charts were thus periodically updated to include recent measurements on a "moving average" basis to reflect these additional temporal sources of background variability. Calibration certificates, daily QC log sheets, and/or control charts for all radiological instrumentation used on the project are included in Attachment J.

A.3.3 Soil Sampling and Analysis

The primary analytical evidence of compliance with the Ra-226 cleanup criterion for individual soil samples at the Davis Mill Site was based on NaI gamma spectroscopy results generated in an on-site soils lab. This soils lab (Figure 2) was housed in an on-site trailer provided by FESI for the duration of the project, with respective functions that included sample preparation, sample analysis, data recording, and data management. MFG also performed on-site Radiation Safety Officer (RSO) duties out of this on-site laboratory in accordance with the radiation safety plan.

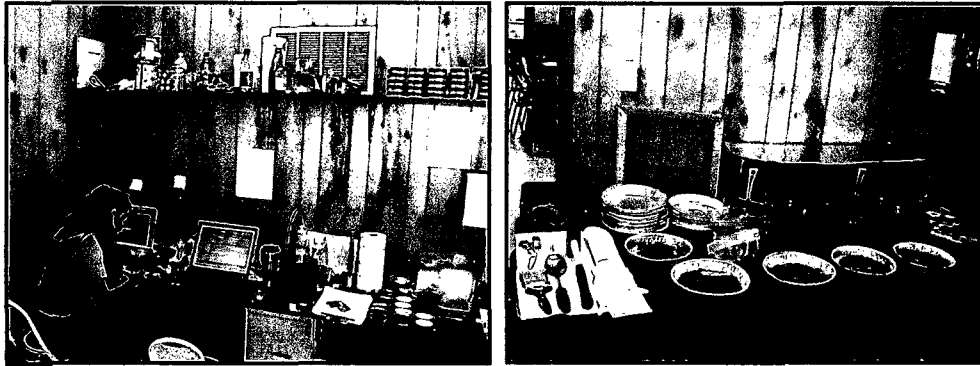


Figure 2. On-site soils lab: MCA counting system (left), soil processing station (right).

A.3.3.1 Soil Sample Collection and Preparation

- Surface soil samples were collected in a manner consistent with the cleanup criterion (over a soil depth of 15 cm to represent an average corresponding concentration).
- The number of surface soil samples collected and respective locations within each survey unit was determined according to MARSSIM protocols. Following the DQO process described in MARSSIM, a minimum of 22 samples were collected in each survey unit for statistical comparison against a minimum of 22 samples that were collected in the background reference areas.
- Samples for three subsurface depth profiles were collected in areas demonstrated to have high gamma exposure rate readings at the site prior to, and/or after, the cleanup. These areas were all located in Survey Units 2 or 3 because of proximity to residents living on the property.
- UTM coordinates were taken at each sample location with a GPS instrument and recorded for mapping purposes.
- Samples were dried in ovens at about 180° C then sieved as necessary to remove and discard any rock fraction greater than 1 cm diameter. Because Ra-226 has greater association with smaller soil particle size fractions, omitting the larger rock fraction is conservative.
- Aliquots of homogenized samples were weighed and placed in counting tins. The tins were sealed with electrical tape before counting. All counting was performed the same day samples were sealed.
- At each stage of sample collection and processing, equipment was thoroughly cleaned to prevent cross-contamination.

A.3.3.2 Soil Sample Analysis: NaI-based Gamma Spectroscopy

On-site soils lab instrumentation for Ra-226 analysis in soils samples included a 3×3 inch Ludlum® Model 44-20 NaI detector coupled to a PC-based URSA-II® multi-channel analyzer (MCA) system. The system was the same as that developed for the cleanup of the Dawn Mining Company uranium mill site in Spokane WA in 1995 (Whicker et al. 2006). The MCA unit is small and portable and was run from an equally portable lap-top computer. Both sample and detector were shielded from background radiation during counting using a series of lead rings and plates.

Based on previous determinations of optimal sample count time that balances the number of samples that can be analyzed per day against the need to achieve sufficient accuracy (i.e. optimization of spectral resolution, counting statistics, and system detection limits relative to the cleanup criterion), sample count time was 20 minutes. An average Minimum Detectable Concentration (MDC) limit for this analytical method was calculated to be 0.7 pCi/g at the Davis Mill Site location using methods described in Principles of Radiological Health and Safety (Martin, 2003), and based on measurements of NIST-certified ²²⁶Ra soil reference material standards and a background soil sample from the site.

Estimation of ²²⁶Ra activity concentrations involved analysis of the number of counts within three energy regions of interest (ROI's) in soil sample gamma emission spectra. These ROI's encompass energy peaks for short-lived ²²⁶Ra decay chain progeny including ²¹⁴Pb (295 and 352 keV) and ²¹⁴Bi (609 keV).

Because ²²²Rn, a noble gas with a half life of 3.8 days, is an intermediate nuclide between ²²⁶Ra and these decay chain progeny, and because the duration of the project was limited, on-site measurements after approximate secular equilibrium between ²²²Rn and ²²⁶Ra could be achieved (e.g. 21-day counts) was not possible. Instead, counts were taken before significant ²²²Rn ingrowth in sealed samples could occur (0-day counts).

Previously established calibration curves, adjusted with site-specific measurements of secondary soil reference material standards to account for differences in background radiation, as well as statistical relationships between 0-day on-site NaI measurements and 21-day high-purity germanium (HPGe) results from Energy Laboratories Inc. (ELI) in Casper, Wyoming, were used to generate "full-ingrowth" ²²⁶Ra estimates without any ²²²Rn ingrowth waiting period. Ten percent of all soil samples were sent to ELI for secondary Ra-226 analysis using HPGe gamma spectroscopy. Results from the ELI analyses were used to ascertain the accuracy of this adjustment and modify it accordingly prior to final data analysis and reporting. Sealed samples retained on site during the project were not archived after NaI analysis, but samples sent to ELI were. Confirmatory samples were also collected and analyzed by the CDPHE at some of the same locations sampled by MFG during the final status survey.

Because NaI-based radionuclide quantification by MFG's on-site soil lab was based on previously established statistical relationships with corresponding HPGe measurements performed by ELI, quality assurance is partially related to ELI's accreditation and QC protocols. ELI is certified by the EPA as well as by seven different states. The laboratory follows strict chain of custody protocols, uses NIST-certified standards for instrument calibrations, and performs measurements on EPA or other certified reference material standards with each set of client samples to provide information on measurement accuracy. ELI also performs duplicate analyses on 10% of all client samples to provide information on measurement variability. MFG observed details of these QC protocols during a visit to ELI's Casper, Wyoming in June, 2005.

A NIST-certified ^{137}Cs source was used to energy calibrate the on-site NaI counting system at the beginning of each day and to monitor the system for spectral drift every 1-2 hours. MCA fine-gain settings were adjusted as needed. Daily system QC checks were also being performed at the beginning of each day. This involved taking measurements on designated "background" level sample (~ 1 pCi/g ^{226}Ra) and a designated "source" level sample (~ 14 pCi/g ^{226}Ra) and recording the concentration estimate on system control charts. Results falling within ± 3 standard deviations from the mean of 20 respective initial control chart measurements indicate that the counting system is working properly. Finally, duplicate measurements were performed on about 5% of samples, while about 1-2% of samples were split for dual analyses to assess sample aliquot variability and the effectiveness of sample homogenization. Proper chain-of-custody protocols were performed and documented for all soil samples sent to ELI for secondary analysis. Chain of custody forms are provided in Attachment J.

A.3.4 Water Sampling and Analysis

A.3.4.1 Groundwater Sampling

- Previous groundwater sampling results showed evidence of elevated levels of radionuclides at three well locations, including temporary monitoring wells CB-2 and CB-3, and the existing water supply well on CDOT property as shown in Figure 7 of the Davis Mill Site Characterization Report (Carter & Burgess 2005). Groundwater at or near these three locations was re-sampled near the end of cleanup operations to assess any changes.
- Two temporary groundwater monitoring wells were installed near the previous temporary groundwater monitoring wells CB-2 and CB-3 as shown in Figure 7 of the Davis Mill Site Characterization Report. Groundwater samples from these two wells were collected and sent to ELI for analysis, along with a third groundwater sample collected from the existing well located on CDOT property.
- Sampling techniques were consistent with those described in the Davis Mill Site Characterization Report.
- Groundwater sample analytes included those listed in the RFP scope of work.

A.3.4.2 Surface Water Sampling

- One surface water sample was collected from the pond just south of the mill building. The sample collection technique was similar to that described in the Davis Mill Site Characterization Report (Carter & Burgess, 2005). The sample was sent to ELI for analysis, and analytes included those listed in the scope of work.

A.3.5 Application of the ALARA Principle

Although a gross Ra-226 soil concentration of 5.4 pCi/g was the initial target criterion for remedial screening measurements, a number of conservative methods were used to help insure that an ALARA (as low as reasonably achievable) result was “built-in” to cleanup protocols. One method was to excavate until gamma readings were below the 25 μ R/hr cut-off of at both 2 feet above the ground, as well as at the ground surface, providing a higher probability of compliance. Another ALARA protocol was to discard large rocks and preferentially select aliquots of finer particle sizes from soil samples. Radium-226 tends to be concentrated in the smallest soil particle size fraction and thus this practice is likely to introduce a slightly high conservative bias in analytical results relative to true overall concentrations.

A.4 Implementation of Radiological and Other Health and Safety Protocols

A primary concern during cleanup operations was ensuring the health and safety of both workers and the public. All workers were required to receive radiation safety training and an attendance sheet was maintained (Attachment K). Daily safety meetings were conducted prior to the beginning of each work day to discuss potential hazards (e.g. radiological risks, accidents, dehydration, etc.) and to plan how to best mitigate associated risks.

Throughout the Mill Site cleanup project, a safety issue of concern was the risk of occupational accidents associated with cleanup activities. Power lines, falling debris, proximity to heavy equipment with limited operator visibility, and tripping/falling were among the primary potential hazards. To help mitigate the possible consequences of these kinds of physical hazards, workers wore protective safety equipment (hard hats, steel toed shoes, safety vests, and safety glasses) when working on the site. No significant accident-related incidents or near incidents were reported.

The Mill Site cleanup took place during the summer months with frequent hot, dry weather. The risk of worker dehydration and sunburn during long periods of exposure to heat and sun was another important health and safety consideration. Workers were encouraged each day to drink liquids frequently and pay close attention to signs of heat stress, as well as to wear plenty of sunscreen. There were no reports of significant heat related complications.

Finally, health risks associated with potential radiological hazards were mitigated through a combination of adherence to radiation safety regulations and ALARA protocols. The potential radiological hazard of greatest concern was inhalation or ingestion of dust particles containing small but measurable amounts of naturally occurring radionuclides (primarily Ra-226 and its daughter products). As a result, dust control measures and radiological air monitoring were continuously implemented. Such measures included thorough water spraying on cleanup areas and adjacent haul roads using water trucks and hoses, maintaining a general area air sampler near work areas, and the use of breathing zone lapel samplers by select workers in order to verify compliance with applicable State and Federal regulatory guidelines. The action level for response to potential inhalation exposures was set at 10% of a regulatory limit known as the derived air concentration (DAC). There were no instances in which this action level was exceeded by general area or lapel sampler monitoring results. General area air monitoring results are included in Attachment K.

The exteriors of haul trucks exiting the restricted zone on the mill site grounds were regularly inspected with radiological survey meters for signs of contamination to prevent any potential spread of radiological material. Decontamination and exit surveys (swipe tests) for removable contamination were conducted for all heavy equipment upon termination of use and removal from the site. Log sheets of routine contamination survey results were maintained by FESI. Examples of routine equipment survey results and final exit survey forms are provided in Attachment K. Eating was not allowed in restricted work areas, but dehydration concerns necessitated that workers be allowed to drink in work areas. Workers were required to use screw-cap type bottles and to wash hands and faces prior to drinking or eating. A wash station was provided near the trailer on the site. External gamma radiation, while not expected to pose a significant health risk, was monitored using TLD dosimeter badges supplied by US Dosimetry. The badges were worn by all site workers. No significant external doses were recorded. Badges were not required for truck drivers that transported material to Uravan. Personnel entering the site were required to sign in, as well as perform a radiological sign-out survey upon leaving the restricted zone. Sign-in/sign-out log sheets were maintained by FESI and personnel survey results were recorded on the form. Examples of these forms are included in Attachment K.

B. CLEANUP AND FINAL STATUS SURVEY RESULTS

B.1 Cleanup Boundaries

Areas of the Davis Mill Site targeted for potential excavation in 2006 are shown in Figure 3. Within this general area, five sub-areas were delineated for evaluation of residual Ra-226 concentrations in accordance with MARSSIM concepts (Figure 4). All of these survey units were designated as "Class 1" impacted areas based on the 2005 Carter & Burgess Characterization Report, as well as on unshielded surveys during the initial stages of the 2006 cleanup effort. MARSSIM suggests that ideally, the maximum size for a Class 1 survey unit would not exceed 2000 m², however, larger areas are acceptable depending on the situation. In this case, Class 1 survey units ranged from about 4,700 m²

to 12,000 m² due to the large overall size of the site and constraints on the amount of funding available for sampling and analysis.



Figure 3. Aerial photo showing approximate boundary of areas targeted for potential excavation on mill site grounds during the 2006 cleanup project.

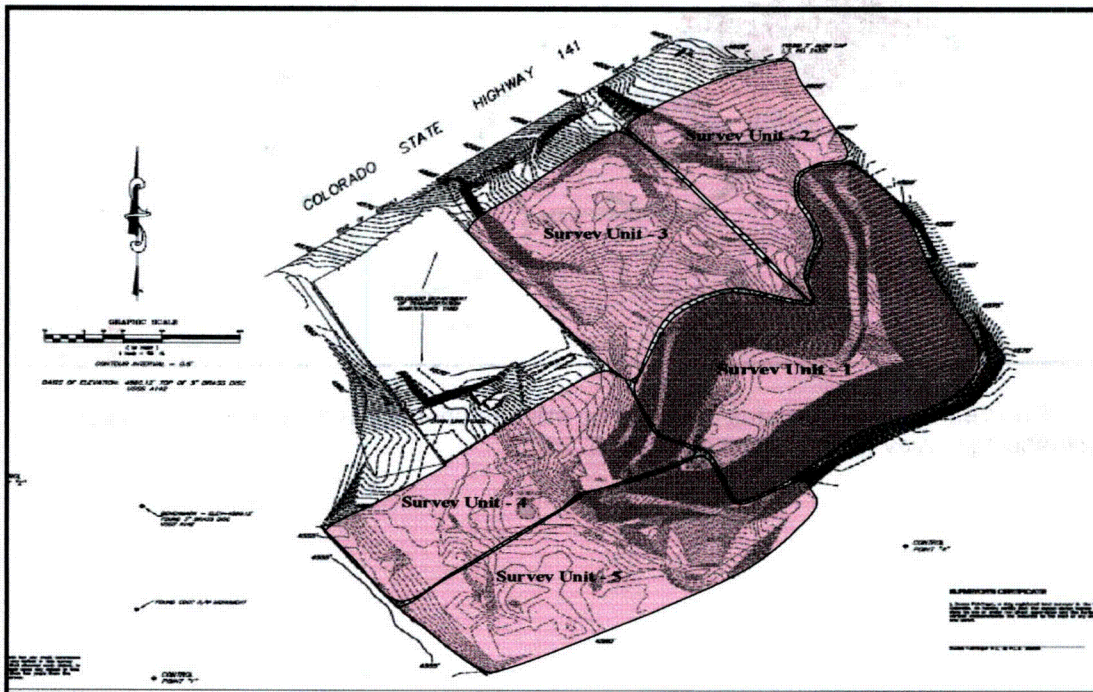


Figure 4. Surveyors' contour map showing delineation of five Class 1 radiological survey units within the overall area targeted for potential excavation during the 2006 cleanup project.

B.2 Gamma Mapping Survey Results

Although the 2005 characterization report for the site (Carter & Burgess 2005) included a gamma mapping survey, an independent survey was conducted by MFG in March of 2006 in order to evaluate the pre-cleanup gamma status using the exact instrumentation, radiological units (uR/hr), and mapping systems that would be used for final status verification surveys. The results of this pre-cleanup survey are shown in Figure 5. Initial cleanup efforts focused first on areas of greatest contamination as depicted by red or dark maroon shaded areas in Figure 5. Unlike the pre-cleanup survey, the final status gamma mapping survey was not conducted all at one time at the end of the project. Instead, the surveys were conducted survey unit by survey unit after respective excavations had ceased. The composite results of the final status gamma mapping survey are shown in Figure 6.

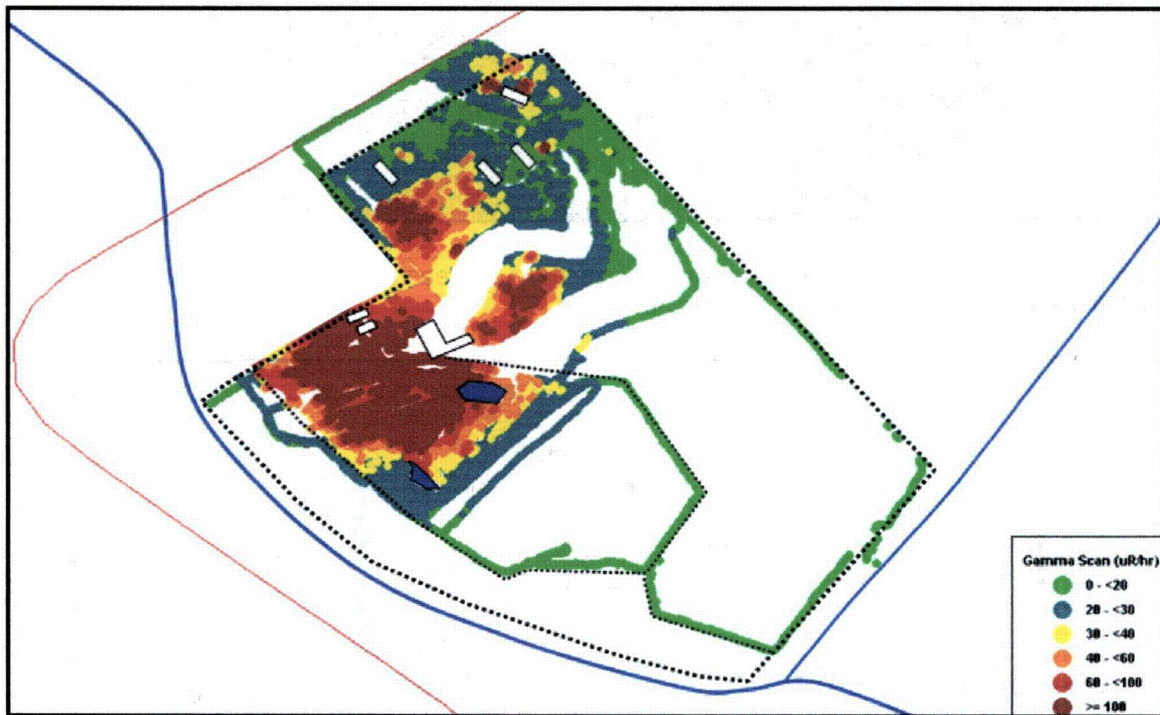


Figure 5. Pre-cleanup gamma status of the Davis Mill Site prior to remedial activities in 2006 (this gamma mapping survey was performed in March, 2006).

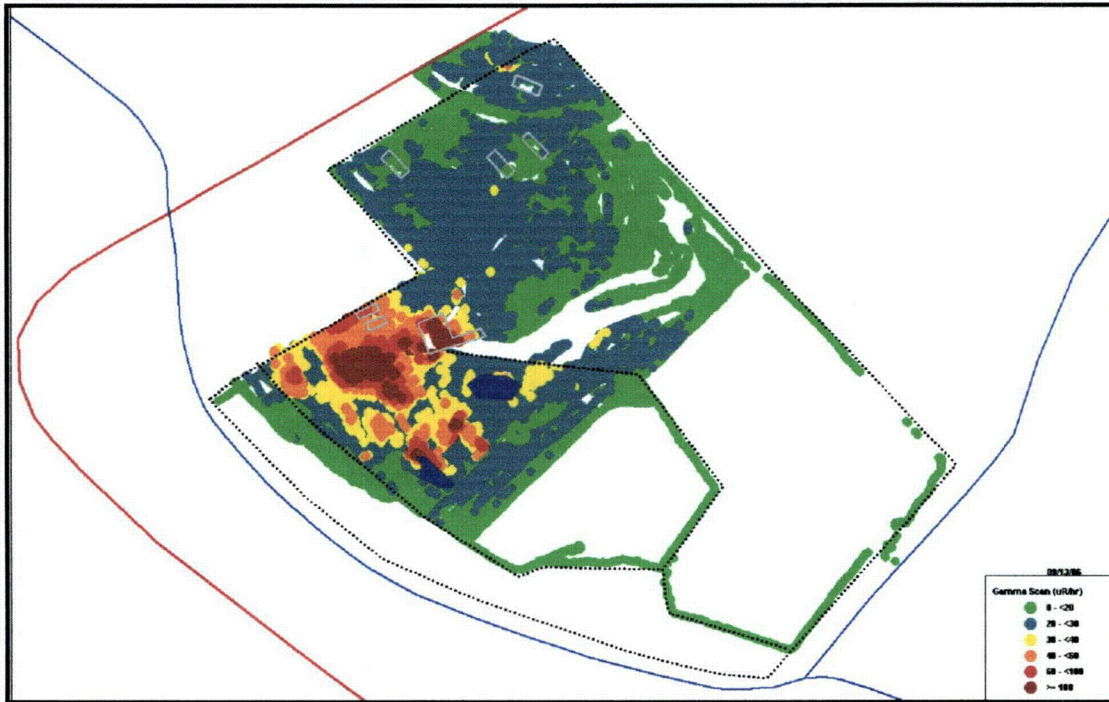


Figure 6. Final gamma status of the Davis Mill Site after all remedial activities were completed (as of June 26, 2006).

Visual comparison of pre-cleanup and post-cleanup gamma survey maps demonstrates the degree to which gamma exposure rates across the Davis Mill Site were reduced as a result of the cleanup. Statistics for the final gamma survey data are shown in Table 1. In Survey Units 1 through 3, the average exposure rate after the cleanup was about the same as the upper limit measured in background locations. Although cleanup efforts in Survey Units 4 and 5 did not result in a level of remediation that appeared possible based on the Site Characterization Report (Carter & Burgess 2005), it was beyond the scope of this project to further remediate this general area because in many locations contamination exists below the groundwater table. The 14,000 cubic yard limit for contaminated soil removal as specified in the Work Plan (FESI 2006) was significantly exceeded in achieving the post-remediation results shown in Figure 6.

Table 1. Gamma scan statistics from the final status survey.

Statistic	Background Areas (uR/hr)	Survey Unit 1 (uR/hr)	Survey Unit 2 (uR/hr)	Survey Unit 3 (uR/hr)	Survey Unit 4 (uR/hr)	Survey Unit 5 (uR/hr)
Max	20	32	30	37	522	480
Min	10	13	12	13	11	11
Mean	14	19	20	20	56	31
Std Dev	3	3	3	3	63	29
n	1068	8338	5635	5980	4431	6262
Percentiles:						
10%	11	15	17	16	21	16
25%	12	16	18	18	25	20
50%	14	18	20	20	34	25
75%	16	21	22	22	55	31
90%	18	24	24	25	112	47

Statistical percentiles for gamma readings illustrate extremely right-skewed distributions in Survey Units 4 and 5, meaning that the highest remaining exposure rates are very limited in aerial extent. In other words, while the cleanup did not eliminate all areas of elevated exposure rates, the "footprint" of source term material was greatly reduced. For example, after the 2006 cleanup effort, 90% of the area in Survey Unit 4 has exposure rate readings less than 112 uR/hr, and half of the area has readings less than 34 uR/hr. This is a significant improvement over pre-cleanup conditions where perhaps only 20% of the same area had exposure rate readings less than 100 uR/hr. Furthermore, high-level contamination in areas of closest proximity to residents currently living on the site (Survey Units 2 and 3) was largely eliminated. Finally, it is important to recognize that gamma exposure rates measured by NaI detectors are only relative measurements. True exposure gamma exposure rates can only be measured with a pressurized ion chamber (HPIC). At background levels, HPIC measurements will typically show exposure rates about two thirds that of NaI detectors. NaI systems are useful for cleanup projects like the Davis Mill Site because they can quickly and effectively demonstrate relative comparisons between background and survey unit readings, identify areas in need of remediation, and demonstrate the effectiveness of remedial activities.

B.3 Soil Sampling Results

B.3.1 Data Quality

As specified in the Work Plan (FESI 2006), ten percent of soil samples were analyzed for Ra-226 concentration both by MFG's on-site soils lab and by a commercial lab (ELI). Initial calibration algorithms used by MFG during the course of the cleanup were adjusted posteriori based on ELI's HPGe gamma spectroscopy results. After evaluation of the accuracy of this adjustment (Figure 7), a final data set was prepared for statistical analysis and presentation in this report. Figure 7 shows good agreement for the adjustment, with a 95% prediction band width of about 2.4 pCi/g. This comparison indicates that a given HPGe-based estimate from ELI has a 95% probability of falling within ± 2.4 pCi/g of a NaI-based estimate as measured on site by MFG's mobile soils lab. Energy Laboratories Inc. has reported levels of accuracy or precision for HPGe-based gamma spectroscopy can vary by as much as $\pm 2-3$ pCi/g (Whicker et al. 2006). This suggests that data from the NaI-based analytical method is similar in terms of accuracy and precision to that of ELI. Further evidence of acceptable measurement precision for NaI-based measurements performed on site can be found by examination of duplicate analysis results in the data tables provided in Attachment E.

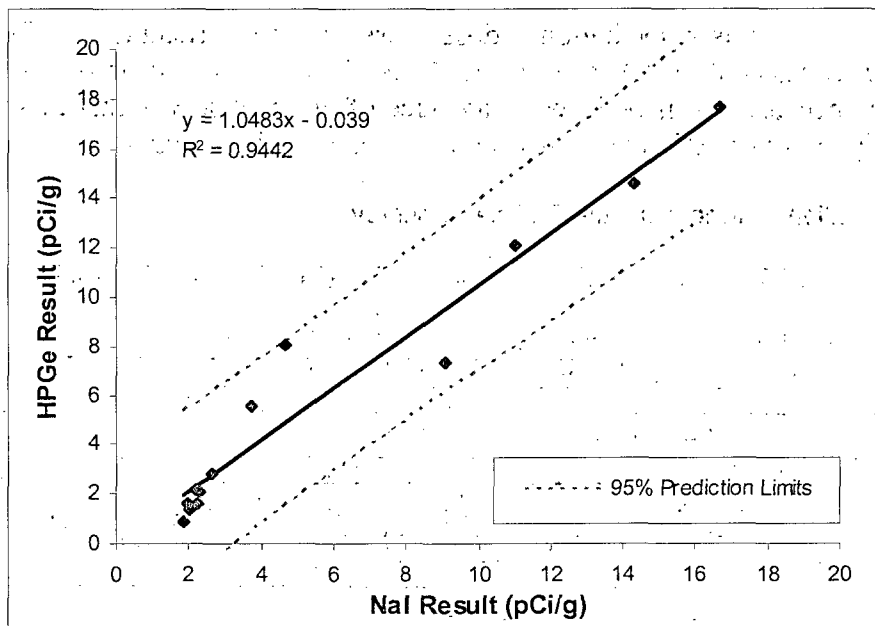


Figure 7. Correlation between ELI's HPGe results and NaI-based estimates from MFG's on-site laboratory.

B.3.2 Surface Soils: Ra-226 Concentration Results

During the course of the 2006 cleanup of the Davis Mill Site, approximately 250 soil samples were collected and analyzed for Ra-226 concentration in the on site soils lab. Of these, about 106 samples were collected and analyzed for interim screening purposes in support of excavation activities. The other 144 samples were collected as part of the final status verification survey. Most (but not all) final status verification survey samples were used in the MARSSIM-based statistical assessment of surface soils for compliance with the 25 mrem/yr release criterion. Some final status survey samples, such as subsurface or composite samples, were collected for additional characterization purposes. Out of 28 samples initially designated as background reference samples, 4 were omitted from statistical analyses due to their proximity to impacted areas.

All Final Survey soil sampling results analyzed in the MFG on-site soils lab are included in Attachment E. That attachment also provides results from ELI for a select subset of these samples that includes a wide spectrum of analytes including naturally occurring radionuclides by HPGe gamma spectroscopy, as well as gross alpha, gross beta, Ra-226, and natural uranium results by wet radiochemistry methods.

With respect to on-site soils lab data, a summary of aerial extent of each survey unit, estimated average depth (thickness) of remaining residual Ra-226 concentration, and descriptive summary statistics for Ra-226 concentrations in surface soil samples are shown in Table 2. All but four of the samples included in this table were part of the MARSSIM surveys and statistical analyses. The additional four samples were judgment-based composite samples of potentially elevated areas, thought to be

additionally relevant to post-remediation dose assessments (Section 3.0). Post-remediation dose assessments for Survey Units 4 and 5 were planned before the cleanup was completed because it was believed in advance of the final survey that these survey units were likely to fail MARSSIM analyses for compliance (discussed later).

Table 2. Ra-226 concentration statistics from the final status survey.

Parameter	Background Areas	Survey Unit 1	Survey Unit 2	Survey Unit 3	Survey Unit 4	Survey Unit 5	Survey Units 4+ 5	All Survey Units
Survey Unit Areas and Average Depth (thickness) of Elevated Ra-226 Layer at surface								
Area (m ²)	-	11,927	4,732	7,574	6,582	8,375	14,957	39,190
Depth* (m)	-	0.15	0.15	0.15	2	1	1.5	-
Ra-226 Concentration Statistics (pCi/g)								
Mean	2.1	2.6	3.9	3.2	19.8	9.6	14.3	8.0
Std Dev	0.2	1.5	3.7	2.5	45.9	17.7	33.8	22.9
Max	2.6	9.1	16.7	12.6	220.8	81.8	220.8	220.8
Min	1.8	1.7	2.0	1.9	1.7	1.8	1.7	1.7
No. Samples	24	22	22	24	24	28	52	120
Ra-226 Concentration Percentiles (pCi/g)								
50%	2.0	2.1	2.7	2.3	3.8	3.3	3.4	2.5
75%	2.2	2.4	3.3	2.8	12.2	5.8	10.5	3.8
90%	2.3	2.9	4.6	3.7	42.5	18.7	31.5	13.5
95%	2.4	3.4	13.1	8.9	66.2	43.9	59.8	29.2

*Depths of elevated layer by Survey Unit was not sampled - these estimates are based on observations during cleanup (subsurface contamination with existing clean cover material is not evaluated)

An overlay of Ra-226 ranges and sampling locations for final status soil samples on the final status gamma map is shown in Figure 8. The upper limit of the lowest concentration range category in this map was chosen to be 4.7 pCi/g because that represents the final gross cleanup criterion as mentioned previously. Additional maps showing greater detail in terms of soil sample locations and results are provided in Attachment F.

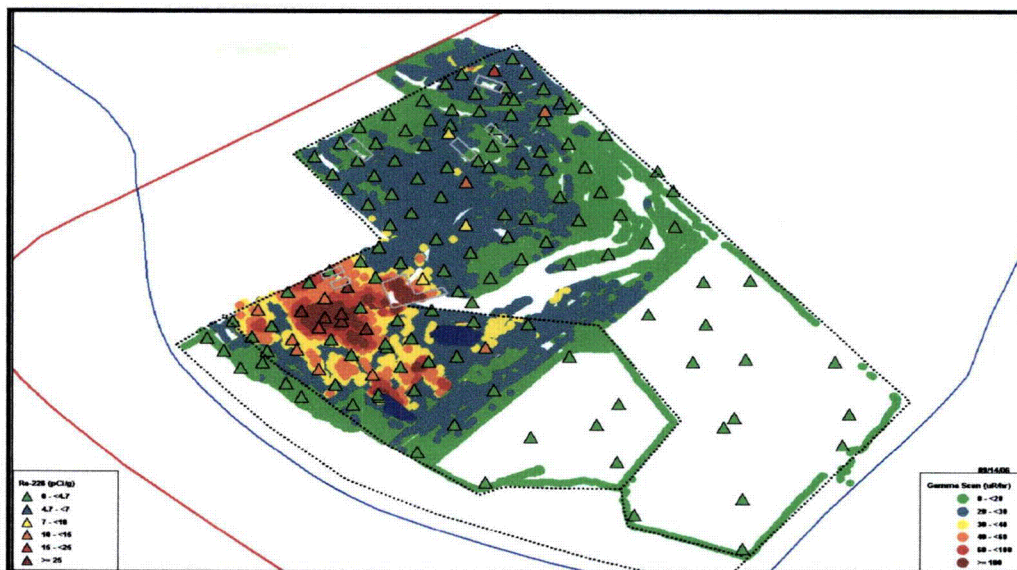


Figure 8. Ra-226 concentration ranges and surface soil sampling locations from the final status survey.

Figure 8 demonstrates a reasonable general correlation between Ra-226 concentration and gamma exposure rate reading. However, there are some unexpectedly frequent inconsistencies where soil samples had high Ra-226 concentrations in areas of relatively low gamma readings and visa versa. This highlights a problem that was discovered during implementation of the MARSSIM survey at this site. Part of the data quality objective (DQO) assessment process in MARSSIM is intended to help select scanning equipment and methodologies capable of meeting a theoretical "minimum detectable concentration" (MDC) criterion. This is meant to insure that "hot spots" between systematic soil sampling locations will be detected by gamma scanning. One suggested method to aid in achieving this conceptual goal, is to use computer-based models such as MicroShield to determine detector response to various radionuclides, amounts of shielding, detector heights, and scan speeds.

Methods to improve "scan MDC's" include using larger detectors, traveling at very slow speeds, and holding the detector a few inches from the ground surface while scanning. Such options were not practical for this project given the size of the site, the terrain involved, the limited budget, and the short time frame allowed to develop a work plan and begin the cleanup. MFG's past experience has been that a 2" x 2" NaI detector held at 2-3 feet above the ground, and traveling at a speed of 2-3 mph, can reliably detect slightly elevated Ra-226 contamination in areas as small as about 20 m² provided the source material is relatively uniform in terms of horizontal and vertical distribution.

The current scanning technology used by MFG is particularly well suited for scanning large sites, rough terrain, and mapping the results on nearly a real time basis. However, at the Davis Mill Site it was not uncommon to find that small-scale variability in contamination (to within a few feet or less) was very high. An unshielded gamma detector, small enough and light enough to be carried with reasonable efficiency at a site like this cannot be expected to "see" very small pockets of contamination (perhaps a foot or less in diameter), particularly if there is any overlying clean soil to shield gamma rays. If a small pocket of contamination is present at or near the soils surface, a soil sample taken in that exact location will detect the elevated material, yet a second sample collected just a foot away can easily come up clean for residual contamination. The point is that MARSSIM statistical tests assume relatively uniform contamination. If that assumption is significantly violated, the statistical results can be questioned on that basis. Fortunately, in Survey Units 1-3 the levels of residual activity did appear reasonably uniform in most areas, while in Survey Units 4-5, variability turned out to be irrelevant with respect to MARSSIM results.

B.3.3 MARRSIM Sampling and Analysis Results

Implementation of MARSSIM protocols for designing a final status survey includes developing a statement of data quality objectives (DQO) in advance. For the Davis Mill Site final status survey, a slightly abbreviated version of the original DQO statement is as follows:

- i. **State the problem:** A characterization survey at the Davis Mill Site has identified residual (above background) levels of radionuclide contamination (Carter & Burgess, 2005). Frontier Environmental Services, Inc. and MFG, Inc. have been contracted by the CDPHE to excavate contaminated soils and transport them to UMETCO for proper disposal. UMETCO no longer receive materials for disposal after June 30, 2006, so remedial activities at the Davis Mill Site must be completed by this date. A final radiological status survey will be conducted to determine whether or not each survey unit at the site qualifies for unrestricted release under NRC decommissioning standards.
- ii. **Identify the decision:** Is the level of residual contamination in a given survey unit below the release criteria.
- iii. **Identify inputs to the decision:** Post-cleanup soil Ra-226 data generated by the Frontier/MFG team will be used to determine compliance with the release criterion in a given survey unit. A combination of NRC decommissioning standards and guidelines, as well as pre-cleanup soil radionuclide data from the Davis Mill Site Characterization Report (Carter & Burgess, 2005), were used to develop the site-specific soil cleanup criterion.
- iv. **Define the study boundaries:** Based on Figures 4, 6, and 21 in the Davis Mill Site Characterization Report (Carter & Burgess, 2005), five impacted Class 1 survey units have been defined (see Appendix I, FESI 2006). A non-impacted background reference area has also been defined. An independent pre-cleanup gamma scan will be conducted by MFG prior to cleanup activities. If warranted, analysis of the scan data could result in modification of survey unit boundaries, though major modifications are not expected.
- v. **Develop a decision rule:** The Ra-226 soil concentration data in each survey unit will be numerically evaluated against a gross cleanup criterion ($DCGL_w$) of 5.4 pCi/g. As indicated in MARSSIM, if all data in the survey unit are less than this criterion, the survey unit meets the conditions for unrestricted release and no statistical test is required. If multiple samples in a given survey unit remain above the gross criterion, the Wilcoxon Rank Sum Test (WRS) will be used to evaluate whether or not the median gross concentration in the survey unit is statistically greater than the median of background plus the *net* $DCGL_w$ (i.e. background reference area sample result + 2.6 pCi/g).

In addition to evaluations of each survey unit against the $DCGL_w$, any areas identified by gamma scans as having potential for elevated Ra-226 levels, will be additionally sampled and evaluated against a secondary "hot spot" criterion as described in MARSSIM.

- vi. **Specify limits on decision errors:** Based on past MFG experience, the expected variability in Ra-226 measurements among samples from a given survey unit is likely to approach ± 2 pCi/g from the mean.

The null hypothesis for statistical testing (if required) is that the survey unit exceeds the cleanup criterion. A Type I error would occur if a survey unit were to be incorrectly released for unrestricted use. The consequences of this type of error would include the potential for a future rural resident living on the site to receive a dose greater than 25 mrem/yr above background. A Type II error would occur if a survey unit were to be incorrectly prohibited from an unrestricted use designation. The consequences of this type of error could include prevention of future development or uses of the site which otherwise might provide economic or other benefits to the local community.

The next step in the implementation of MARSSIM was to design the final status survey. First, initial survey unit delineations were modified based on the additional information provided by the independent pre-cleanup gamma mapping scan conducted by MFG in March of 2006, as well as based on actual observations made during the cleanup (Figure 4 shows final survey unit delineations). Next, the number of samples required was calculated according to MARSSIM guidelines. There are several parameters that impact the number of samples needed to satisfy statistical testing requirements. These include the following:

1. Acceptable rates on Type I and Type II decision errors (α and β respectively).
 - For the Davis Mill Site α was set at 0.05 (meaning only a 5% chance that a Type I error would occur). This value for α is commonly accepted by regulators as being adequately protective in terms of insuring that the 25 mrem/yr dose limit for any survey unit will be correctly assessed by the final status survey and respective statistical testing.
 - For the Davis Mill Site β was set at 0.15 (meaning only a 15% chance that a Type II error would occur). This error rate can vary and is typically up to the licensee to select – it affects the amount of risk the licensee is willing to accept that a clean survey unit will fail the test due to an insufficient number of samples being taken.
 - The values chosen for α and β are independent of one another in terms of limiting respective chances of Type I or Type II errors.
2. Selection of the lower bound on the grey region (LBGR)
 - A MARSSIM default value of 50% of the DCGL (1.3 pCi/g) was used for the Davis Mill Site.
3. Anticipated variability (standard deviation) in soil Ra-226 concentration in the survey units after remediation.

- For the Davis Mill Site, a value of ± 1.3 pCi/g was used
- Actual standard deviations for Survey Units 1-3 turned out to range from ± 1.5 to ± 3.7 pCi/g. As higher standard deviation values are used in this computation, the number of samples required quickly becomes unreasonable (e.g. if a standard deviation of 2.0 pCi/g had been used, 54 samples per survey unit would have been needed, requiring a total of 324 samples at the site to be collected and analyzed just for the final status survey alone – far more than the project budget or time frame could support).

Using these input parameters, a total of 22 samples in each survey unit were determined to be needed (along with 22 background reference area samples). Next, systematic grid sampling locations were determined using a square sampling pattern and the corresponding formula for calculating distances between sampling locations in each respective survey unit. The systematic grid design was randomized by throwing a pin flag in the air in the general area near the potential location of the first sample, and beginning the sampling grid wherever it landed. In some cases, the sampling grid appeared a little short of covering all areas in a given survey unit. This was likely due to inherent measurement error in survey unit area calculations and/or in measuring distances over rough or obstructed terrain. In these cases, extra systematic samples were taken to insure accurate representation. Several extra background reference area samples were also taken to insure the best possible representation.

Once all systematic samples were collected and analyzed, the data was reviewed along with the gamma mapping scan results. It became apparent that all survey units had at least some soil concentration results above the initial cleanup criterion of 5.4 pCi/g. As mentioned earlier, this resulted in a decision to abandon that initial concentration criterion and perform all further analyses using the mean of background values as actually measured by the on-site soils lab. The final gross Ra-226 criterion for compliance was 4.7 pCi/g (the 2.1 pCi/g average for background + the 2.6 pCi/g DCGL).

In further reviewing the data, areas having gamma readings in excess of 30 uR/hr were flagged for further investigation, as were areas with soil sampling results greater than 4.7 pCi/g. Investigation of these areas included careful scanning close to the ground at very slow speeds to determine the aerial extent of any elevated readings. Localized soil samples were then collected to estimate the average Ra-226 concentration within each of these potential "hot spots." Photo diagrams of these areas with respective delineations, sampling locations, results, and statistics are shown in Attachment H. No hot spot investigations were conducted in survey units 4 and 5 because it was clear from the systematic data that these survey units would fail the initial MARSSIM assessment.

The first assessment MARSSIM employs is to simply compare mean of the systematic grid samples with that of background. If the mean Ra-226 concentration in the survey unit exceeds the mean of background by an amount greater than the DCGL, the survey unit does not meet the 25 mrem/yr standard for unrestricted release and thus fails to

qualify for free release. No statistical testing is performed. If, however, the mean concentration in the survey unit is greater than the mean of background, but the difference is less than the net DCGL, the Wilcoxon Rank Sum (WRS) test is used to evaluate compliance. As with all MARSSIM hypothesis tests, the null hypothesis for this test is that the survey unit does not meet the release criterion. The WRS test is a distribution-free, non-parametric statistical assessment that doesn't assume a normal distribution of the data. The WRS test evaluates differences in median values rather than mean values. Under the WRS test, if the median of the survey unit does not *statistically* exceed the median of background plus the DCGL (given the variability in measurements), the survey unit passes the primary test for compliance. A secondary Elevated Measurement Comparison or "hot spot" test must then be performed (see section 1.2). If the survey unit also passes this test, then it can qualify for free release.

Once all of the systematic and elevated measurement results were compiled, a computer code software program called COMPASS (ORAU/ORISE 2000, 2001) was used to analyze and compare the data for each survey unit against background data. The COMPASS code includes a DQO assessment and performs all MARSSIM statistical testing. Computer output reports of MARSSIM analyses for each survey unit at the Davis Mill Site are provided in Attachment G. A summary of MARSSIM analysis results and relevant statistics is shown in Table 3.

Table 3. Summary statistics and results for MARSSIM testing

Survey Area	Sample Size (n)	Ra-226 Median (pCi/g)	Ra-226 Mean (pCi/g)	Ra-226 Std. Dev. (pCi/g)	WRS Test Results	Number of Elevated Measurement Areas	EMC Test Results
Survey Unit 1	22	2.1	2.6	1.5	Pass	1	Pass
Survey Unit 2	22	2.7	3.9	3.7	Pass	2	Pass
Survey Unit 3	24	2.3	3.2	2.5	Pass	3	Fail
Survey Unit 4	23	3.6	17.7	45.6	Failed comparison of means against DCGL		
Survey Unit 5	25	2.8	7.2	11.2	Failed comparison of means against DCGL		

Background	24	2.1	2.1	0.2			
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These results indicate that Survey Units 1 and 2 meet the 25 mrem/yr dose standard for residual surface soil contamination and thus can qualify for unrestricted release. During remediation, two small areas of sub-surface soil contamination were identified and excavated in Survey Unit 2 (see photos, Attachment M). After this remediation, soil samples (see samples with ID prefixes "WRC" and "AT" under "Final Status Subsurface Samples" in Attachment E) indicated that no significant residual sub-surface contamination remained in these areas. There was no evidence of the existence of other areas of sub-surface contamination in these two survey units.

Survey Unit 3 passed the WRS test, but failed the Elevated Measurement Comparison test for compliance. A primary reason for this failure was residual contamination around the roots of a tree next to one of the resident trailer homes (see photo diagram labeled SU3-HS2 in Attachment H). This tree is the only source of shade for residents in this particular trailer and was a consideration in deciding not to excavate further to eliminate

this relatively small (20 m²) area of residual activity. Any radiological risks associated with this small area were considered negligible compared to the risks of heat exhaustion during summer months for residents living in this trailer had the tree been removed. Furthermore, by the time this hot spot was identified, the budgetary limit on total volume of soil to be removed from the site was already exceeded. This latter issue was the reason further remediation was not attempted for the other two hot spots identified in Survey Unit 3. The CDHPE should consider whether it is reasonable to exclude Survey Unit 3 from free release based solely on the result of the secondary EMC test in MARSSIM. For this reason, a post-remediation dose assessment using RESRAD was performed (Section 3.0) using actual data obtained from the final status survey to see if the 25 mrem/yr standard could still be met, or whether some kind of partial future use restriction on this portion of the property might be warranted as an appropriate compromise.

As expected, both Survey Unit 4 and Survey Unit 5 failed the comparison of mean values with background relative to the DCGL. As a result, COMPASS did not perform any statistical testing. Contamination in both survey units exists below the groundwater table and thus these areas could not be fully remediated. Contaminated soils in these areas were generally excavated until the gamma cut-off value was attained or until the groundwater table was close to being breached. Efforts were made wherever possible to avoid excavating soil to the point of exposing the groundwater table so that current residents could continue to access and use most areas of the property. It is not known how deep below the groundwater table contamination in this area resides. Digging backhoe test pits to sample soils below the groundwater table is not possible, and no provisions for bore-hole sampling equipment were anticipated or budgeted for this purpose. Clearly the area of highest surficial contamination left on the property exists in Survey Unit 4 around the pond formed during remediation (see photos, Attachment M). A post-remediation dose assessment for Survey Units 4 and 5 was performed (Section 3.0) to determine likely doses for the current land use, as well as for alternate potential future uses.

B.3.4 Sub-surface Soils: Ra-226 Concentration Results

In accordance with the Work Plan (FESI 2006), three locations at the Davis Mill Site were selected for subsurface soil sampling. Survey Units 4 and 5 were ruled out for subsurface sampling due to reasons mentioned in the preceding paragraph. Instead, sub-surface samples were collected from the walls of trenches or pits excavated to remove contaminated sub-surface soils that had been identified during the cleanup. Sub-surface sampling was conducted after gamma readings in these trenches or pits suggested that the former pockets or seams of contaminated sub-surface material had been successfully removed. Sub-surface sampling was conducted incrementally in order to generate Ra-226 depth profiles at these locations. The results are provided in Attachment E. All subsurface samples from the three pits were below the 4.7 pCi/g cleanup criterion for surface soils.

B.4 Water Sampling Results

The results from ELI for surface and groundwater samples are provided in Attachment E. These results, in addition to soil sampling results from the on-site soils lab, were used for the post-remediation dose assessment (Section 3.0). At temporary groundwater monitoring wells number 1 and 2, groundwater was reached at 6.7 feet and 1.0 feet respectively. Well 1 was located approximately 20 feet to the east of where groundwater sample CB-2 was collected by Carter & Burgess during their 2005 site characterization study (Carter & Burgess 2005). Well 2 was located approximately 75 feet to the southeast of where groundwater sample CB-3 was collected by Carter & Burgess in their 2005 study. GPS coordinates for these locations are provided in Attachment E. The CDOT well and pond were the same sources as sampled by Carter & Burgess in 2005.

Post-remediation water sampling results for the 2006 Davis Mill Site cleanup indicated that in all cases, the only measurable radioactivity was due to the presence of uranium (Ra-226 was not measured at levels above analytical detection limits). Of all the water samples taken, the highest measured levels of gross alpha, gross beta, and uranium were found in the groundwater sample from Well 1. As can be seen by the comparisons shown in Table 4, a similar spatial relationship for the relative levels of these radio-analytes in generally corresponding groundwater locations was found by Carter & Burgess in 2005. The 2005 pre-cleanup data, however, showed lower values in all cases compared to the 2006 post-cleanup data. This is not surprising as the entire area, presumably including its groundwater dynamics, was disturbed during the cleanup. Given that a great deal of source term material was removed from Survey Units 4 and 5 during the cleanup, it is likely that over time groundwater radionuclide concentrations will decline and eventually will stabilize below pre-cleanup levels. The surface water sample collected by Carter & Burgess showed surprisingly high Ra-226 levels prior to the cleanup, whereas the post-cleanup level was very low.

Table 4. Comparison of radio-analyte data for 2005 pre-cleanup water samples and generally corresponding 2006 post-cleanup samples.

Sample ID	Sample Type	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Uranium (mg/L)	Ra-226 (pCi/L)
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Pre-cleanup Data (Carter & Burgess 2005)

CB-2	Groundwater	34.8	12.5	0.0444	0.6
CB-3	Groundwater	16.2	6.9	0.0232	<0.2
CDOT	Groundwater	22.3	5.2	0.0236	0.3
Pond	Surface water	15.6	14	0.0026	5

Corresponding Post-cleanup Data

Well 1	Groundwater	126	52.8	0.163	<0.2
Well 2	Groundwater	58.8	28.6	0.0743	<0.2
CDOT	Groundwater	45.5	17	0.073	<0.2
Pond	Surface water	44.4	20.7	0.0223	<0.2

B.5 Mill building decontamination

The Work Plan included provisions for decontamination of the mill building by pressure washing. This objective was only partially achieved. During the course of the cleanup, conditions and remedial strategies were changing in close consultation between FESI and the CDPHE. Early on during the project, three lower levels of the interior of the mill building were cleaned of debris followed by an initial pressure washing. Swipe tests were collected in these areas and analyzed. The results are included in the field notes provided in Attachment L. Before an attempt was made to further pressure wash these areas, or to clean and decontaminate the fourth and highest interior level of the building, the possibility of demolishing the mill and using part of the underlying hill side for clean backfill in other areas of the site was being discussed. As such, decontamination efforts ceased. Eventually, a decision was made not to take down the mill but by that time the budget for decontamination had shifted to the more important issue of removing as much of the remaining contaminated soil from the site as possible. Because soils around the mill building could not be fully remediated within the scope of this project, decontaminating the remainder of the mill building interior no longer made practical sense.

C. POST-REMEDATION DOSE ASSESSMENT

The potential doses to individuals residing on the Davis Mill Site were estimated using the RESRAD Computer Code. The potential doses to individuals residing on the Davis Mill Site prior to remediation and respective initial cleanup criterion for the Davis Mill Site were also derived using RESRAD.

C.1 RESRAD Computer Code

RESRAD was developed by the U. S. Department of Energy (DOE) to evaluate the radiation doses and risks to members of the public from residual radioactive materials. The computer code was first issued in 1989. The version used in this analysis, RESRAD 6.22, was issued in February 2004. RESRAD is part of a family of codes that are designed to estimate radiation doses to individuals and ecological receptors from residual radioactivity. Further information on the RESRAD codes can be obtained from the User's Manual for RESRAD, Version 6 (Yu 2001).

RESRAD can be used to calculate the dose from a single radionuclide or a mixture of radionuclides, such as that which exists at sites where naturally occurring radionuclides are of concern. The user specifies soil concentrations for each nuclide. The Code can also be used to establish soil cleanup criteria based on a user-specified dose to a member of the public. The output from the code provides the doses from each individual radionuclide in a mixture by each exposure pathway as well as the total dose from all nuclides and pathways. Doses are calculated for user-designated time periods. RESRAD also calculates the peak total dose from the radionuclide mixture.

The Code requires user input parameter values in the following categories applicable to the particular location:

- Soil concentrations;
- Contaminated zone characteristics;
- Cover and hydrological characteristics;
- Saturated zone characteristics;
- Unsaturated zone characteristics; and
- Occupancy

Where no site-specific information is available, RESRAD provides default parameter values. For the pre-cleanup Davis Mill Site dose assessment for developing a cleanup criterion, site-specific parameter values provided in the Site Characterization Summary Report for the Davis Mill Site were used (Carter & Burgess 2005). Where no site-specific parameter values were available, the RESRAD default values for site characteristics were used. The occupancy factors and consumption values used depended on the selected exposure scenario. The NRC's indoor shielding factor of 0.33 was used instead of the RESRAD default factor of 0.7 (NUREG CR 5512 as quoted by EPA, 1996).

RESRAD calculates the dose to a member of the public for the following pathways:

- Direct gamma radiation;
- Inhalation of dust;
- Inhalation of radon and its decay products;
- Meat ingestion;
- Plant ingestion;
- Soil ingestion; and
- Water pathways.

The user selects the appropriate pathways for a particular exposure scenario.

C.2 Derivation of the Ra-226 Cleanup Criterion

MFG, Inc. adjusted the initial residual Ra-226 criterion proposed by Carter Burgess, based on their RESRAD analyses, to be consistent with the Nuclear Regulatory Commission's decommissioning standard as set forth in 10CFR20.1402 and as amplified in the Federal Register Notice dated Monday, July 22, 1997. The Carter Burgess analysis included indoor radon in the determination of the residual Ra-226 concentration that would result in a potential dose to a site resident of 25 mrem per year, the 10CFR20.1402 decommissioning standard for unrestricted use. However, the preamble to the Federal Register Notice on the Final Decommissioning Rule makes it clear that the intent of the NRC was to exclude indoor radon from the 25 mrem per year criterion. The notice states the following: "...the Commission believes that it is not practical for licensees to distinguish between radon from licensed activities at a dose comparable to a 0.25 mSv/y (25 mrem/y) dose criterion and radon which occurs naturally. Therefore, in

implementing the final rule, licensees will not be expected to demonstrate that radon from licensed activities is indistinguishable from background on a site-specific basis. Instead, this *“may be considered to have been demonstrated on a generic basis when radium, the principal precursor to radon, meets the requirements for unrestricted release without including doses from the radon pathway”* (emphasis added). [These statements can be found on page 39083 of the July 22, 1997 Federal Register.] MFG, Inc. proposed, and CDPHE accepted, a residual Ra-226 cleanup criterion of 2.6 pCi/g above background. The RESRAD dose assessment included all U-238 decay series nuclides in equilibrium, i.e., all nuclides in the decay series are present at the same concentration as the Ra-226. The ratio of Th-232 decay series radionuclides was assumed to be as indicated by the Carter & Burgess report.

C.3 Post-remediation Dose Assessment

The post-remediation dose assessment addresses Survey Units 3, 4, and 5. Survey Units 1 and 2 can be released for unrestricted use based on the MARSSIM analysis described in Section 2. The potential annual doses to individuals residing within Survey Units 1 and 2 have been demonstrated to be less than 25 mrem (excluding indoor radon) based on the dose assessment performed to establish the cleanup criterion.

Since the purpose of the post-remediation dose assessment is to determine how the Davis Mill Site property can be used in the future given the current radionuclide concentrations at the site, the best estimates of the measured Ra-226 concentrations, i.e., mean values, were used in the dose assessments for Survey Units 3, 4, and 5. Using the upper 95% confidence limits would compound the conservatism inherent in the RESRAD dose assessment and could result in recommendations for more restrictive use of the site than is warranted based on real potential dose to members of the public.

C.3.1. Survey Unit 3

Survey Unit 3 passed the MARSSIM guidelines for average and median residual Ra-226 concentration but failed the elevated measurement test because of three small areas where residual Ra-226 concentrations exceeded combined elevated measurement criteria in the MARSSIM analyses (see photo diagrams for HS3-1, HS3-2, and HS3-3 provided in Attachment H for reference). These elevated measurement criteria were based on area factors as calculated in RESRAD. In order to demonstrate that Survey Unit 3 meets the 25 mrem per year dose criterion for unrestricted release, the RESRAD Code was run for each of the three elevated measurement areas for two scenarios. In the first scenario, it was assumed that a member of the public would build a residence directly on the elevated measurement area. The assumed occupancy factor was dependent on the size of the area. The second scenario assumed the individual used the area for a vegetable garden but lived in another area of Survey Unit 3. Due to their small size, the elevated measurement areas could only provide a small fraction of the annual vegetable intake by a site resident. Either the default values or the Carter & Burgess RESRAD values were used for the other RESRAD input parameters. Table 5 includes the occupancy and consumption factors for each of the elevated measurement areas.

Table 5: Elevated Measurement Area Occupancy and Consumption Values

Location	Area (m ²)	Ra-226 Conc. above background (pCi/g)	Exposure Scenario	Indoor Residential Occupancy Factor	Outdoor Occupancy Factor	Vegetable Consumption Fraction
HS-1	6	3.2	Residence	0.125	0	0
HS-1	6	3.2	Garden	0	0.05	0.025
HS-2	20	8.1	Residence	0.25	0	0
HS-2	20	8.1	Garden	0	0.05	0.05
HS-3	9	8.4	Residence	0.125	0	0
HS-3	9	8.4	Garden	0	0.05	0.025

The default RESRAD indoor occupancy factor is 0.5 (i.e. an individual spends half of his or her time in the residence). For the purpose of this assessment it was assumed that an area no greater than 10 m² would be occupied for approximately one-fourth of the indoor residence time and an area no greater than 20 m² would be occupied for approximately half of the indoor residence time.

The outdoor occupancy time directly on the elevated measurement area where a vegetable garden might be located was assumed to be 0.05 or 8 hours per week. That is highly conservative. In fact, the probability that a resident would cultivate any of these elevated measurement areas is remote. In addition, the depth of contamination in the elevated measurement areas was assumed to be 1.0 meter. Therefore, the RESRAD analysis for Survey Unit 3 is very conservative.

In addition to the residential and garden scenarios for the elevated measurement areas, two RESRAD analyses were performed for the average residual radionuclide values for the survey unit, one assuming no residential exposure and one assuming all pathways. The calculated average annual dose to a resident on Survey Unit 3 was added to the dose for the garden scenario for each of the elevated measurement areas. The calculated dose, excluding residential exposure, was added to the dose for the elevated measurement area residential scenario. Carter & Burgess parameter values were used in the analysis. The occupancy and plant consumption fractions were adjusted to account for occupancy on the elevated measurement areas.

RESRAD provides doses over various time intervals. For the scenarios in this dose assessment, the initial calculated doses are the peak doses. The results of the RESRAD analyses are given in Table 6. The RESRAD output files are included on compact disk as Attachment I to this report.

Table 6: Estimated Annual Doses for Survey Unit 3

Area	Scenario	External Gamma Dose (mrem/y)	Plant Consumption Dose (mrem/y)	Total Dose (mrem/y)
Survey Unit 3	Non-residential	2.96	12.88	16.60
Survey Unit 3	Residential (All pathways)	4.33	11.59	16.89
HS-1	Residential	0.52	0	0.52
HS-1	Garden	1.08	1.50	2.59
HS-2	Residential	4.54	0	4.54
HS-2	Garden	2.74	9.47	12.25
HS-3	Residential	2.35	0	2.35
HS-3	Garden	2.85	3.93	6.81
HS-1r + SU 3nr ⁽¹⁾	Residential	3.48	12.88	17.12
HS-1g + SU-3r	Garden	5.41	13.09	19.48
HS-2r + SU-3nr	Residential	7.50	12.88	21.14
HS-2g + SU-3 r	Garden	7.07	21.06	29.14
HS-3r + SU-3nr	Residential	5.31	12.88	18.95
HS-3g + SU-3r	Garden	7.18	15.52	23.70

⁽¹⁾ nr means non-residential occupancy; r means residential occupancy

Survey Unit 3 meets the decommissioning standard of 25 mrem per year for all scenarios except a garden on HS3-2. The average concentrations in HS3-2 are skewed by the concentration in the root ball of a tree. The average Ra-226 concentration in HS-2, excluding the tree root ball is 6.2 pCi/g (4.1 pCi/g above background) or about half the concentration used in the RESRAD analysis. It is highly unlikely that the area would be used for a vegetable garden because of the presence of the tree. The estimated doses for the garden scenario on HS3-2 would be approximately half the values listed above.

Based on the RESRAD analysis for reasonable exposure scenarios, Survey Unit 3 meets the decommissioning standard and can be released for unrestricted use.

C.3.2 Survey Units 4 and 5

Survey Units 4 and 5 did not pass the initial MARSSIM comparative assessment of mean values. Mean Ra-226 concentrations in both survey units exceeded the gross soil cleanup criterion. Under MARSSIM, if the mean value in the survey unit exceeds the gross DCGL criterion, then the survey unit fails based solely on this comparison and no further statistical tests are performed. Therefore, Survey Units 4 and 5 should not be released for unrestricted use.

The Ra-226 concentrations in Survey Unit 4 varied greatly, ranging from near background to 221 pCi/g. Sixteen of the twenty-three soil samples taken and analyzed showed Ra-226 concentrations below the criterion. The average concentration over the survey unit is primarily driven by a single sample that had a Ra-226 concentration approximately three times the average value and fifty times the criterion. The survey unit includes the area directly beneath the old mill building. Observations during remediation suggested that tailings may have once been stored in this general location. Attempts to remove as much contaminated soil from this area as possible resulted in the formation of a small pond to the west of the mill building (see SU-4 photos in Attachment M) as excavations reached below the water table.

Survey Unit 5 also had highly variable Ra-226 concentrations, ranging from background to 82 pCi/g. Seven of the 25 grid samples had concentrations exceeding the cleanup criterion. An additional four samples were taken in "hot spot" areas and included in the overall average.

While unrestricted use is not appropriate for either Survey Unit 4 or Survey Unit 5, limited uses such as cattle grazing and recreational use (such as hiking, ball fields, etc.) would result in doses below the decommissioning standard. The RESRAD code was run for a cattle grazing, milk production and recreational use scenarios for the two survey units combined since it is likely that beef cattle or milk cows would range freely over both survey units. In fact, domestic animals would likely graze over the entire site. Limiting the analysis to the two failed survey units is very conservative and overestimates the potential dose from meat and milk.

The average Ra-226 concentration for the combined Survey Units 4 and 5 was 14.3 pCi/g. The recreational and cattle grazing scenario assumed a member of the public would spend approximately 10% of his or her time in Survey Units 4 and 5. The same individual was assumed to obtain the default RESRAD fraction (33%) of his or her meat and milk from animals grazing full time in the area. Carter & Burgess site-specific parameter values were used in the analysis. The depth of contamination was assumed to be 2 meters, the estimated depth for Survey Unit 4. The total area of contamination was 14,957 m². The results of the RESRAD analysis are given in Table 7.

Table 7: Estimated Annual Doses for Limited Uses of Survey Units 4 and 5

Pathway	Estimated Dose (mrem/y)
Direct Gamma Radiation	6.64
Inhalation of particulates	0.09
Meat ingestion	8.17
Milk Ingestion	5.14
Soil Ingestion	0.05
Total Annual Dose for Recreational/Animal Grazing Scenario	20.09
Total Annual Dose for Recreational Scenario	6.69

The potential total dose from all pathways in the limited use scenario is less than 25 mrem per year. Therefore, the limited uses assumed for the scenario are acceptable for Survey Units 4 and 5.

Exposure pathways for a recreational scenario on Survey Units 4 and 5 would be limited to direct gamma radiation and ingestion of soil. The occupancy parameters would be the same as for the Limited Use scenario. That is, it is unlikely that a recreational user would spend more than 5% of his or her time within the survey units.

C.3.2.1 New Pond in Survey Unit 4

Excavations in Survey Unit 4 resulted in the formation of a small pond (New Pond) directly west of and below the mill building. As mentioned previously, this location may have once been used to store tailings from mill operations. Despite efforts to remove as much contaminated soil as possible from this location, additional remediation was not possible as the groundwater table was breached resulting in the formation of the New Pond. Soils underlying and bordering the New Pond still exhibit relatively high levels of residual radioactivity. The current residents asked for a determination as to whether it is "safe" to drink milk and eat meat from animals grazing and drinking water from sources on their property including the New Pond.

No direct water quality measurements of suspended sediment concentration (SSC) or radionuclide activity concentration were obtained from the New Pond during the reclamation and verification process for the site. Therefore, estimates of dose to individuals consuming meat and milk from animals drinking pond water have been made based on measured groundwater concentrations, measured soil concentrations in the vicinity of the New Pond, and assumed SSC.

The New Pond is not the only source of water for animals grazing on the Davis Mill Site. There are several other ponds on the property, notably the pre-existing pond to the southeast of the mill buildings. The New Pond is in an area devoid of vegetation so would not be as attractive to grazing animals as the other ponds on the site that have forage nearby. However, it is a potential source of livestock water. The dose calculation assumes a very conservative value of 0.5 for the fraction of water livestock obtain from the New Pond.

Two temporary groundwater wells were installed in an area near the New Pond. The water from the wells was analyzed for uranium and Ra-226. The Ra-226 concentrations were below detection limits. The maximum measured uranium concentration was 0.161 mg/L (110 pCi/L). This concentration was used in the dose analysis for groundwater radionuclides since it is assumed that the water in the New Pond comes from groundwater.

The area has been disturbed so a significant amount of sediment would be likely to be in the water consumed by livestock, particularly since the animals would stir up sediment in the process of reaching the water. We found no values in the literature for SSC in stock

The area has been disturbed so a significant amount of sediment would be likely to be in the water consumed by livestock, particularly since the animals would stir up sediment in the process of reaching the water. We found no values in the literature for SSC in stock pond water. However, a study by the U. S. Geological Survey (USGS) compared SSC and total suspended solids (TSS) measured concentrations using data from over 600 water samples representing seven rivers (Glysson, undated). While these sources are not directly comparable to stock ponds, the SSC values can be used as ballpark numbers for the New Pond with the understanding that they introduce significant uncertainty into the calculations. The USGS analyzed over 600 samples. The highest single SSC measurement was 4,600 mg/L. This value was used in the New Pond dose calculations.

The activity concentration in the water was estimated by assuming a SSC of 4,600 mg/L and a sediment concentration of 90 pCi/g. The sediment concentration is the average of the four highest soil sample concentration measurements in the vicinity of the New Pond. These are likely to be conservative assumptions and would probably result in an overestimate of potential dose. The sediment concentration was added to the uranium concentration in groundwater to obtain a total concentration for each of the nuclides in the U-238 decay series. The U-238 decay series radionuclides (U-234, Th-230, Ra-226, and Pb-210) were assumed to be in equilibrium in the soil and groundwater. Uranium-235 and its decay products were assumed to be present at 0.045 times the activity of the U-238.

Transfer coefficients and usage factors from NCRP Report No. 123I (NCRP 1996) were used to estimate the uptake and transfer of radionuclides from intake by beef cattle and milk cows to meat and milk. Beef cattle were assumed to drink 50 liters of water per day and milk cows, 60 liters per day. The calculation assumes that the residents eat 100 kg of beef from the site per year and drink 300 liters of milk produced on site. That is, the residents had no other source of meat and milk. This is also a very conservative assumption. The transfer coefficients are based on uptake of radionuclides from feed and water. The uptake of insoluble sediments by animals may be lower, introducing another conservative factor into the calculation. Dose Coefficients were obtained from "The ICRP Database for Dose Coefficients for Workers and Members of the Public" (ICRP 2001).

The doses were calculated as shown in Table 8. The estimated dose due to eating meat from cattle drinking New Pond water was 3.6 mrem per year. The estimated dose due to drinking milk from cows drinking New Pond water was 7.3 mrem per year.

Table 8: Dose calculation for sediment in New Pond water: contribution to meat and milk dose

Meat											
Nuclide	Pond	Cons. Rate	Fraction	Transfer factor	Conc.	Intake	Intake	Intake	DCF	Dose	Dose
	Conc.	Beef Cattle	from new	meat	Meat	meat	meat	meat	Sv/Bq	Sv/y	mrem/y
	pCi/L	L/d	pond	d/kg	pCi/kg	kg/y	pCi/y	Bq/y			
U-238	469	50	0.5	8.00E-04	9.38E+00	100	9.38E+02	3.47E+01	4.50E-08	1.56E-06	0.2
U-234	469	50	0.5	8.00E-04	9.38E+00	100	9.38E+02	3.47E+01	4.90E-08	1.70E-06	0.2
Th-230	414	50	0.5	1.00E-04	1.04E+00	100	1.04E+02	3.83E+00	2.10E-07	8.04E-07	0.1
Ra-226	414	50	0.5	1.00E-03	1.04E+01	100	1.04E+03	3.83E+01	2.80E-07	1.07E-05	1.1
Pb-210	414	50	0.5	8.00E-04	8.28E+00	100	8.28E+02	3.06E+01	6.90E-07	2.11E-05	2.1
U-235	19	50	0.5	8.00E-04	3.80E-01	100	3.80E+01	1.41E+00	4.70E-08	6.61E-08	0.0
Pa-231	19	50	0.5	5.00E-06	2.38E-03	100	2.38E-01	8.79E-03	7.10E-07	6.24E-09	0.0
Ac-231	19	50	0.5	2.00E-05	9.50E-03	100	9.50E-01	3.52E-02	1.10E-06	3.87E-08	0.0
Total										3.60E-05	3.6
Milk											
Nuclide	Pond	Cons. Rate	Fraction	Transfer factor	Conc.	Intake	Intake	Intake	DCF	Dose	Dose
	Conc.	Milk Cow	from	Milk	Meat	milk	milk	milk	Sv/Bq	Sv/y	mrem/y
	pCi/L	L/d	new pond	d/L	pCi/kg	L/y	pCi/y	Bq/y			
U-238	469	60	0.5	4.00E-04	5.63E+00	300	1.69E+03	6.25E+01	4.50E-08	2.81E-06	0.3
U-234	469	60	0.5	4.00E-04	5.63E+00	300	1.69E+03	6.25E+01	4.90E-08	3.06E-06	0.3
Th-230	414	60	0.5	5.00E-06	6.21E-02	300	1.86E+01	6.89E-01	2.10E-07	1.45E-07	0.0
Ra-226	414	60	0.5	1.00E-03	1.24E+01	300	3.73E+03	1.38E+02	2.80E-07	3.86E-05	3.9
Pb-210	414	60	0.5	3.00E-04	3.73E+00	300	1.12E+03	4.14E+01	6.90E-07	2.85E-05	2.9
U-235	19	60	0.5	8.00E-04	4.56E-01	300	1.37E+02	5.06E+00	4.70E-08	2.38E-07	0.0
Pa-231	19	60	0.5	5.00E-06	2.85E-03	300	8.55E-01	3.16E-02	7.10E-07	2.25E-08	0.0
Ac-227	19	60	0.5	2.00E-06	1.14E-03	300	3.42E-01	1.27E-02	1.10E-06	1.39E-08	0.0
Total										7.34E-05	7.3

While there is considerable uncertainty in the assessment due to the lack of measured water concentrations, the calculated doses are likely to be overestimates. Even if the concentrations are in error by a factor of two, the estimated doses are low compared to background.

While the calculated doses indicate that there is no valid reason to restrict animals immediately from drinking water in the New Pond, it would be advisable to obtain real measured concentrations. Animals should be allowed to drink the water pending analysis of water quality. This assessment in no way considers the potential impact of non-radioactive constituents on the quality of meat and milk from animals drinking from the New Pond.

C.3.3 Combined Doses from All Sources

While it is possible for a resident on an elevated measurement area in Survey Unit 3 to also eat meat and drink milk from animals grazing on Survey Units 4 and 5, it is not likely. Therefore, the doses for the three survey units were not combined. To do so would result in unnecessarily restrictive limits on the types of activities that may be allowed on the site.

For the same reason, the dose from drinking shallow groundwater was not included in the dose assessment. The groundwater is not used at the present time for either domestic use or irrigation since there is an irrigation ditch through the property. Wells for domestic

water use would be installed in a deeper aquifer since the shallow groundwater is likely to be impacted by animal wastes and other contaminants that would make it non-potable.

C.3.4. Indoor Radon Dose

While the decommissioning standard excludes indoor radon, as noted in Section 3.2, the dose calculations were performed for various individual scenarios. However, these dose calculations should not be used to determine whether a particular survey unit can be released.

Indoor radon doses were calculated using the RESRAD Code. In order to simplify analysis, the only nuclide used in the RESRAD Code was Ra-226, the parent of Rn-222. In addition, radon was the only pathway used in the analysis. The estimated doses from inhalation of radon decay products indoors are given in Table 9.

Table 9: Gateway Indoor Radon Dose

Location	Depth of Contamination (meters)	Area of Contamination (sq. meters)	Ra-226 Conc. (pCi/g)	Estimated Annual Indoor Rn Dose (mrem/y)		
				Slab (foundation depth = 0)	Garden Level (foundation depth = 1 m)	Basement (foundation depth = 1.75 m)
Background	2	10,000	2.1	111	147	120
SU1	0.15	11,927	2.6	65	0.54	0.54
SU2	0.15	4,732	3.9	97	0.51	0.51
SU3	0.15	7,574	3.2	80	0.53	0.53
SU4	2	6,582	19.8	1038	1377	1125
SU5	1	8,375	9.6	479	8.55	8.55

The RESRAD estimated doses are somewhat puzzling in that the dose from a full basement is less than the dose from a slab on grade foundation. The RESRAD Manual states that "The indoor (radon) concentration is calculated by a model in which radon enters the room through the floor and through ventilation inflow from the outdoor air." (Yu 2001, p 150) In a later section of that document, Yu indicates that the below-grade walls are also considered (Yu 2001, p. 157). However, the equation provided in the manual only includes radon flux from the floor built on the contaminated area. Therefore, in cases where the foundation extends below the maximum depth of the contaminated zone, the calculated radon dose becomes dependent only on inflow from ambient outdoor air. However, where foundations extend partially into the contaminated zone (i.e., garden level foundations for SU4 and background), the estimated garden level dose is greater than the slab dose, indicating that the code does, in fact, include some horizontal transport of radon from soil to sub-surface interior spaces.

By comparison, the average estimated indoor radon dose to members of the public in the United States, based on radon concentration measurements, is approximately 200 mrem per year. The reason this dose is greater than the RESRAD estimated dose for

background is that the input used for the code limited the area with Ra-226 in soil to finite dimensions.

As noted above, the indoor radon pathway was excluded from the dose estimates performed for the purpose of determining whether the survey units can be released for unrestricted use based on the NRC's decommissioning rule that specifically excludes indoor radon dose from the 25 mrem per year dose criterion.

C.3.5 Dose from Crops Grown on Site

The plant, meat, and milk ingestion pathways were included in the dose analysis for SU4 and SU5 and are discussed in Section 3.3.2. The RESRAD Code was also run assuming all default parameter values. The code was run for background as well as the gross average radionuclide concentration in each of the survey units. Doses were estimated for background concentrations at three different depths corresponding to the estimated depth of the residual contamination levels above background. The background doses were subtracted from the calculated doses for each of the survey units. The results are summarized in Tables 10a, b, and c.

Table 10a: Gateway RESRAD Background Dose Assessment – All Pathways (Excluding Indoor Rn)

Pathway	Dose (mrem/y) including background		
	Background	Background	Background
Location			
Area (square meters)	10,000	10,000	10,000
Depth of contamination (meters)	2	1	0.15
Average Ra-226 Conc. (pCi/g)	2.1	2.1	2.1
Ground (mrem/y)	8.30E+00	8.29E+00	7.33E+00
Inhalation (mrem/y)	1.17E-01	1.16E-01	1.15E-01
Plant - default consumption (mrem/y)	2.45E+01	2.46E+01	3.66E+00
Meat (mrem/y)	9.40E-01	9.40E-01	4.24E-01
Milk (mrem/y)	5.92E-01	5.91E-01	2.52E-01
Soil (mrem/y)	5.83E-01	5.82E-01	5.77E-01
Total - default consumption (mrem/y)	3.52E+01	3.51E+01	1.24E+01

Table 10b: Gateway RESRAD Dose Assessment – All Pathways (Excluding Indoor Rn)

Pathway	Dose (mrem/y) from Survey Units				
	SU1	SU2	SU3	SU4	SU5
Location					
Area (square meters)	11,927	4,732	7,574	6,582	8,375
Depth of contamination (meters)	0.15	0.15	0.15	2	1
Average Ra-226 Conc. (pCi/g)	2.6	3.9	3.2	19.8	9.6
Ground (mrem/y)	9.10E+00	1.35E+01	1.12E+01	8.83E+01	4.20E+01
Inhalation (mrem/y)	1.46E-01	2.00E-01	1.69E-01	1.19E+00	5.84E-01
Plant - default consumption (mrem/y)	5.04E+00	7.56E+00	6.19E+00	2.32E+02	1.12E+02
Meat (mrem/y)	6.29E-01	3.74E-01	4.86E-01	5.84E+00	3.59E+00
Milk (mrem/y)	3.73E-01	2.21E-01	2.91E-01	3.67E+00	2.27E+00
Soil (mrem/y)	7.17E-01	1.08E+00	8.77E-01	5.89E+00	2.85E+00

Total - default consumption (mrem/y)	1.60E+01	2.30E+01	1.92E+01	3.37E+02	1.65E+02
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Table 10c: Gateway RESRAD Dose Assessment – Background Dose Subtracted

Pathway	Dose (mrem/y) background subtracted ¹				
	SU1	SU2	SU3	SU4	SU5
Area (square meters)	11,927	4,732	7,574	6,582	8,375
Depth of Contamination (meters)	0.15	0.15	0.15	2	1
Average Ra-226 Conc. (pCi/g)	2.6	3.9	3.2	19.8	9.6
Ground (mrem/y)	1.77E+00	6.17E+00	3.82E+00	8.00E+01	3.37E+01
Inhalation (mrem/y)	3.10E-02	8.50E-02	5.36E-02	1.07E+00	4.68E-01
Plant - default consumption (mrem/y)	1.38E+00	3.90E+00	2.53E+00	2.07E+02	8.77E+01
Meat (mrem/y)	2.05E-01	-5.00E-02	6.16E-02	4.90E+00	2.65E+00
Milk (mrem/y)	1.21E-01	-3.10E-02	3.92E-02	3.08E+00	1.68E+00
Soil (mrem/y)	1.40E-01	5.03E-01	3.00E-01	5.31E+00	2.27E+00
Total - default consumption (mrem/y)	3.60E+00	1.06E+01	6.76E+00	3.02E+02	1.30E+02

¹The negative net doses for SU2 for meat and milk ingestion are an artifact of the way RESRAD calculates consumption fraction.

C.3.5.1 Radionuclides in Soil

RESRAD calculates the dose from ingestion of crops grown in soils with residual radionuclide contamination. RESRAD automatically calculates the fraction of fruits and vegetables grown on soils with residual contamination based on the area, i.e., the area factor. Using the average residual radionuclide concentrations for each survey unit and the RESRAD calculated consumption fraction the estimated net annual doses (i.e., background dose subtracted) due to ingestion of fruits and vegetables grown on the survey unit were 1.4 mrem per year, 3.9 mrem per year, 2.53 mrem per year, 207 mrem per year, and 88 mrem per year for SU1, SU2, SU3, SU4, and SU5 respectively. (See Table 10c) This analysis indicates that SU1, SU2, and SU3 are suitable for growing crops for human consumption.

C.3.5.2 Radionuclides in Groundwater

The analysis in Section 3.3.5.1 addresses the existing residual radioactivity in the soils. However, analysis of groundwater shows elevated concentrations of uranium. If groundwater is used to irrigate crops, the residual radionuclide concentrations in the soil will increase slightly. Analysis of groundwater in the two wells in SU4 showed Ra-226 concentrations below detection and uranium at 0.163 mg/L and 0.074 mg/L for Wells 1 and 2 respectively. The uranium activity concentrations for the two wells were 110 pCi/L and 50.3 pCi/L respectively. The average uranium activity concentration was 70.3 pCi/L. The activity concentrations calculated from the mass concentrations using the specific activity of natural uranium (677 pCi/mg) correlated well with the measured gross alpha and gross beta concentrations.

The following calculations assume the usage parameter values in NCRP Report 1231, *Screening Models for Releases of Radionuclides to Atmosphere, Surface Water, and*

Ground (NCRP 1996). Assuming an irrigation rate of 5 liters per square meter per day for 150 days per year, and the average uranium concentration in groundwater, the total amount of radioactivity added to the surface soil per year would be as follows:

$$\text{Annual input} = 5 \text{ L/m}^2\text{-d} \times 150 \text{ d/y} \times 70.3 \text{ pCi/L} = 5.27\text{E}4 \text{ pCi/y}$$

Assuming a plow depth of 15 cm and a soil density of 1.7 g/cm³, the added activity per gram of soil at the surface would be as follows:

$$\text{Soil concentration} = 5.27\text{E}4 \text{ pCi/y} \times 1\text{E-}4 \text{ m}^2\text{/cm}^2 / (15 \text{ cm} \times 1.7 \text{ g/cm}^3) = 0.21 \text{ pCi/g}$$

Assuming equilibrium between U-238 and U-234 in groundwater the estimated potential increase in U-238 concentration would be 0.10 pCi/g. This is less than 5 percent of the existing background soil concentration and approximately 0.5 percent of the average soil concentration in SU4. Therefore, the dose from plants grown on SU4 could increase by approximately 0.5%.

Because most of the source term has been removed, groundwater concentrations are expected to decrease significantly over the next few years. Therefore, it is not reasonable to project the impact of irrigating crops with groundwater at the measured concentrations into the future.

C.3.6 Dose from Animals Grazing on Site

The estimated doses from meat and milk from animals grazing on SU4 and SU5 were calculated by RESRAD using default consumption fractions (Table 10c).

C.3.6.1 Radionuclides in Soil

The estimated annual doses for SU1, SU2, and SU3 were less than 1 mrem per year. The estimated net doses for SU4 and SU5 from meat ingestion were 4.9 and 2.7 mrem per year respectively. The estimated doses for SU4 and SU5 from milk ingestion were 3.1 and 1.7 mrem per year respectively (See Table 10c). As noted in Section 3.3.2, domestic animal grazing even on the areas of the site with the highest levels of residual radionuclide concentrations would not result in doses greater than 25 mrem per year to members of the public consuming meat and milk. The consumption fractions used in the analysis are appropriate for residents consuming home-grown beef and milk. The potential doses to members of the public if the meat and milk were sold for consumption by non-residents would be much lower since the fraction of meat and milk consumed from the site would be much lower.

C.3.6.2 Radionuclides in Groundwater

Beef cattle and milk cows could also consume slightly contaminated groundwater. RESRAD does not take into account water consumption unless the groundwater is contaminated by future leaching from the soil. RESRAD does not allow input of existing groundwater concentrations. Therefore, the doses from this pathway were calculated manually using standard usage parameters from NCRP Report 123I (NCRP, 1996).

Three sources of drinking water for the animals were considered separately: Well 1, Well 2, and the pre-existing pond southeast of the mill building. The uranium concentrations in the three sources are given in Table 11. The potential doses to members of the public consuming meat and milk from animals drinking water from these sources were calculated as follows:

$$\text{Concentration in meat} = \text{Water intake (L/d)} \times \text{transfer factor (d/kg)} \times \text{Conc. (pCi/L)}$$

$$\text{Concentration in milk} = \text{Water intake (L/d)} \times \text{transfer factor (d/L)} \times \text{Conc. (pCi/L)}$$

The annual intakes by members of the public were estimated assuming an individual drinks 300 liters of milk per year and consumes 100 kg of meat. The concentrations in beef were assumed to be representative of concentrations in other animals that might be used for meat.

$$\text{Intake (meat)} = \text{Conc. in beef} \times 100 \text{ kg/y}$$

$$\text{Intake (milk)} = \text{Conc. in milk} \times 200 \text{ L/y}$$

The annual doses were calculated by multiplying the annual intake by the International Commission on Radiological Protection (ICRP) dose coefficient for natural uranium (ICRP, 2001). This analysis assumes that the residents get all of their meat and milk from animals' drinking impacted ground water or pond water from the site. The usage and transfer factors are given in Table 11 along with the results of the calculations.

Table 11: Dose from Groundwater Consumption by Domestic Animals

Source	Well 1	Well 2	Pre-existing Pond
U-nat Concentration in Water (pCi/L)	110	50.3	15.1
Daily water consumption by beef cattle (L/d)	50	50	50
Daily water consumption by milk cows (L/d)	60	60	60

Transfer Coefficient water to meat (d/kg)	0.0008	0.0008	0.0008
Transfer Coefficient water to milk (d/L)	0.0004	0.0004	0.0004
Concentration in meat (pCi/kg)	4.4	2.0	0.60
Concentration in milk (pCi/L)	2.6	1.2	0.36
Annual intake in meat (pCi/y)	440	200	60
Annual intake in milk (pCi/y)	780	360	108
ICRP Dose Coefficient for natural uranium (mrem/pCi)	1.7E-4	1.7E-4	1.7E-4
Estimated annual dose from meat intake (mrem/y)	<0.1	<0.1	<0.01
Estimated annual dose from milk intake (mrem/y)	0.14	<0.1	<0.1
Estimated annual dose from routine direct ingestion of groundwater (mrem/y)	13.7	6.2	non-potable
Estimated annual dose from incidental ingestion of groundwater (mrem/y)	0.9	0.4	non-potable

C.3.7 Direct Ingestion of Groundwater

The shallow groundwater at the site is not likely to be potable. However, the doses to individuals consuming groundwater were calculated assuming a drinking water intake of 2 liters per day for 365 days per year. This is an unlikely scenario for the shallow groundwater.

$$\text{Dose} = 2 \text{ L/d} \times 365 \text{ d/y} \times \text{Concentration} \times \text{Dose coefficient}$$

The estimated doses are given in Table 11.

A more reasonable exposure scenario would be incidental ingestion of groundwater. An intake rate of 0.25 L/d for 200 days per year for a total of 50 L/y was assumed. That is equivalent to one glass of water every day during the late spring, summer, and early fall.

C.3.8 Playground Scenario

Soil ingestion was included in all of the RESRAD analyses since it is a viable exposure pathway for all scenarios. In SU4 and SU5 soil ingestion at a rate of 36.5 grams per year (100 mg/day), the default full-time occupancy value, resulted in estimated doses of 5.89 mrem per year and 2.85 mrem per year. The estimated daily intake of soil for a child is 200 mg/day. Assuming a child plays on a playground for several hours per day for six months of the year, and that he or she ingests half his or her daily soil intake while on the playground, the dose would be approximately half the estimated RESRAD dose. It should be noted, however, that the dose to the child can be adjusted for intake but that RESRAD does not specifically calculate doses to children.

It is unlikely that a playground could be constructed on the most contaminated portions of SU4 and SU5. If indeed, the area was put to such a use, it would be covered with a protective surface, preventing direct contact with soils. However, it would not be prudent to put a child's playground in the area with greatest residual contamination in SU4 or SU5 without some sort of ground cover.

D. CONCLUSIONS

From both radiological and economic perspectives, the 2006 cleanup of the George E. Davis Mill Site could be considered successful. Although full remediation of the site was not achieved, a large amount of the most highly contaminated source term material was removed from the site. Given all possible alternatives, the relative cost of material removal, transport, and disposal was extremely low. Contaminated soils in areas nearest to where residents are currently living on the site were largely eliminated. Two of the five survey units (Survey Units 1 and 2) passed all MARSSIM-based analyses for compliance with the 25 mrem/yr dose criterion. About 4 acres, or over 40% of the total area targeted for potential remediation, now appears to meet this standard as a result of the cleanup.

Although Survey Unit 3 did not quite meet the 25 mrem/yr standard based on MARSSIM elevated measurement analyses, the overall concentrations met the cleanup criterion. The post-remediation dose assessment for this area demonstrates that for any reasonable land use scenario, Survey Unit 3 meets the 25 mrem/year decommissioning standard.

Survey Units 4 and 5 did not meet the criterion for cleanup and should not be released for unrestricted use. However, limited use such as livestock grazing and recreation activities would not result in annual doses to members of the public in excess of 25 mrem per year. The area should not be used for cultivation of crops for human consumption since the projected doses exceed 25 mrem per year.

Other specific land and water uses were considered for Survey Units 4 and 5 including use of groundwater for irrigation, stock water, and direct ingestion. Irrigation and stock watering with groundwater would be acceptable under the limited use scenarios. Routine direct ingestion of groundwater should not be allowed on the basis of keeping doses As

Low As Reasonable Achievable (ALARA) even though the annual dose from that single pathway would not exceed 25 mrem per year. Incidental ingestion of groundwater would result in a dose less than 1 mrem per year so is not a significant risk from radionuclides. However, the chemical and biological contaminants in the ground and surface water most likely render it non-potable.

E. REFERENCES

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FIGURE 1

**GEORGE E. DAVIS MILL SITE
LOCATION MAP**



TRUCKS ENTERING HIGHWAY






TRUCKS TURNING

CDOT YARD

DOLORES RIVER

141



-  SURFACE WATER BODY
-  HAUL ROAD
-  SOIL STOCKPILE & LOADOUT AREA
-  SILT FENCE
-  CDOT YARD

GATEWAY-DAVIS MILL SITE

Figure: 1
AERIAL SITE MAP

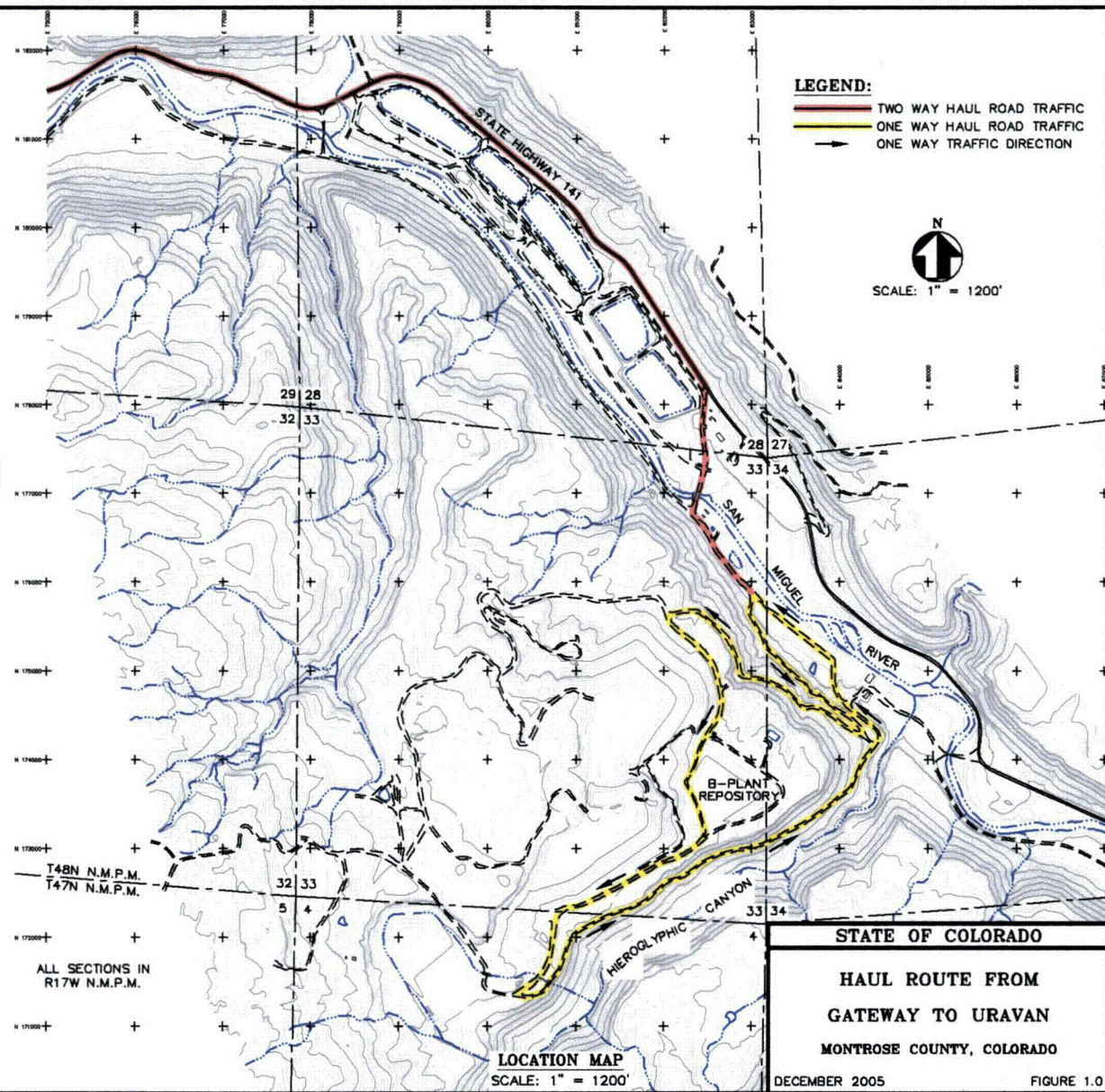
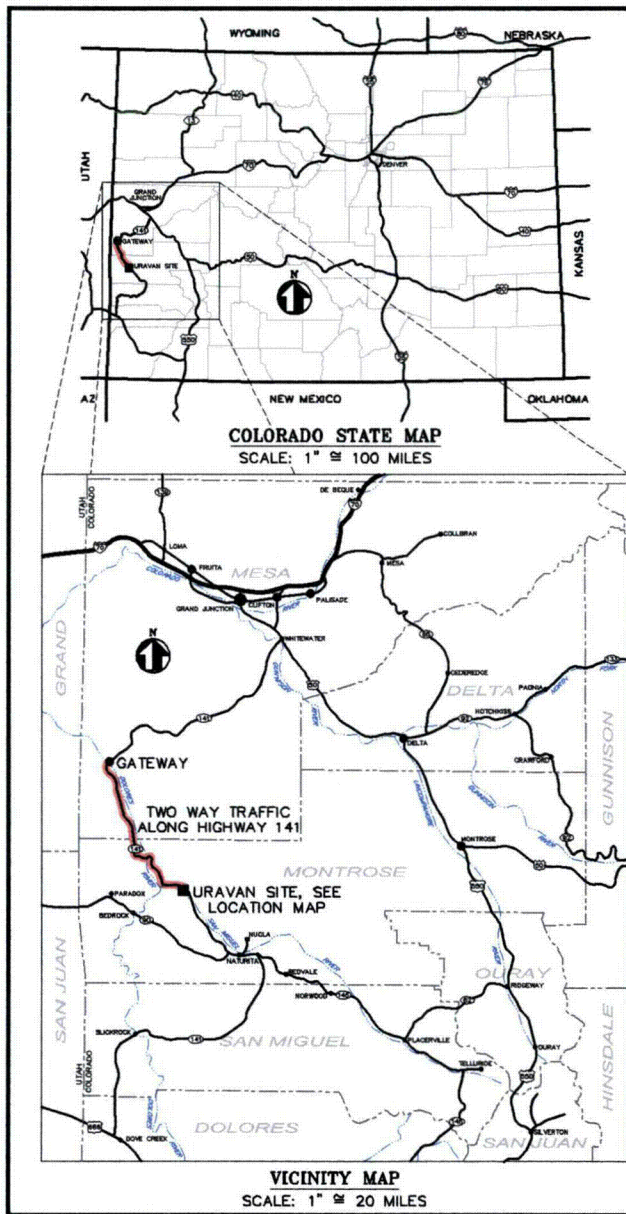


FIGURE 2

PROJECT ORGANIZATIONAL CHART

Frontier Environmental Services, Inc.
Project
Organization Chart
CDPHE Gateway, Colorado
Davis Mill Project

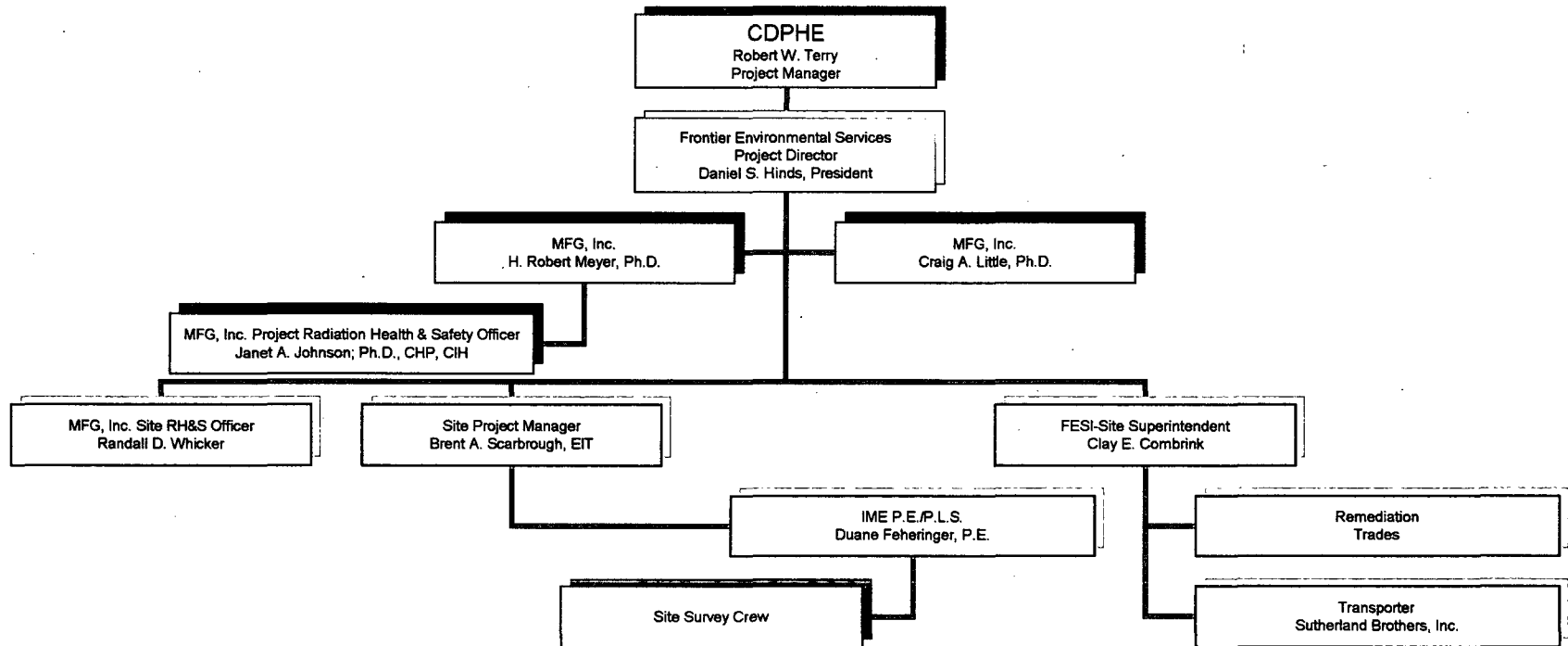


Figure 2

ATTACHMENT A

**SITE OWNER
ACCESS AGREEMENT**

CONSENT FOR RIGHT OF ENTRY FOR REMEDIATION ACTIVITIES

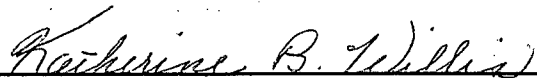
At The
Davis Mill Site
Gateway, Colorado

Mrs. Katherine B. Willis hereby represents to The State of Colorado, Department of Public Health and Environment (CDPHE), that the undersigned is the land owner of the following real property located in the County of Mesa and the State of Colorado: the Davis Mill physically located at 43201 Colorado Highway 141; Gateway, Colorado.

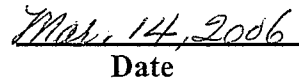
As such, the undersigned hereby grants to the agents and employees of the State of Colorado, Department of Public Health and Environment and its Contractor - Frontier Environmental Services, Inc. and their sub-contractor(s), permission to enter upon such property and land to remediate and mitigate past mine milling practices and to do all things necessary or expedient for the protection of human health and environment by the systematic removal of radiological materials from the Davis Mill Site.

Consent is given to enter upon the above described property for the length of time necessary to remediate the Davis Mill Site and to adequately re-grade the site post-remediation pursuant to the Contract entered into between the State of Colorado; Department of Public Health and Environment and Frontier Environmental Services, Inc. (Contractor). Reference: CDPHE Project Number HMWMD-RAD-01 and Contract Number FEA-06-00043.


The land owner has a responsibility to ensure that any existing physical assets not specifically addressed by the Contract are identified by the undersigned or their agent as not to be addressed or acted upon by the Contractor - Frontier Environmental Services, Inc.

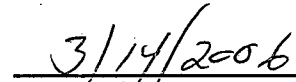


Mrs. Katherine B. Willis



Date


Witnessed By:


Date

ATTACHMENT B

SUMMARY

OF

**GEORGE E. DAVIS MILL SITE
PROJECT SPECIFIC
BILL-OF-LADING
ISSUED**

SUMMARY OF GEORGE E. DAVIS SITE PROJECT SPECIFIC BILL-OF-LADING ISSUED

Date:	Number of Vehicles:	Total Loads Shipped:	Accumulated Loads:	Daily Tare Tons:	Accumulated Tons:	*Daily Cubic Yards:	*Accumulated yd ³ :
Tuesday, May 02, 2006	7	23	23.0	527.0	527.0	376.4	376.4
Wednesday, May 03, 2006	7	28	51.0	643.6	1170.6	459.7	836.1
Thursday, May 04, 2006	8	34	85.0	796.8	1967.4	569.1	1405.3
Friday, May 05, 2006	7	28	113.0	654.4	2621.8	467.4	1872.7
Monday, May 08, 2006	7	32	145.0	754.0	3375.8	538.6	2411.3
Tuesday, May 09, 2006	8	32	177.0	753.6	4129.4	538.3	2949.6
Wednesday, May 10, 2006	8	32	209.0	756.2	4885.6	540.1	3489.7
Thursday, May 11, 2006	8	32	241.0	759.4	5645.0	542.4	4032.1
Friday, May 12, 2006	8	31	272.0	738.5	6383.5	527.5	4559.6
Monday, May 15, 2006	8	32	304.0	760.0	7143.5	542.9	5102.5
Tuesday, May 16, 2006	6	23	327.0	541.0	7684.5	386.4	5488.9
Wednesday, May 17, 2006	7	31	358.0	749.2	8433.7	535.1	6024.1
Thursday, May 18, 2006	8	34	392.0	798.4	9232.1	570.3	6594.4
Friday, May 19, 2006	8	32	424.0	739.8	9971.9	528.4	7122.8
Monday, May 22, 2006	8	20	444.0	466.7	10438.6	333.4	7456.1
Tuesday, May 23, 2006	8	33	477.0	769.5	11208.1	549.6	8005.8
Wednesday, May 24, 2006	8	40	517.0	928.9	12137.0	663.5	8669.3
Thursday, May 25, 2006	No Loads Shipped Due To UMETCO Facility Shut-Down; De-contamination Pad Repair Activities						
Friday, May 26, 2006	No Loads Shipped Due To UMETCO Facility Shut-Down; De-contamination Pad Repair Activities						
Tuesday, May 30, 2006	6	15	532.0	347.5	12484.5	248.2	8917.5
Wednesday, May 31, 2006	6	32	564.0	745.3	13229.8	532.4	9449.9
Thursday, June 01, 2006	8	40	604.0	931.3	14161.1	665.2	10115.1
Friday, June 02, 2006	7	35	639.0	816.7	14977.8	583.4	10698.4
Monday, June 05, 2006	7	38	677.0	882.9	15860.7	630.6	11329.1
Tuesday, June 06, 2006	7	36	713.0	839.4	16700.1	599.6	11928.6
Wednesday, June 07, 2006	8	38	751.0	839.5	17539.6	599.6	12528.3
Thursday, June 08, 2006	8	26	777.0	609.0	18148.6	435.0	12963.3
Friday, June 09, 2006	4	15	792.0	326.2	18474.8	233.0	13196.3
Monday, June 12, 2006	8	34	826.0	795.1	19269.9	567.9	13764.2
Tuesday, June 13, 2006	5	22	848.0	519.7	19789.6	371.2	14135.4
Wednesday, June 14, 2006	6	13	861.0	304.7	20094.3	217.6	14353.1
Thursday, June 15, 2006	6	28	889.0	653.4	20747.7	466.7	14819.8
Friday, June 16, 2006	6	22	911.0	513.4	21261.1	366.7	15186.5
Monday, June 19, 2006	3	7	918.0	164.3	21425.4	117.4	15303.9
Tuesday, June 20, 2006	3	14	932.0	324.3	21749.7	231.6	15535.5
Wednesday, June 21, 2006	4	4	936.0	94.2	21843.9	67.3	15602.8
Daily Average:	6.8	27.5	N/A	642.5	N/A	458.9	N/A
Total:	N/A	936	N/A	21843.9	N/A	15602.8	N/A

*1.4 Tons Per Cubic Yard

ATTACHMENT B:

SUMMARY OF GEORGE E. DAVIS SITE PROJECT SPECIFIC BILL-OF-LADING ISSUED

Date:	Number of Vehicles:	Total Loads Shipped:	Accumulated Loads:	Daily Tare Tons:	Accumulated Tons:	*Daily Cubic Yards:	*Accumulated yd ³ :
Tuesday, May 02, 2006	7	23	23.0	527.0	527.0	415.0	415.0
Wednesday, May 03, 2006	7	28	51.0	643.6	1170.6	506.8	921.7
Thursday, May 04, 2006	8	34	85.0	796.8	1967.4	627.4	1549.1
Friday, May 05, 2006	7	28	113.0	654.4	2621.8	515.3	2064.4
Monday, May 08, 2006	7	32	145.0	754.0	3375.8	593.7	2658.1
Tuesday, May 09, 2006	8	32	177.0	753.6	4129.4	593.4	3251.5
Wednesday, May 10, 2006	8	32	209.0	756.2	4885.6	595.4	3846.9
Thursday, May 11, 2006	8	32	241.0	759.4	5645.0	598.0	4444.9
Friday, May 12, 2006	8	31	272.0	738.5	6383.5	581.5	5026.4
Monday, May 15, 2006	8	32	304.0	760.0	7143.5	598.4	5624.8
Tuesday, May 16, 2006	6	23	327.0	541.0	7684.5	426.0	6050.8
Wednesday, May 17, 2006	7	31	358.0	749.2	8433.7	589.9	6640.7
Thursday, May 18, 2006	8	34	392.0	798.4	9232.1	628.7	7269.4
Friday, May 19, 2006	8	32	424.0	739.8	9971.9	582.5	7851.9
Monday, May 22, 2006	8	20	444.0	466.7	10438.6	367.5	8219.4
Tuesday, May 23, 2006	8	33	477.0	769.5	11208.1	605.9	8825.3
Wednesday, May 24, 2006	8	40	517.0	928.9	12137.0	731.4	9556.7
Thursday, May 25, 2006	No Loads Shipped Due To UMETCO Facility Shut-Down; De-contamination Pad Repair Activities						
Friday, May 26, 2006	No Loads Shipped Due To UMETCO Facility Shut-Down; De-contamination Pad Repair Activities						
Tuesday, May 30, 2006	6	15	532.0	347.5	12484.5	273.6	9830.3
Wednesday, May 31, 2006	6	32	564.0	745.3	13229.8	586.9	10417.2
Thursday, June 01, 2006	8	40	604.0	931.3	14161.1	733.3	11150.5
Friday, June 02, 2006	7	35	639.0	816.7	14977.8	643.1	11793.5
Monday, June 05, 2006	7	38	677.0	882.9	15860.7	695.2	12488.7
Tuesday, June 06, 2006	7	36	713.0	839.4	16700.1	660.9	13149.7
Wednesday, June 07, 2006	8	38	751.0	839.5	17539.6	661.0	13810.7
Thursday, June 08, 2006	8	26	777.0	609.0	18148.6	479.5	14290.2
Friday, June 09, 2006	4	15	792.0	326.2	18474.8	256.9	14547.1
Monday, June 12, 2006	8	34	826.0	795.1	19269.9	626.1	15173.1
Tuesday, June 13, 2006	5	22	848.0	519.7	19789.6	409.2	15582.4
Wednesday, June 14, 2006	6	13	861.0	304.7	20094.3	239.9	15822.3
Thursday, June 15, 2006	6	28	889.0	653.4	20747.7	514.5	16336.8
Friday, June 16, 2006	6	22	911.0	513.4	21261.1	404.3	16741.0
Monday, June 19, 2006	3	7	918.0	164.3	21425.4	129.4	16870.4
Tuesday, June 20, 2006	3	14	932.0	324.3	21749.7	255.4	17125.7
Wednesday, June 21, 2006	4	4	936.0	94.2	21843.9	74.2	17199.9
Daily Average:	6.8	27.5	N/A	642.5	N/A	458.9	N/A
Total:	N/A	936	N/A	21843.9	N/A	17199.9	N/A

*1.27 Tons Per cubic Yard

ATTACHMENT B:

ATTACHMENT C

**PRE-REMEDICATION DAVIS MILL SITE
TOPOGRAPHICAL SURVEY DRAWING**

**THIS PAGE IS AN
OVERSIZED DRAWING OR
FIGURE,**

**THAT CAN BE VIEWED AT THE
RECORD TITLED:**

**PROJECT NO.: 06-0021S, SHEET 1 OF 1
“TOPOGRAPHICAL MAP GATEWAY
PROJECT MESA COUNTY, CO.”**

**WITHIN THIS PACKAGE... OR,
BY SEARCHING USING THE
DOCUMENT/REPORT
PROJECT NO.: 06-0021S**

D-01

ATTACHMENT D

**POST-REMEDICATION DAVIS MILL SITE
TOPOGRAPHICAL SURVEY DRAWING
WITH
CUT/FILL VOLUME CALCULATION**

**THIS PAGE IS AN
OVERSIZED DRAWING OR
FIGURE,
THAT CAN BE VIEWED AT THE
RECORD TITLED:
PROJECT NO.: 06-0021S, SHEET 1 OF 1
“SITE VOLUMES GATEWAY PROJECT
MESA COUNTY, CO.”**

**WITHIN THIS PACKAGE... OR,
BY SEARCHING USING THE
DOCUMENT/REPORT
PROJECT NO.: 06-0021S**

D-02

ATTACHMENT E

**FINAL STATUS SURVEY
SOIL
AND
WATER SAMPLING RESULTS**

DAVIS MILL SITE REMEDIATION PROJECT, GATEWAY, CO

ANALYTICAL SOIL SAMPLE RESULTS FOR Ra-226

Analyzed by

MFG INC. in the On-site Soils Laboratory

Sample Description	Sample ID	Latitude (North, dd)	Longitude (West, dd)	Date Collected	Canned Sample Weight (g)	Ra-226 (pCi/g)
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FINAL STATUS BACKGROUND SAMPLES

South Meadow*	GWB-1	38.678960	108.97763	5/4/2006	130.1	2.1
South Meadow*	GWB-2	38.679220	108.97714	5/4/2006	114.8	2.2
South Meadow*	GWB-3	38.678700	108.97788	5/4/2006	124.5	2.2
South Meadow*	GWB-4	38.678480	108.97812	5/4/2006	132.1	1.9
South Meadow	GWB-5	38.678250	108.97768	5/4/2006	137.4	1.9
South Meadow	GWB-6	38.678600	108.97739	5/4/2006	131.4	1.9
South Meadow	GWB-7	38.678410	108.97683	5/4/2006	147.5	1.8
South Meadow	GWB-8	38.678860	108.97682	5/4/2006	139.3	2.1
South Meadow	GWB-9	38.679820	108.97597	5/4/2006	165.8	1.8
South Meadow	GWB-10	38.679470	108.97626	5/4/2006	157.6	1.9
South Meadow	GWB-11	38.679200	108.97600	5/4/2006	170.4	1.9
South Meadow	GWB-12	38.679180	108.97542	5/4/2006	116.0	2.1
South Meadow	GWB-13	38.678780	108.97533	5/4/2006	121.5	2.0
South Meadow	GWB-14	38.678540	108.97537	5/4/2006	126.2	2.0
South Meadow	GWB-15	38.678130	108.97602	5/4/2006	137.7	2.0
South Meadow	GWB-16	38.677750	108.97602	5/4/2006	148.0	1.8
South Meadow	GWB-17	38.678010	108.97672	5/4/2006	139.7	1.8
South Meadow	GWB-18	38.678750	108.97607	5/4/2006	134.0	2.0
South Meadow	GWB-19	38.679550	108.97663	5/4/2006	149.6	2.2
South Meadow	GWB-20	38.680230	108.97646	5/4/2006	104.9	2.6
South Meadow	GWB-21	38.680510	108.97647	5/4/2006	107.5	2.2
South Meadow	GWB-22	38.680660	108.97657	5/4/2006	127.2	2.2
South Meadow	GWB-23	38.680940	108.97691	5/4/2006	126.2	2.2
South Meadow	GWB-24	38.681140	108.97713	5/4/2006	112.8	2.4
South Meadow	GWB-25	38.679810	108.97627	5/10/2006	148.0	2.0
South Meadow	GWB-26	38.679180	108.97634	5/10/2006	146.4	2.1
South Meadow	GWB-27	38.678680	108.97614	5/10/2006	108.2	2.3
South Meadow	GWB-28	38.678700	108.97696	5/10/2006	147.3	2.1

FINAL STATUS SAMPLES FOR SURVEY UNIT 1

SU1-1	SU1-1	38.681050	108.97731	6/14/2006	163.7	2.3
SU1-2	SU1-2	38.680870	108.97715	6/14/2006	184.7	2.1
SU1-3	SU1-3	38.680690	108.97704	6/14/2006	199.2	2.9
SU1-4	SU1-4	38.680500	108.97694	6/13/2006	178.7	2.0
SU1-5	SU1-5	38.680320	108.97681	6/13/2006	177.4	2.1
SU1-6	SU1-6	38.680100	108.97664	6/13/2006	182.0	2.5
SU1-6 (split)**	SU1-6 (split)			6/13/2006	176.5	2.4
SU1-7	SU1-7	38.680670	108.97729	6/14/2006	164.8	2.5
SU1-8	SU1-8	38.680460	108.97720	6/13/2006	170.5	2.2
SU1-9	SU1-9	38.680280	108.97708	6/13/2006	199.6	2.1
SU1-10	SU1-10	38.680020	108.97689	6/13/2006	187	1.7
SU1-11	SU1-11	38.680290	108.97742	6/13/2006	172.4	2.0
SU1-11 (2nd count)**	SU1-11 (2)			6/13/2006	172.4	1.9
SU1-12	SU1-12	38.680110	108.97729	6/13/2006	171.1	2.0
SU1-13	SU1-13	38.679940	108.97714	6/13/2006	215.4	3.5
SU1-14	SU1-14	38.680320	108.97756	6/13/2006	195	2.0
SU1-15	SU1-15	38.680150	108.97754	6/13/2006	146.4	2.2
SU1-16	SU1-16	38.679980	108.97745	6/13/2006	186.1	2.0
SU1-17	SU1-17	38.680240	108.97781	6/13/2006	184.6	9.1
SU1-18	SU1-18	38.680030	108.97778	6/13/2006	181	2.1
SU1-19	SU1-19	38.679840	108.97765	6/13/2006	203.3	2.0
SU1-20	SU1-20	38.680130	108.97800	6/13/2006	152.5	2.9
SU1-21	SU1-21	38.679890	108.97795	6/13/2006	175.8	2.1
SU1-21 (2nd count)**	SU1-21 (2)			6/13/2006	175.8	2.2
SU1-22	SU1-22	38.679730	108.97786	6/13/2006	190.9	2.1

*Not used in statistical analyses as background samples due to proximity to impacted areas

** Duplicate or split samples not used in statistical analyses. Composite samples not used in MARSSIM analyses

Sample Description	Sample ID	Latitude (North, dd)	Longitude (West, dd)	Date Collected	Canned Sample Weight (g)	Ra-226 (pCi/g)
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FINAL STATUS SAMPLES FOR SURVEY UNIT 2

SU2-1	SU2-1	38.681200	108.97809	6/14/2006	114.2	2.1
SU2-2	SU2-2	38.681330	108.97794	6/14/2006	153.4	3.3
SU2-3	SU2-3	38.681400	108.97784	6/14/2006	145.6	3.0
SU2-4	SU2-4	38.681430	108.97763	6/14/2006	126.8	16.7
SU2-4 (2nd count)**	SU2-4 (2)			6/14/2006	126.8	19.1
SU2-5	SU2-5	38.681520	108.97751	6/14/2006	172	3.1
SU2-6	SU2-6	38.681410	108.97742	6/14/2006	144.8	2.6
SU2-7	SU2-7	38.681300	108.97756	6/14/2006	148.5	2.1
SU2-8	SU2-8	38.681250	108.97775	6/14/2006	181.4	2.9
SU2-9	SU2-9	38.681130	108.97790	6/14/2006	139.9	2.0
SU2-10	SU2-10	38.681010	108.97791	6/14/2006	163.3	2.4
SU2-11	SU2-11	38.681120	108.97772	6/14/2006	130.8	2.1
SU2-12	SU2-12	38.681210	108.97755	6/14/2006	129.1	2.3
SU2-13	SU2-13	38.681210	108.97750	6/14/2006	125.5	3.9
SU2-14	SU2-14	38.681290	108.97731	6/14/2006	147.3	3.2
SU2-15	SU2-15	38.681180	108.97720	6/14/2006	105.9	4.7
SU2-16	SU2-16	38.681120	108.97730	6/14/2006	120.2	13.6
SU2-17	SU2-17	38.681090	108.97752	6/14/2006	137.9	2.6
SU2-18	SU2-18	38.680980	108.97762	6/14/2006	167.7	2.2
SU2-19	SU2-19	38.680850	108.97764	6/14/2006	119.8	2.2
SU2-19 (Split)**	SU2-19 (split)			6/14/2006	119.8	2.5
SU2-20	SU2-20	38.680890	108.97752	6/14/2006	125.2	2.9
SU2-21	SU2-21	38.680810	108.97733	6/14/2006	174.7	3.8
SU2-21 (2nd count)**	SU2-21 (2)			6/14/2006	174.7	3.6
SU2-22	SU2-22	38.680720	108.97744	6/14/2006	150.5	2.4

FINAL STATUS SAMPLES FOR SURVEY UNIT 3

SU3-1	SU3-1	38.680240	108.97830	6/18/2006	149.2	2.3
SU3-2	SU3-2	38.680330	108.97816	6/18/2006	163.5	2.3
SU3-3	SU3-3	38.680460	108.97797	6/18/2006	163.6	2.0
SU3-4	SU3-4	38.680570	108.97781	6/18/2006	173.8	12.6
SU3-5	SU3-5	38.680690	108.97766	6/18/2006	146	3.0
SU3-6	SU3-6	38.680740	108.97773	6/18/2006	123.1	3.4
SU3-7	SU3-7	38.680690	108.97793	6/18/2006	166.8	2.5
SU3-8	SU3-8	38.680600	108.97812	6/18/2006	142.0	2.6
SU3-8 (2nd count)**	SU3-8 (2)			6/18/2006	142.0	2.6
SU3-9	SU3-9	38.680480	108.97829	6/18/2006	174.2	1.9
SU3-10	SU3-10	38.680400	108.97844	6/18/2006	140.7	2.2
SU3-11	SU3-11	38.680520	108.97857	6/18/2006	172.2	1.9
SU3-12	SU3-12	38.680620	108.97840	6/18/2006	171.3	2.2
SU3-12 (Split)**	SU3-12 (Split)			6/18/2006	133	2.0
SU3-13	SU3-13	38.680740	108.97827	6/18/2006	170.5	2.4
SU3-14	SU3-14	38.680860	108.97808	6/18/2006	131.7	2.6
SU3-15	SU3-15	38.680950	108.97792	6/18/2006	150.6	9.9
SU3-16	SU3-16	38.681050	108.97804	6/18/2006	168.2	2.2
SU3-17	SU3-17	38.680970	108.97820	6/18/2006	132.1	2.1
SU3-18	SU3-18	38.680870	108.97839	6/18/2006	153.4	2.1
SU3-19	SU3-19	38.680740	108.97851	6/18/2006	168.6	2.1
SU3-20	SU3-20	38.680630	108.97867	6/18/2006	161.5	2.8
SU3-21	SU3-21	38.680770	108.97879	6/18/2006	158.4	2.6
SU3-22	SU3-22	38.680870	108.97862	6/18/2006	155	3.8
SU3-23	SU3-23	38.681000	108.97850	6/18/2006	156.5	3.0
SU3-24	SU3-24	38.681090	108.97831	6/18/2006	138.9	2.1

*Not used in statistical analyses as background samples due to proximity to impacted areas

** Duplicate or split samples not used in statistical analyses. Composite samples not used in MARSSIM analyses

Sample Description	Sample ID	Latitude (North, dd)	Longitude (West, dd)	Date Collected	Canned Sample Weight (g)	Ra-226 (pCi/g)
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FINAL STATUS SAMPLES FOR SURVEY UNIT 4

SU4-1	SU4-1	38.679360	108.97948	6/21/2006	176	2.3
SU4-1 (2nd count)**	SU4-1 (2)			6/21/2006	176	2.1
SU4-2	SU4-2	38.679260	108.97937	6/21/2006	171.1	2.4
SU4-3	SU4-3	38.679130	108.97926	6/21/2006	158.5	2.5
SU4-4	SU4-4	38.679260	108.97909	6/21/2006	146.4	2.8
SU4-5	SU4-5	38.679370	108.97919	6/21/2006	135.5	3.2
SU4-6	SU4-6	38.679490	108.97931	6/21/2006	113.6	2.9
SU4-7	SU4-7	38.679580	108.97915	6/21/2006	124.5	14.3
SU4-8	SU4-8	38.679450	108.97906	6/21/2006	178.9	2.2
SU4-9	SU4-9	38.679350	108.97893	6/21/2006	128.4	10.4
SU4-10	SU4-10	38.679440	108.97876	6/21/2006	165.8	18.8
SU4-11	SU4-11	38.679570	108.97887	6/21/2006	149.3	47.1
SU4-12	SU4-12	38.679720	108.97896	6/21/2006	185.8	4.0
SU4-13	SU4-13	38.679800	108.97882	6/21/2006	167.3	4.5
SU4-14	SU4-14	38.679670	108.97872	6/21/2006	172.2	11.5
SU4-15	SU4-15	38.679550	108.97861	6/21/2006	138	220.8
SU4-16	SU4-16	38.679600	108.97849	6/21/2006	143.1	4.3
SU4-17	SU4-17	38.679760	108.97857	6/21/2006	166.8	31.7
SU4-18	SU4-18	38.679890	108.97869	6/21/2006	124.7	3.6
SU4-19	SU4-19	38.679960	108.97849	6/22/2006	150.1	2.4
SU4-20	SU4-20	38.679840	108.97839	6/22/2006	165.9	1.7
SU4-21	SU4-21	38.679830	108.97809	6/22/2006	174.3	9.8
SU4-22	SU4-22	38.679950	108.97823	6/22/2006	154.7	1.7
SU4-23	SU4-23	38.680070	108.97837	6/22/2006	168.5	2.0
SU4-24 (hot spot composite)**	SU4-24	38.679520	108.97872	6/21/2006	161	69.6

FINAL STATUS SAMPLES FOR SURVEY UNIT 5

SU5-1	SU5-1	38.679170	108.97912	6/16/2006	121	2.2
SU5-2	SU5-2	38.679010	108.97897	6/16/2006	129.3	2.1
SU5-3	SU5-3	38.678910	108.97887	6/16/2006	140.1	2.1
SU5-4	SU5-4	38.679000	108.97865	6/16/2006	131.0	2.6
SU5-5	SU5-5	38.679120	108.97876	6/16/2006	123.9	11.0
SU5-6	SU5-6	38.679270	108.97890	6/16/2006	103.1	13.5
SU5-6 (2nd count)**	SU5-6 (2)			6/16/2006	103.1	10.7
SU5-7	SU5-7	38.679350	108.97868	6/16/2006	158.9	3.8
SU5-8	SU5-8	38.679230	108.97855	6/16/2006	183.6	3.4
SU5-9	SU5-9	38.679080	108.97841	6/16/2006	110.9	14.3
SU5-10	SU5-10	38.679140	108.97823	6/16/2006	152.5	2.1
SU5-11	SU5-11	38.679290	108.97832	6/16/2006	158.1	2.2
SU5-12	SU5-12	38.679430	108.97845	6/16/2006	148.5	29.1
SU5-13	SU5-13	38.679500	108.97825	6/16/2006	184.9	1.8
SU5-14	SU5-14	38.679360	108.97816	6/16/2006	127	4.2
SU5-15	SU5-15	38.679180	108.97805	6/16/2006	162.3	1.9
SU5-16	SU5-16	38.679220	108.97787	6/16/2006	160.3	2.1
SU5-17	SU5-17	38.679410	108.97799	6/16/2006	161.4	51.9
SU5-18	SU5-18	38.679580	108.97803	6/16/2006	181.2	1.8
SU5-18 (2nd count)**	SU5-18 (2)			6/16/2006	181.2	1.9
SU5-19	SU5-19	38.679640	108.97777	6/16/2006	176.9	2.8
SU5-20	SU5-20	38.679490	108.97776	6/16/2006	178.9	3.8
SU5-21	SU5-21	38.679290	108.97768	6/16/2006	74.9	10.3
SU5-22	SU5-22	38.679470	108.97741	6/16/2006	180	3.1
SU5-23	SU5-23	38.678960	108.97814	6/16/2006	104.2	4.3
SU5-24	SU5-24	38.678910	108.97836	6/16/2006	141.3	2.0
SU5-25	SU5-25	38.678850	108.97854	6/16/2006	134.9	2.1
SU5-26 (hot spot composite 1)**	SU5-26	38.678930	108.97837	6/16/2006	146.9	3.4
SU5-26 (2nd count)**	SU5-26 (2)			6/16/2006	146.9	3.2
SU5-27 (hot spot composite 2)**	SU5-27	38.679320	108.97833	6/16/2006	134.7	3.5
SU5-28 (hot spot composite 3)**	SU5-28	38.679490	108.97861	6/16/2006	149.5	81.8

*Not used in statistical analyses as background samples due to proximity to impacted areas

** Duplicate or split samples not used in statistical analyses. Composite samples not used in MARSSIM analyses

Sample Description	Sample ID	Latitude (North, dd)	Longitude (West, dd)	Date Collected	Canned Sample Weight (g)	Ra-226 (pCi/g)
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Survey Unit Hot Spot Characterization Samples

SU1-HS1-1	SU1-HS1-1	38.680240	108.97781	7/24/2007	175.0	2.3
SU1-HS1-2	SU1-HS1-2			7/24/2007	170.3	3.1
SU1-HS1-3	SU1-HS1-3			7/24/2007	183.5	3.2
SU1-HS1-4	SU1-HS1-4			7/24/2007	168.7	4.7
SU1-HS1-5	SU1-HS1-5			7/24/2007	180.1	10.1

SU2-HS1-1	SU2-HS1-1	38.681430	108.97763	7/17/2006	141.7	4.5
SU2-HS1-2	SU2-HS1-2			7/17/2006	129.7	4.3
SU2-HS1-3	SU2-HS1-3			7/17/2006	104.8	4.3
SU2-HS1-4	SU2-HS1-4			7/17/2006	109.3	3.3
SU2-HS1-5	SU2-HS1-5			7/17/2006	114.7	3.1
SU2-HS1-6	SU2-HS1-6			7/17/2006	120.1	3.3
SU2-HS1-7	SU2-HS1-7			7/17/2006	119.5	3.1
SU2-HS1-8	SU2-HS1-8			7/17/2006	132.3	3.2
SU2-HS1-9	SU2-HS1-9			7/17/2006	148.7	3.2

SU2-HS2-1	SU2-HS2-1	38.681120	108.97730	7/19/2006	162.3	3.0
SU2-HS2-2	SU2-HS2-2			7/19/2006	174.7	4.0
SU2-HS2-3	SU2-HS2-3			7/19/2006	141.6	22.1
SU2-HS2-4	SU2-HS2-4			7/19/2006	148.2	4.0
SU2-HS2-5	SU2-HS2-5			7/19/2006	125.3	4.5
SU2-HS2-6	SU2-HS2-6			7/19/2006	122.9	7.3
SU2-HS2-7	SU2-HS2-7			7/19/2006	138.4	4.6
SU2-HS2-8	SU2-HS2-8			7/19/2006	108.2	3.0
SU2-HS2-9	SU2-HS2-9			7/19/2006	128.6	3.1
SU2-HS2-10	SU2-HS2-10			7/19/2006	138.7	3.5

SU3-HS1-1	SU3-HS1-1	38.680950	108.97792	7/20/2007	176.6	2.2
SU3-HS1-2	SU3-HS1-2			7/20/2007	158.2	7.4
SU3-HS1-3	SU3-HS1-3			7/20/2007	171.3	7.4
SU3-HS1-4	SU3-HS1-4			7/20/2007	171.1	2.3
SU3-HS1-5	SU3-HS1-5			7/20/2007	168.0	7.3

SU3-HS2-1	SU3-HS2-1	38.680730	108.97789	7/20/2007	174.7	7.1
SU3-HS2-2	SU3-HS2-2			7/20/2007	143.8	3.1
SU3-HS2-3	SU3-HS2-3			7/20/2007	167.8	13.5
SU3-HS2-4	SU3-HS2-4			7/20/2007	177.6	4.2
SU3-HS2-5	SU3-HS2-5			7/20/2007	190.2	2.8
SU3-HS2-6	SU3-HS2-6			7/20/2007	154.9	10.0
SU3-HS2-7	SU3-HS2-7			7/20/2007	156.4	45.5
SU3-HS2-8	SU3-HS2-8			7/20/2007	161.0	3.8
SU3-HS2-9	SU3-HS2-9			7/20/2007	147.2	2.6
SU3-HS2-10	SU3-HS2-10			7/20/2007	159.2	9.1

SU3-HS3-1	SU3-HS3-1	38.680570	108.97781	7/20/2007	150.4	30.7
SU3-HS3-2	SU3-HS3-2			7/20/2007	175.6	6.8
SU3-HS3-3	SU3-HS3-3			7/20/2007	176.4	3.1
SU3-HS3-4	SU3-HS3-4			7/20/2007	162.4	4.3
SU3-HS3-5	SU3-HS3-5			7/20/2007	173.1	7.6

FINAL STATUS SUB-SURFACE SAMPLES

Willis Root Cellar Depth Profile 0-1'	WRC-DP-1	38.681340	108.97754	6/11/2006	157.1	3.3
Willis Root Cellar Depth Profile 1-2'	WRC-DP-2			6/11/2006	157.6	2.2
Arthur's Trailer Depth Profile 0-1'	AT-DP-1	38.680950	108.97747	6/11/2006	159.0	2.1
Arthur's Trailer Depth Profile 1-2'	AT-DP-2			6/11/2006	148.9	3.0
Arthur's Trailer Depth Profile 2-3'	AT-DP-3			6/11/2006	156.9	4.5
Arthur's Trailer Depth Profile 3-4'	AT-DP-4			6/11/2006	189.5	1.9
Trailer Court Deep Pit 0-2'	TC-DP-1	38.680900	108.97797	6/11/2006	155.4	4.4
Trailer Court Deep Pit 2-4'	TC-DP-2 (2nd)			6/14/2006	120.0	2.0
Trailer Court Deep Pit 4-6'	TC-DP-3			6/11/2006	178.3	2.0

DAVIS MILL SITE REMEDIATION PROJECT, GATEWAY, CO
ANALYTICAL SOIL AND WATER SAMPLE RESULTS

Analyzed by

ENERGY LABORATORIES INC.
(CASPER, WY)

REPORTING TERMS:

GAMMA – Analysis by high purity germanium (HPGe) gamma spectroscopy

CHEM – Analyses involving wet radiochemical methods

PQL = Practical Quantitation Limit, data above this value is considered to be reliable and reproducible within standard limits

MDL = Method Detection Limit, this is the statistical lowest limit of the measurement method determined in clean laboratory matrices. Data above this value, yet less than the PQL is deemed to be 'estimated'

Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
GWB-8	5/4/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Bismuth 214	GAMMA	1.4	0.4	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Radium 226	GAMMA	1.4	0.4	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-8	5/4/2006	Soil	USDA26	Moisture		0.8	0	0.1	0	%	8/22/2006
GWB-8	5/4/2006	Soil	E900.0	Gross Beta	CHEM	25.8	0.7	2	1	pCi/g-dry	8/23/2006
GWB-8	5/4/2006	Soil	E903.0	Radium 226	CHEM	0.6	0.1	0.01	0.01	pCi/g-dry	8/28/2006
GWB-8	5/4/2006	Soil	E900.0	Gross Alpha	CHEM	5.3	0.6	1	0.5	pCi/g-dry	8/23/2006
GWB-8	5/4/2006	Soil	SW6020	Uranium, Natural	CHEM	0.74		0.02	0.02	pCi/g-dry	8/24/2006
Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
GWB-20	5/4/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Bismuth 214	GAMMA	2.8	0.5	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Radium 226	GAMMA	2.8	0.5	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
GWB-20	5/4/2006	Soil	USDA26	Moisture		1.3		0.1	0	%	8/22/2006

Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU1-12	6/14/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Bismuth 214	GAMMA	1.6	0.3	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Radium 226	GAMMA	1.6	0.3	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-12	6/14/2006	Soil	USDA26	Moisture		1.7		0.1	0	%	8/22/2006
Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU1-17	6/14/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Bismuth 214	GAMMA	7.4	1	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Radium 226	GAMMA	7.4	1	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU1-17	6/14/2006	Soil	USDA26	Moisture		0.8		0.1	0	%	8/22/2006
SU1-17	6/14/2006	Soil	E900.0	Gross Alpha	CHEM	43.9	1.2	1	0.5	pCi/g-dry	8/23/2006
SU1-17	6/14/2006	Soil	E900.0	Gross Beta	CHEM	58.4	0.9	2	1	pCi/g-dry	8/23/2006
SU1-17	6/14/2006	Soil	E903.0	Radium 226	CHEM	6	0.3	0.01	0.01	pCi/g-dry	8/28/2006
SU1-17	6/14/2006	Soil	SW6020	Uranium, Natural	CHEM	9.41		0.02	0.02	pCi/g-dry	8/24/2006

Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU2-4	6/14/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Bismuth 214	GAMMA	17.9	2.1	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Radium 226	GAMMA	17.9	2.1	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-4	6/14/2006	Soil	USDA26	Moisture		1.2		0.1	0	%	8/22/2006
Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU2-15	6/14/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Bismuth 214	GAMMA	8.2	1.2	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Radium 226	GAMMA	8.2	1.2	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU2-15	6/14/2006	Soil	USDA26	Moisture		0.8		0.1	0	%	8/22/2006
SU2-15	6/14/2006	Soil	E900.0	Gross Alpha	CHEM	24.4	1	1	0.5	pCi/g-dry	8/23/2006
SU2-15	6/14/2006	Soil	E900.0	Gross Beta	CHEM	39.9	0.8	2	1	pCi/g-dry	8/23/2006
SU2-15	6/14/2006	Soil	E903.0	Radium 226	CHEM	5.4	0.3	0.01	0.01	pCi/g-dry	8/28/2006
SU2-15	6/14/2006	Soil	SW6020	Uranium, Natural	CHEM	0.77		0.02	0.02	pCi/g-dry	8/24/2006

Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU3-1	6/18/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Bismuth 214	GAMMA	2.1	0.5	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Radium 226	GAMMA	2.1	0.5	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-1	6/18/2006	Soil	USDA26	Moisture		1		0.1	0	%	8/22/2006
Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU3-9	6/18/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Bismuth 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Radium 226	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-9	6/18/2006	Soil	USDA26	Moisture		0.8		0.1	0	%	8/22/2006
SU3-9	6/18/2006	Soil	E900.0	Gross Alpha	CHEM	8.2	0.7	1	0.5	pCi/g-dry	8/23/2006
SU3-9	6/18/2006	Soil	E900.0	Gross Beta	CHEM	28.4	0.7	2	1	pCi/g-dry	8/23/2006
SU3-9	6/18/2006	Soil	E903.0	Radium 226	CHEM	0.3	0.07	0.01	0.01	pCi/g-dry	8/28/2006
SU3-9	6/18/2006	Soil	SW6020	Uranium, Natural	CHEM	6.74		0.02	0.02	pCi/g-dry	8/24/2006

Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU3-22	6/18/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Bismuth 214	GAMMA	5.7	0.9	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Radium 226	GAMMA	5.7	0.9	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU3-22	6/18/2006	Soil	USDA26	Moisture		1.4		0.1	0	%	8/22/2006
SU3-22	6/18/2006	Soil	E900.0	Gross Alpha	CHEM	29.6	1	1	0.5	pCi/g-dry	8/23/2006
SU3-22	6/18/2006	Soil	E900.0	Gross Beta	CHEM	44	0.8	2	1	pCi/g-dry	8/23/2006
SU3-22	6/18/2006	Soil	E903.0	Radium 226	CHEM	4.4	0.2	0.01	0.01	pCi/g-dry	8/28/2006
SU3-22	6/18/2006	Soil	SW6020	Uranium, Natural	CHEM	6.76		0.02	0.02	pCi/g-dry	8/24/2006
Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU4-1	6/21/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Bismuth 214	GAMMA	1.6	0.4	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Radium 226	GAMMA	1.6	0.4	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-1	6/21/2006	Soil	USDA26	Moisture		0.5		0.1	0	%	8/22/2006

Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU4-7	6/21/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Bismuth 214	GAMMA	14.9	1.7	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Radium 226	GAMMA	14.9	1.7	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU4-7	6/21/2006	Soil	USDA26	Moisture		1.8		0.1	0	%	8/22/2006
Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU5-1	6/16/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Bismuth 214	GAMMA	2.2	0.5	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Radium 226	GAMMA	2.2	0.5	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-1	6/16/2006	Soil	USDA26	Moisture		0.8		0.1	0	%	8/22/2006
SU5-1	6/16/2006	Soil	E900.0	Gross Alpha	CHEM	6.9	0.6	1	0.5	pCi/g-dry	8/23/2006
SU5-1	6/16/2006	Soil	E900.0	Gross Beta	CHEM	27	0.7	2	1	pCi/g-dry	8/23/2006
SU5-1	6/16/2006	Soil	E903.0	Radium 226	CHEM	0.9	0.1	0.01	0.01	pCi/g-dry	8/28/2006
SU5-1	6/16/2006	Soil	SW6020	Uranium, Natural	CHEM	1.14		0.02	0.02	pCi/g-dry	8/24/2006

Sample ID	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	Precision (±)	PQL	MDL	Units	Analysis Date
SU5-5	6/16/2006	Soil	E901.1	Actinium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Americium 241	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Barium 133	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Bismuth 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Bismuth 214	GAMMA	12.2	1.5	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Cesium 134	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Cesium 137	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Cobalt 60	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Gross Gamma	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Iodine 125	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Iodine 131	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Lead 212	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Lead 214	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Manganese 54	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Potassium 40	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Radium 223	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Radium 224	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Radium 226	GAMMA	12.2	1.5	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Radium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Strontium 86	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Strontium 87	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Thallium 208	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Thorium 228	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Thorium 234	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	E901.1	Zinc 65	GAMMA	0	0	2	1	pCi/g-dry	7/17/2006
SU5-5	6/16/2006	Soil	USDA26	Moisture		1		0.1	0	%	8/22/2006
SU5-5	6/16/2006	Soil	E900.0	Gross Alpha	CHEM	36.2	1.1	1	0.5	pCi/g-dry	8/23/2006
SU5-5	6/16/2006	Soil	E900.0	Gross Beta	CHEM	45.9	0.8	2	1	pCi/g-dry	8/23/2006
SU5-5	6/16/2006	Soil	E903.0	Radium 226	CHEM	6.8	0.3	0.01	0.01	pCi/g-dry	8/28/2006
SU5-5	6/16/2006	Soil	SW6020	Uranium, Natural	CHEM	4.48		0.02	0.02	pCi/g-dry	8/24/2006

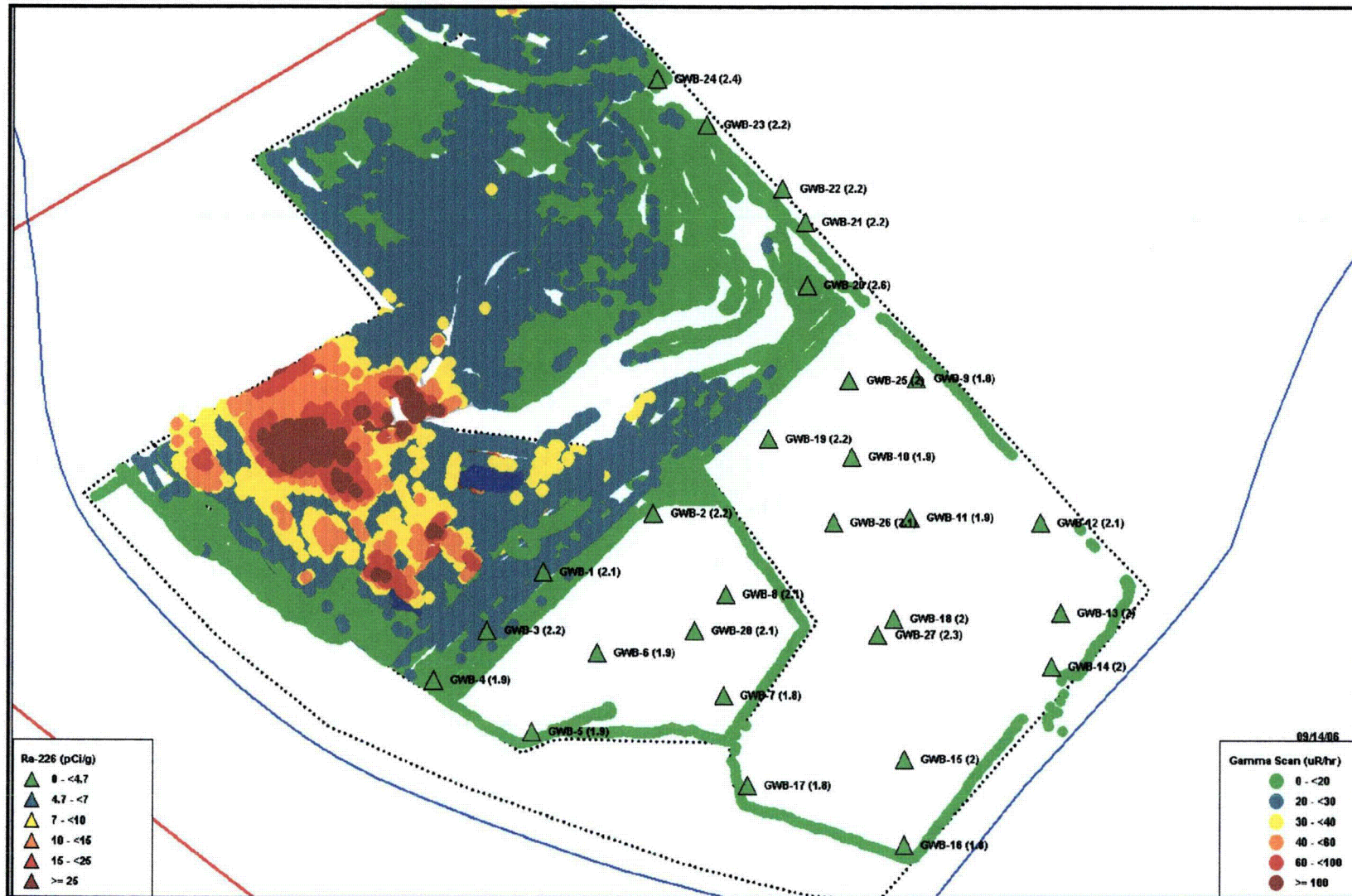
Sample ID	Latitude (North, dd)	Longitude (West, dd)	Collection Date	Matrix	Test No	Analyte	Test Type	Final Value	PQL	Units
Well 1	38.67982	108.97871	6/20/2006	Aqueous	A4500-Cl B	Chloride	DIS	43	1	mg/L
Well 1			6/20/2006	Aqueous	E900.0	Gross Alpha	DIS	126	1	pCi/L
Well 1			6/20/2006	Aqueous	E900.0	Gross Beta	DIS	52.8	2	pCi/L
Well 1			6/20/2006	Aqueous	E353.2	Nitrogen, Nitrate+Nitrite as N	DIS	290	3	mg/L
Well 1			6/20/2006	Aqueous	A4500-NO2 B	Nitrogen, Nitrite as N	DIS	<0.1	0.1	mg/L
Well 1			6/20/2006	Aqueous	A4500-H B	pH	DIS	3.37	0.01	s.u.
Well 1			6/20/2006	Aqueous	E903.0	Radium 226	TOT	<0.2	0.2	pCi/L
Well 1			6/20/2006	Aqueous	A4500-SO4 E	Sulfate	DIS	58	1	mg/L
Well 1			6/20/2006	Aqueous	E200.8	Uranium	TOT	0.163	0.0003	mg/L
Well 2	38.67960	108.97897	6/20/2006	Aqueous	A4500-Cl B	Chloride	DIS	8	1	mg/L
Well 2			6/20/2006	Aqueous	E900.0	Gross Alpha	DIS	58.8	1	pCi/L
Well 2			6/20/2006	Aqueous	E900.0	Gross Beta	DIS	28.6	2	pCi/L
Well 2			6/20/2006	Aqueous	E353.2	Nitrogen, Nitrate+Nitrite as N	DIS	249	3	mg/L
Well 2			6/20/2006	Aqueous	A4500-NO2 B	Nitrogen, Nitrite as N	DIS	<0.1	0.1	mg/L
Well 2			6/20/2006	Aqueous	A4500-H B	pH	DIS	3.06	0.01	s.u.
Well 2			6/20/2006	Aqueous	E903.0	Radium 226	TOT	<0.2	0.2	pCi/L
Well 2			6/20/2006	Aqueous	A4500-SO4 E	Sulfate	DIS	17	1	mg/L
Well 2			6/20/2006	Aqueous	E200.8	Uranium	TOT	0.0743	0.0003	mg/L
CDOT Well	38.68029	108.97883	6/20/2006	Aqueous	A4500-Cl B	Chloride	DIS	152	1	mg/L
CDOT Well			6/20/2006	Aqueous	E900.0	Gross Alpha	DIS	45.5	1	pCi/L
CDOT Well			6/20/2006	Aqueous	E900.0	Gross Beta	DIS	17	2	pCi/L
CDOT Well			6/20/2006	Aqueous	E353.2	Nitrogen, Nitrate+Nitrite as N	DIS	240	3	mg/L
CDOT Well			6/20/2006	Aqueous	A4500-NO2 B	Nitrogen, Nitrite as N	DIS	<0.1	0.1	mg/L
CDOT Well			6/20/2006	Aqueous	A4500-H B	pH	DIS	2.9	0.01	s.u.
CDOT Well			6/20/2006	Aqueous	E903.0	Radium 226	TOT	<0.2	0.2	pCi/L
CDOT Well			6/20/2006	Aqueous	A4500-SO4 E	Sulfate	DIS	45	1	mg/L
CDOT Well			6/20/2006	Aqueous	E200.8	Uranium	TOT	0.073	0.0003	mg/L
Pond	38.67939	108.97800	6/20/2006	Aqueous	A4500-Cl B	Chloride	DIS	10	1	mg/L
Pond			6/20/2006	Aqueous	E900.0	Gross Alpha	DIS	44.4	1	pCi/L
Pond			6/20/2006	Aqueous	E900.0	Gross Beta	DIS	20.7	2	pCi/L
Pond			6/20/2006	Aqueous	E353.2	Nitrogen, Nitrate+Nitrite as N	DIS	267	3	mg/L
Pond			6/20/2006	Aqueous	A4500-NO2 B	Nitrogen, Nitrite as N	DIS	<0.1	0.1	mg/L
Pond			6/20/2006	Aqueous	A4500-H B	pH	DIS	2.58	0.01	s.u.
Pond			6/20/2006	Aqueous	E903.0	Radium 226	TOT	<0.2	0.2	pCi/L
Pond			6/20/2006	Aqueous	A4500-SO4 E	Sulfate	DIS	13	1	mg/L
Pond			6/20/2006	Aqueous	E200.8	Uranium	TOT	0.0223	0.0003	mg/L

ATTACHMENT F

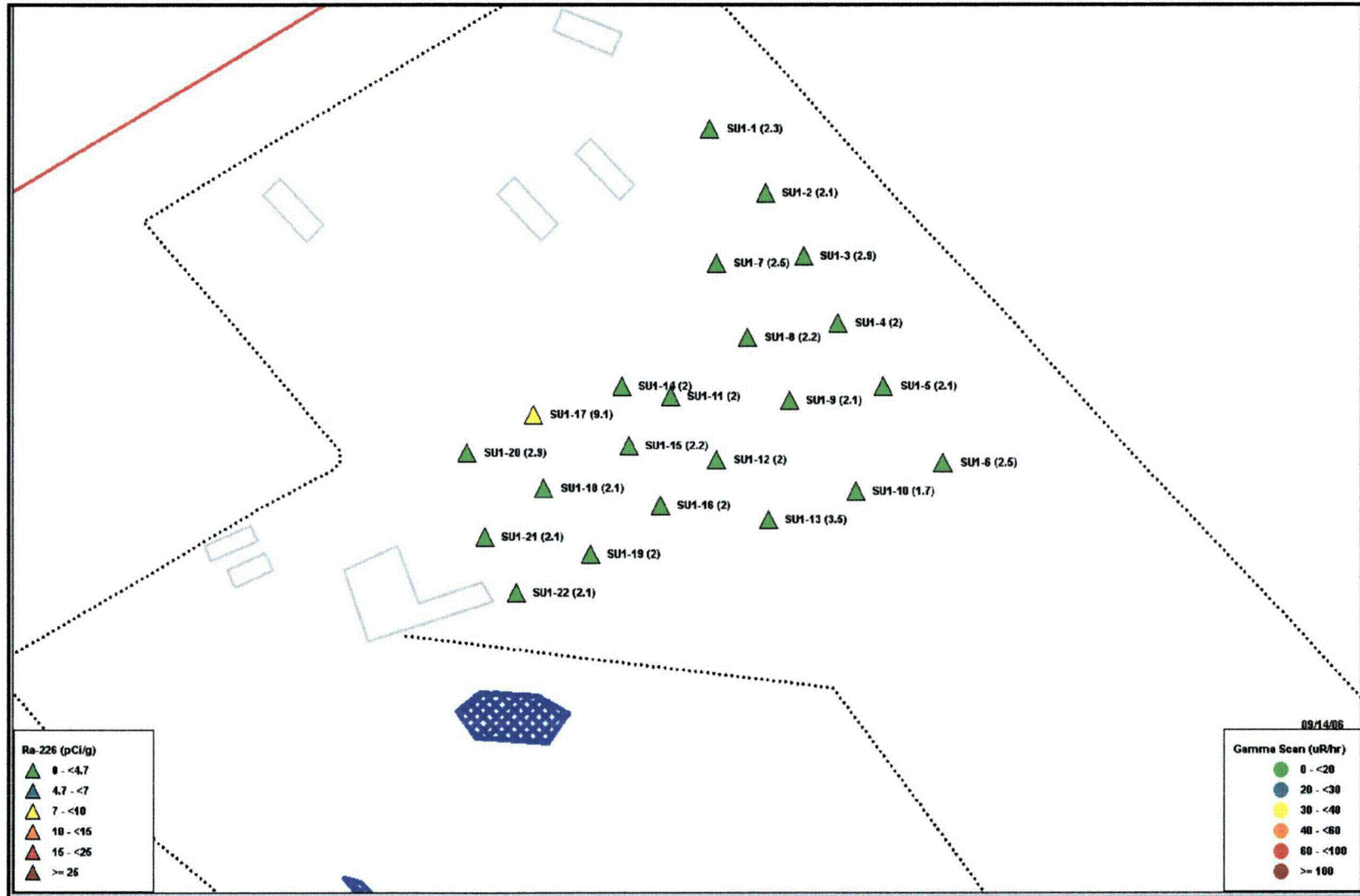
**FINAL STATUS SURVEY: MAPS
OF
SURFACE SOIL SAMPLING
LOCATION AND RESULTS**

MAPS OF SURFACE SOIL SAMPLING LOCATIONS

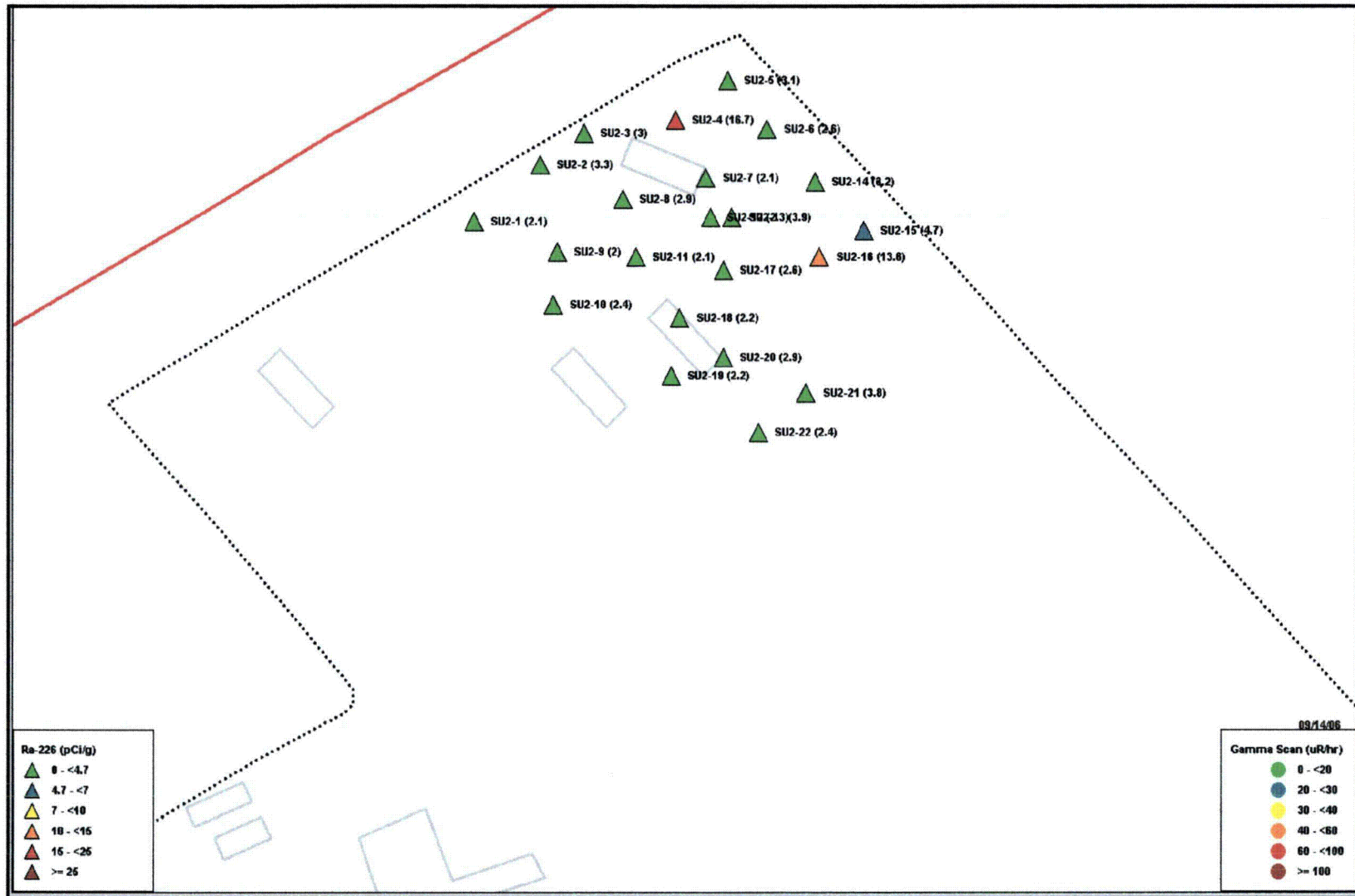
Background Reference Area: Final Status Surface Soil Sampling Locations and Ra-226 Concentrations



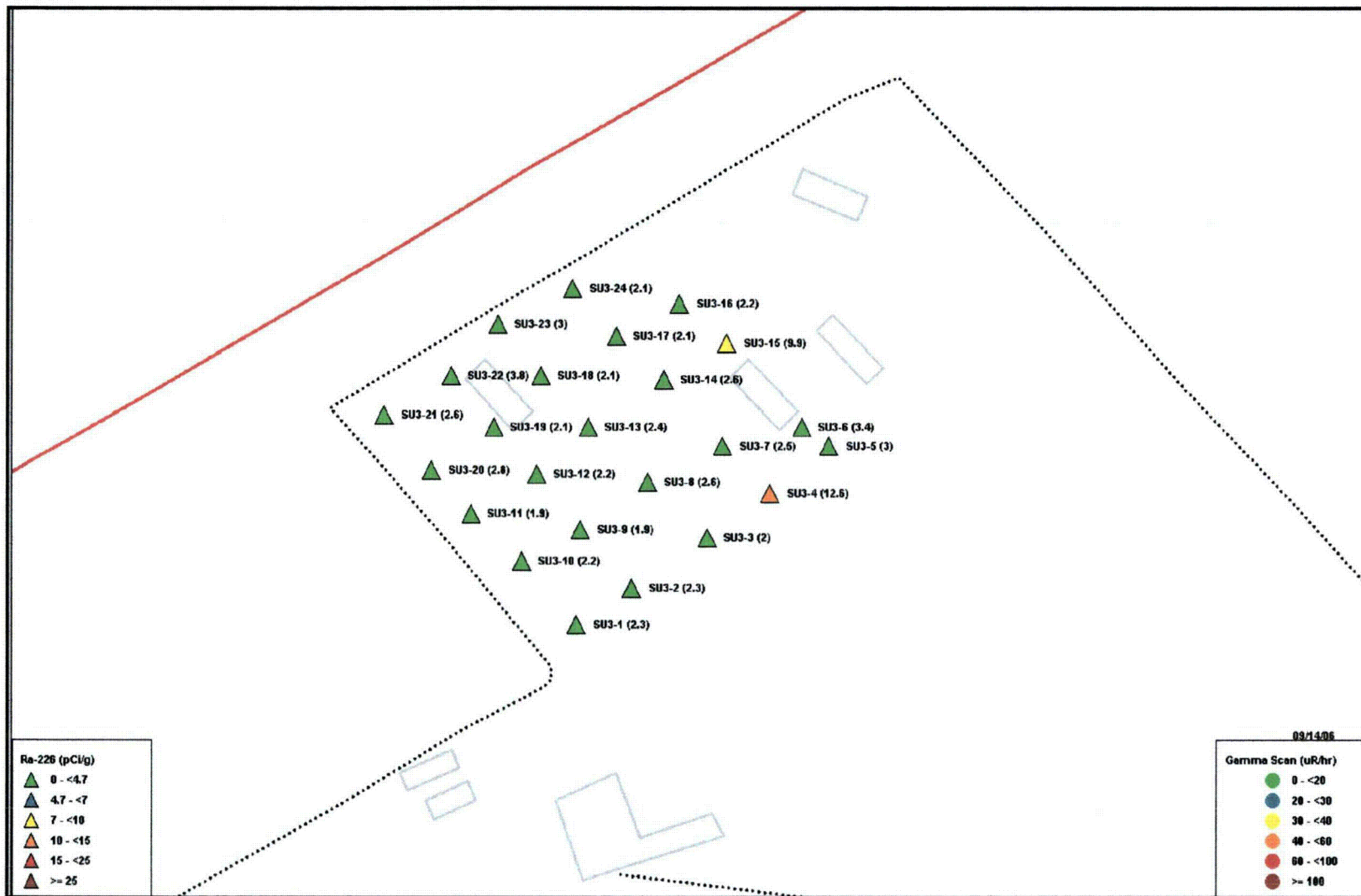
Survey Unit 1: Final Status Surface Soil Sampling Locations and Ra-226 Concentrations



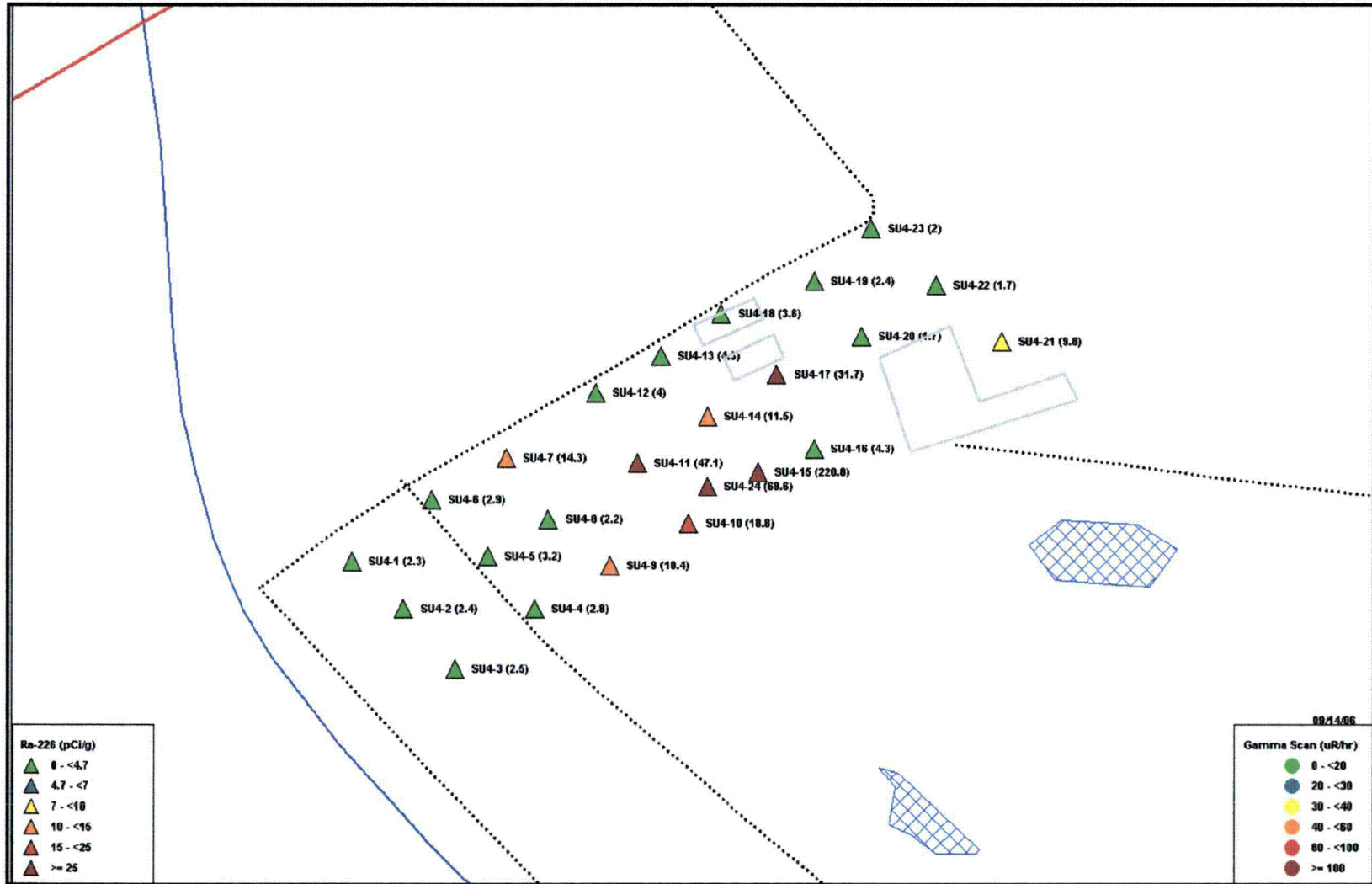
Survey Unit 2: Final Status Surface Soil Sampling Locations and Ra-226 Concentrations



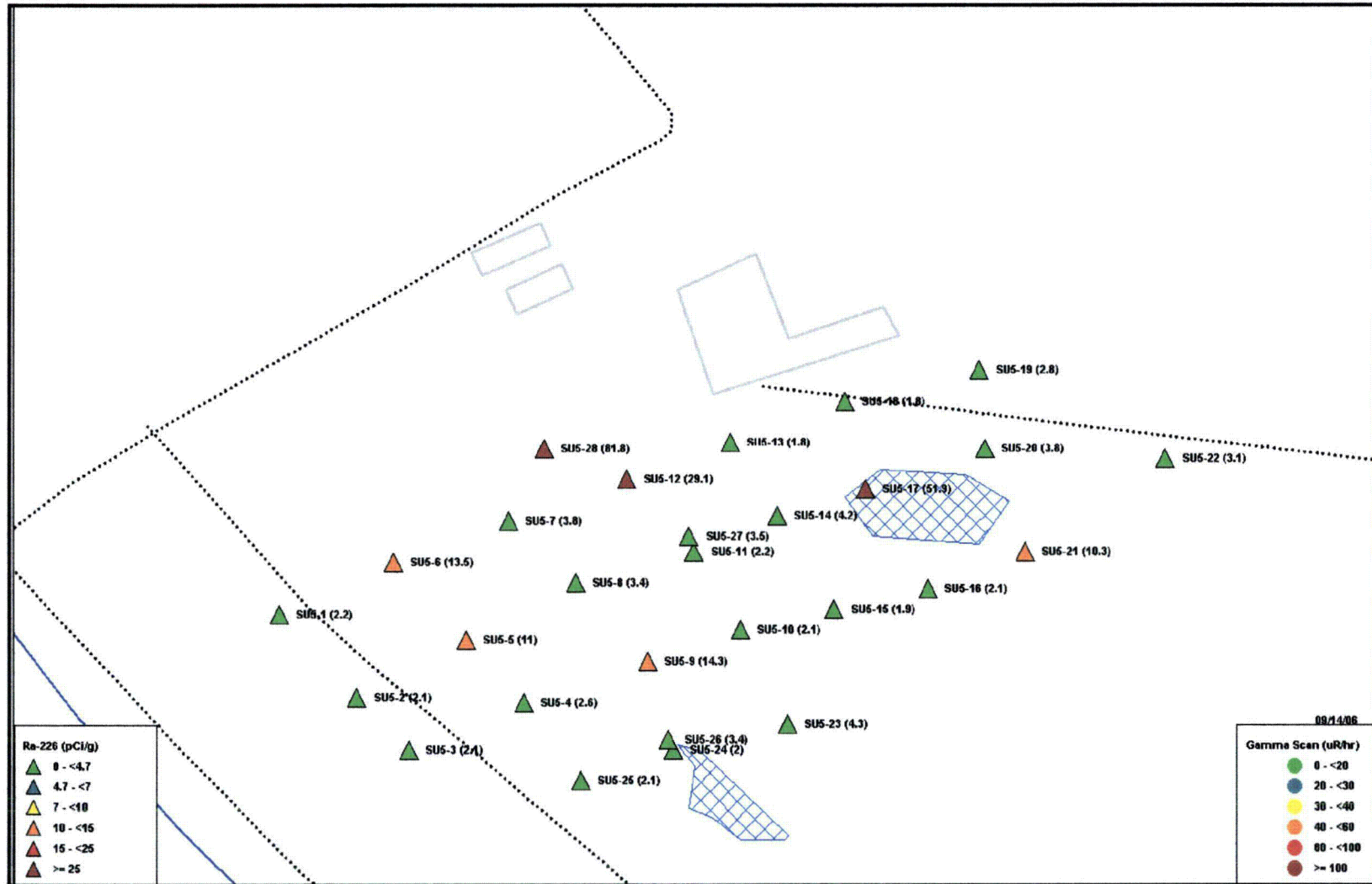
Survey Unit 3: Final Status Surface Soil Sampling Locations and Ra-226 Concentrations



Survey Unit 4: Final Status Surface Soil Sampling Locations and Ra-226 Concentrations



Survey Unit 5: Final Status Surface Soil Sampling Locations and Ra-226 Concentrations



ATTACHMENT G

**COMPASS
OUTPUT RESULTS
FOR
MARSSIM ANALYSES**



Site Report

Site Summary

Site Name: Davis Mill Site, Gateway, CO
Planner(s): Randy Whicker

Contaminant Summary

NOTE: Surface soil DCGLw units are pCi/g.
Building surface DCGLw units are dpm/100 cm².

Contaminant	Type	DCGLw	Screening Value Used?	Area (m ²)	Area Factor
Ra-226	Surface Soil	2.60	No	2	12.5
				10	4.6
				20	3.5
				30	3.1
				50	2.7
				100	2.3
				215	1.9
				299	1.8
				344	1.7
				381	1.6
				542	1.4
10,000	1				

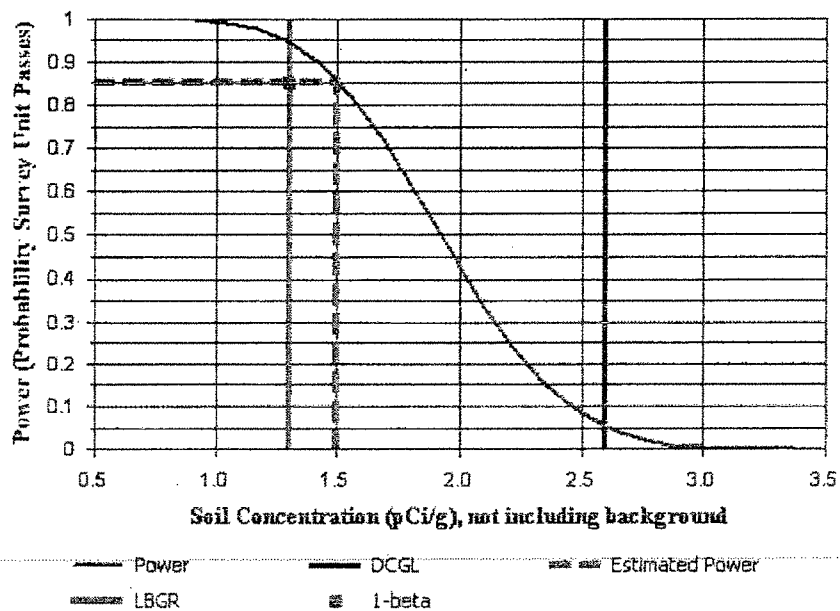


Surface Soil Survey Plan

Survey Plan Summary

Site:	Davis Mill Site, Gateway, CO		
Planner(s):	Randy Whicker		
Survey Unit Name:	Survey Unit 1		
Comments:	Hill area northeast of mill building		
Area (m ²):	11,927	Classification:	1
Selected Test:	WRS	Estimated Sigma (pCi/g):	1.3
DCGL (pCi/g):	2.60	Sample Size (N/2):	22
LBGR (pCi/g):	1.3	Estimated Conc. (pCi/g):	1.5
Alpha:	0.050	Estimated Power:	0.85
Beta:	0.150	EMC Sample Size (N):	22
Scanning Instrumentation:	2x2 NaI detector		

Prospective Power Curve





Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Ra-226	2.60	N/A	N/A	N/A	2.6

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Ra-226	3.5 \pm 1.3	2 \pm 0.2

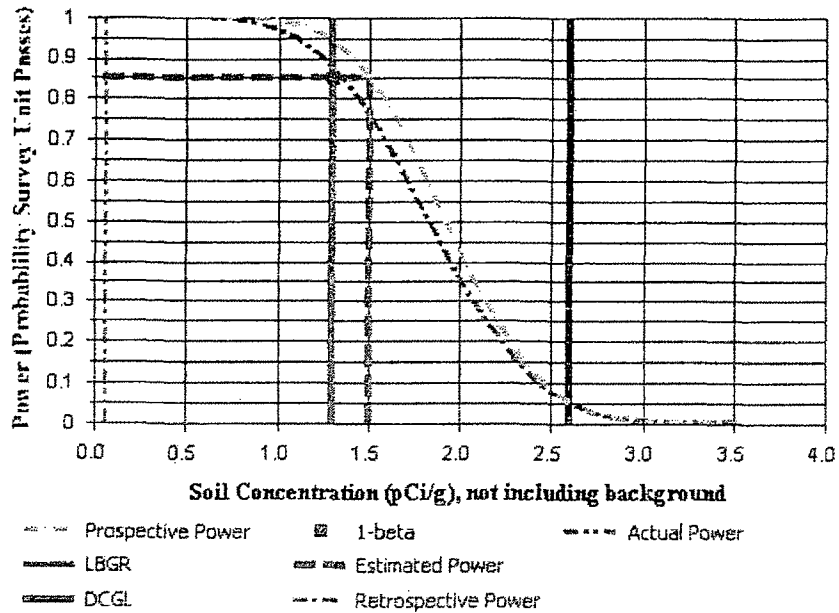


DQA Surface Soil Report

Assessment Summary

Site: Davis Mill Site, Gateway, CO
Planner(s): Randy Whicker
Survey Unit Name: Survey Unit 1
Report Number: 1
Survey Unit Samples: 22
Reference Area Samples: 24
Test Performed: WRS Test Result: Pass
Judgmental Samples: 1 EMC Result: Pass
Assessment Conclusion: **Reject Null Hypothesis (Survey Unit PASSES)**

Retrospective Power Curve





DQA Surface Soil Report

Survey Unit Data

NOTE: Type = "S" indicates survey unit sample.
Type = "R" indicates reference area sample.

Sample Number	Type	Ra-226 (pCi/g)
SU1-1	S	2.25
SU1-2	S	2.07
SU1-3	S	2.86
SU1-4	S	2.04
SU1-5	S	2.1
SU1-6	S	2.49
SU1-7	S	2.49
SU1-8	S	2.2
SU1-9	S	2.1
SU1-10	S	1.73
SU1-11	S	1.95
SU1-12	S	1.97
SU1-13	S	3.45
SU1-14	S	2.02
SU1-15	S	2.17
SU1-16	S	2.05
SU1-17	S	9.1
SU1-18	S	2.11
SU1-19	S	2.03
SU1-20	S	2.89
SU1-21	S	2.09
SU1-22	S	2.1
GWB-5	R	1.93
GWB-6	R	1.92
GWB-7	R	1.84
GWB-8	R	2.06
GWB-9	R	1.77
GWB-10	R	1.88
GWB-11	R	1.86
GWB-12	R	2.11
GWB-13	R	2
GWB-14	R	2.03
GWB-15	R	2.05
GWB-16	R	1.8
GWB-17	R	1.84
GWB-18	R	2.04
GWB-19	R	2.17
GWB-20	R	2.65
GWB-21	R	2.2
GWB-22	R	2.18
GWB-23	R	2.18
GWB-24	R	2.37
GWB-25	R	1.96
GWB-26	R	2.07
GWB-27	R	2.34
GWB-28	R	2.09



DQA Surface Soil Report

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	22	24	N/2=22
Mean (pCi/g)	2.56	2.06	1.5
Median (pCi/g)	2.10	2.04	N/A
Std Dev (pCi/g)	1.51	0.20	1.3
High Value (pCi/g)	9.10	2.65	N/A
Low Value (pCi/g)	1.73	1.77	N/A

Statistical Test Summary

Sum of Ranks:	1081
Sum of Reference Ranks:	804
Critical Value:	639
Result:	Pass

Data	Type	Adjusted Data	Rank	Reference Rank
1.77133963850069	R	4.37133963850069	22	22
1.79805311429921	R	4.39805311429921	23	23
1.84006436647869	R	4.44006436647869	24	24
1.84296635988417	R	4.44296635988417	25	25
1.8612314533171	R	4.4612314533171	26	26
1.88212586906523	R	4.48212586906523	27	27
1.91662598293582	R	4.51662598293582	28	28
1.93284946874048	R	4.53284946874048	29	29
1.95832252784789	R	4.55832252784789	30	30
2.0009789340342	R	4.6009789340342	31	31
2.03334570754897	R	4.63334570754897	32	32
2.04007816644093	R	4.64007816644093	33	33
2.04855643617589	R	4.64855643617589	34	34
2.05786128409954	R	4.65786128409954	35	35
2.07104127891348	R	4.67104127891348	36	36
2.0933084703521	R	4.6933084703521	37	37
2.11232241369155	R	4.71232241369155	38	38
2.16512796042125	R	4.76512796042125	39	39
2.18319450888067	R	4.78319450888067	40	40
2.18435105418638	R	4.78435105418638	41	41
2.19648736553904	R	4.79648736553904	42	42
2.34076611666604	R	4.94076611666604	43	43
2.37427973064163	R	4.97427973064163	44	44
2.64847706260998	R	5.24847706260998	45	45
1.72974230575363	S	1.72974230575363	1	0



DQA Surface Soil Report

Statistical Test Summary

Data	Type	Adjusted Data	Rank	Reference Rank
1.95285457343759	S	1.95285457343759	2	0
1.97124489089476	S	1.97124489089476	3	0
2.01651764047906	S	2.01651764047906	4	0
2.02781449311629	S	2.02781449311629	5	0
2.04144026422809	S	2.04144026422809	6	0
2.04639984069005	S	2.04639984069005	7	0
2.06575225925816	S	2.06575225925816	8	0
2.09185266145706	S	2.09185266145706	9	0
2.09563297461554	S	2.09563297461554	10	0
2.10091610225155	S	2.10091610225155	11	0
2.10120451123082	S	2.10120451123082	12	0
2.10723859321503	S	2.10723859321503	13	0
2.16723542267884	S	2.16723542267884	14	0
2.20018824992876	S	2.20018824992876	15	0
2.25286555112446	S	2.25286555112446	16	0
2.48635328453815	S	2.48635328453815	17	0
2.49265004850043	S	2.49265004850043	18	0
2.85501347439814	S	2.85501347439814	19	0
2.88886042988156	S	2.88886042988156	20	0
3.45267028335858	S	3.45267028335858	21	0
9.0970464252565	S	9.0970464252565	46	0

Elevated Measurement Comparison (EMC)

Sum of All Contaminants: 0.29

EMC Result: Pass

EMC Description	Area (m ²)	Contaminant	Average Concentration (pCi/g)
SU1-HS1	6	Ra-226	4.7
Equation 8-2 Result for Ra-226: 0.29			

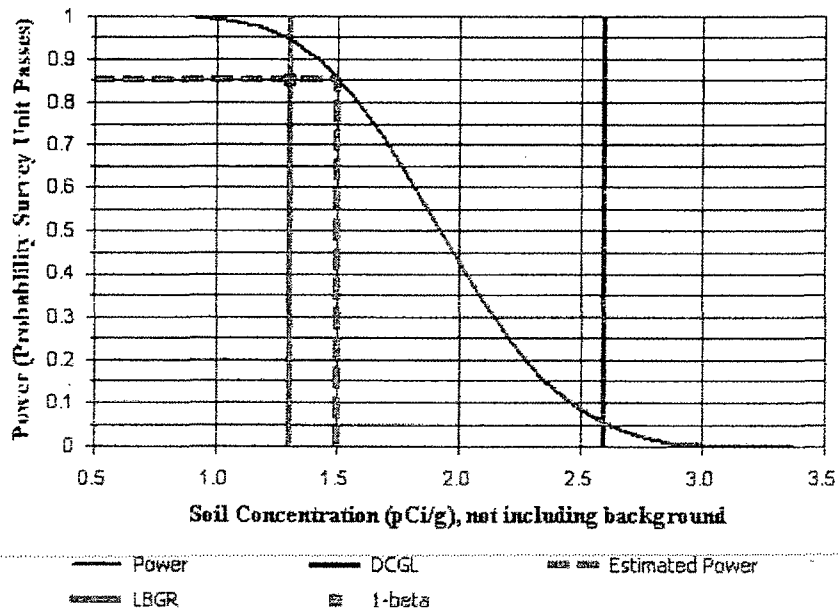


Surface Soil Survey Plan

Survey Plan Summary

Site:	Davis Mill Site, Gateway, CO		
Planner(s):	Randy Whicker		
Survey Unit Name:	Survey Unit 2		
Comments:	Northeast corner of site near Willis Trailer		
Area (m ²):	4,732	Classification:	1
Selected Test:	WRS	Estimated Sigma (pCi/g):	1.3
DCGL (pCi/g):	2.60	Sample Size (N/2):	22
LBGR (pCi/g):	1.3	Estimated Conc. (pCi/g):	1.5
Alpha:	0.050	Estimated Power:	0.85
Beta:	0.150	EMC Sample Size (N):	22
Scanning Instrumentation:	2x2 NaI detector		

Prospective Power Curve





Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Ra-226	2.60	N/A	N/A	N/A	2.6

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Ra-226	3.5 \pm 1.3	2 \pm 0.2

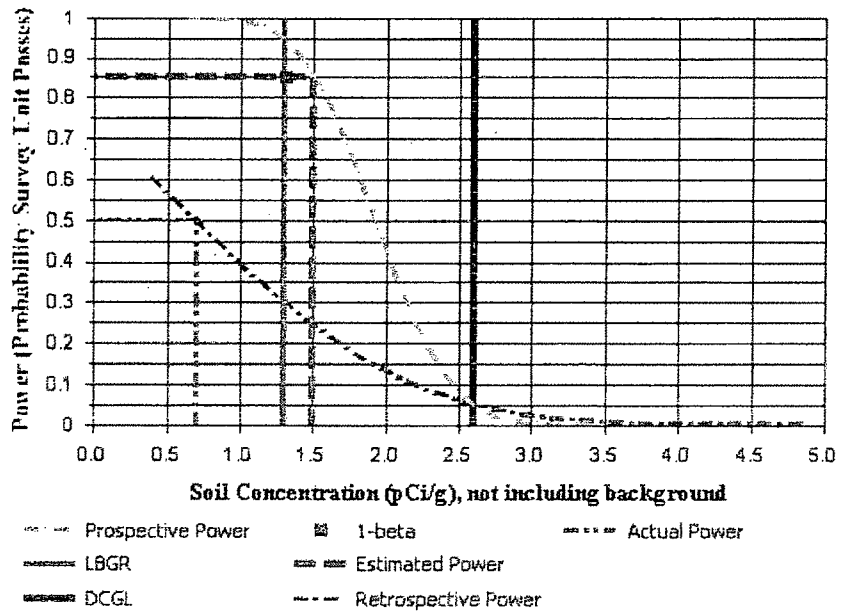


DQA Surface Soil Report

Assessment Summary

Site: Davis Mill Site, Gateway, CO
Planner(s): Randy Whicker
Survey Unit Name: Survey Unit 2
Report Number: 1
Survey Unit Samples: 22
Reference Area Samples: 24
Test Performed: WRS Test Result: Pass
Judgmental Samples: 2 EMC Result: Pass
Assessment Conclusion: **Reject Null Hypothesis (Survey Unit PASSES)**

Retrospective Power Curve





DQA Surface Soil Report

Survey Unit Data

NOTE: Type = "S" indicates survey unit sample.
Type = "R" indicates reference area sample.

Sample Number	Type	Ra-226 (pCi/g)
SU2-1	S	2.07
SU2-2	S	3.34
SU2-3	S	2.96
SU2-4	S	16.72
SU2-5	S	3.14
SU2-6	S	2.63
SU2-7	S	2.13
SU2-8	S	2.87
SU2-9	S	2.02
SU2-10	S	2.4
SU2-11	S	2.09
SU2-12	S	2.33
SU2-13	S	3.92
SU2-14	S	3.22
SU2-15	S	4.66
SU2-16	S	13.59
SU2-17	S	2.63
SU2-18	S	2.24
SU2-19	S	2.21
SU2-20	S	2.86
SU2-21	S	3.8
SU2-22	S	2.4
GWB-5	R	1.93
GWB-6	R	1.92
GWB-7	R	1.84
GWB-8	R	2.06
GWB-9	R	1.77
GWB-10	R	1.88
GWB-11	R	1.86
GWB-12	R	2.11
GWB-13	R	2
GWB-14	R	2.03
GWB-15	R	2.05
GWB-16	R	1.8
GWB-17	R	1.84
GWB-18	R	2.04
GWB-19	R	2.17
GWB-20	R	2.65
GWB-21	R	2.2
GWB-22	R	2.18
GWB-23	R	2.18
GWB-24	R	2.37
GWB-25	R	1.96
GWB-26	R	2.07
GWB-27	R	2.34
GWB-28	R	2.09



DQA Surface Soil Report

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	22	24	N/2=22
Mean (pCi/g)	3.92	2.06	1.5
Median (pCi/g)	2.74	2.04	N/A
Std Dev (pCi/g)	3.73	0.20	1.3
High Value (pCi/g)	16.72	2.65	N/A
Low Value (pCi/g)	2.02	1.77	N/A

Statistical Test Summary

Sum of Ranks:	1081
Sum of Reference Ranks:	766
Critical Value:	639
Result:	Pass

Data	Type	Adjusted Data	Rank	Reference Rank
1.77133963850069	R	4.37133963850069	20	20
1.79805311429921	R	4.39805311429921	21	21
1.84006436647869	R	4.44006436647869	22	22
1.84296635988417	R	4.44296635988417	23	23
1.8612314533171	R	4.4612314533171	24	24
1.88212586906523	R	4.48212586906523	25	25
1.91662598293582	R	4.51662598293582	26	26
1.93284946874048	R	4.53284946874048	27	27
1.95832252784789	R	4.55832252784789	28	28
2.0009789340342	R	4.6009789340342	29	29
2.03334570754897	R	4.63334570754897	30	30
2.04007816644093	R	4.64007816644093	31	31
2.04855643617589	R	4.64855643617589	32	32
2.05786128409954	R	4.65786128409954	33	33
2.07104127891348	R	4.67104127891348	35	35
2.0933084703521	R	4.6933084703521	36	36
2.11232241369155	R	4.71232241369155	37	37
2.16512796042125	R	4.76512796042125	38	38
2.18319450888067	R	4.78319450888067	39	39
2.18435105418638	R	4.78435105418638	40	40
2.19648736553904	R	4.79648736553904	41	41
2.34076611666604	R	4.94076611666604	42	42
2.37427973064163	R	4.97427973064163	43	43
2.64847706260998	R	5.24847706260998	44	44
2.02190762630746	S	2.02190762630746	1	0



DQA Surface Soil Report

Statistical Test Summary

Data	Type	Adjusted Data	Rank	Reference Rank
2.0679219255328	S	2.0679219255328	2	0
2.08897843290803	S	2.08897843290803	3	0
2.12940068298931	S	2.12940068298931	4	0
2.2055120400935	S	2.2055120400935	5	0
2.24035544656398	S	2.24035544656398	6	0
2.33072596974448	S	2.33072596974448	7	0
2.40244624339506	S	2.40244624339506	8	0
2.40455629079187	S	2.40455629079187	9	0
2.62582215824983	S	2.62582215824983	10	0
2.62857060090377	S	2.62857060090377	11	0
2.85977104513702	S	2.85977104513702	12	0
2.87038968128714	S	2.87038968128714	13	0
2.96234970821611	S	2.96234970821611	14	0
3.13958965917103	S	3.13958965917103	15	0
3.21629887571395	S	3.21629887571395	16	0
3.34204178889468	S	3.34204178889468	17	0
3.80352954297997	S	3.80352954297997	18	0
3.91980385250329	S	3.91980385250329	19	0
4.66186328494637	S	4.66186328494637	34	0
13.5867519827964	S	13.5867519827964	45	0
16.7207728536595	S	16.7207728536595	46	0

Elevated Measurement Comparison (EMC)

Sum of All Contaminants: 0.9

EMC Result: Pass

EMC Description	Area (m ²)	Contaminant	Average Concentration (pCi/g)
SU2-HS1	5	Ra-226	3.6
SU2-HS2	16	Ra-226	5.9

Equation 8-2 Result for Ra-226: 0.9

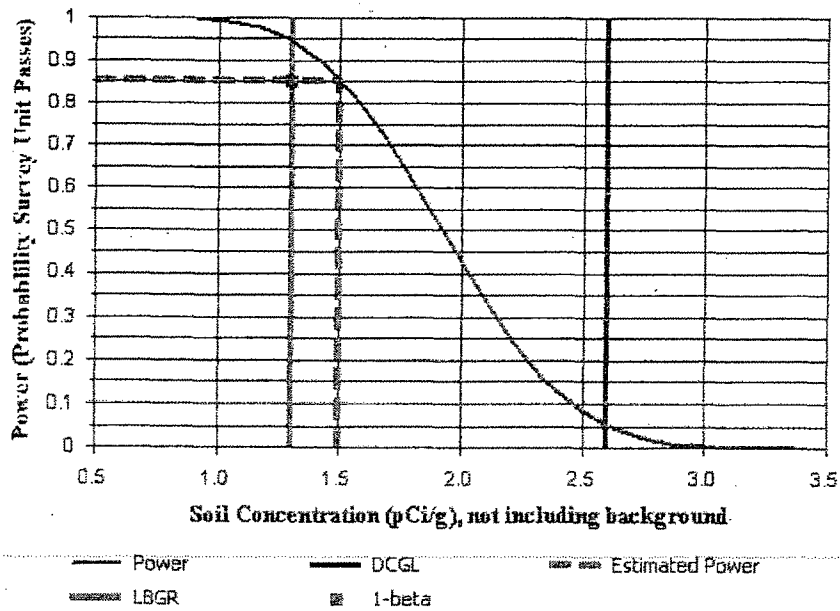


Surface Soil Survey Plan

Survey Plan Summary

Site:	Davis Mill Site, Gateway, CO		
Planner(s):	Randy Whicker		
Survey Unit Name:	Survey Unit 3		
Comments:	Trailer court / site access areas NE of mill		
Area (m ²):	7,574	Classification:	1
Selected Test:	WRS	Estimated Sigma (pCi/g):	1.3
DCGL (pCi/g):	2.60	Sample Size (N/2):	22
LBGR (pCi/g):	1.3	Estimated Conc. (pCi/g):	1.5
Alpha:	0.050	Estimated Power:	0.85
Beta:	0.150	EMC Sample Size (N):	22
Scanning Instrumentation:	2x2 NaI detector		

Prospective Power Curve





Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Ra-226	2.60	N/A	N/A	N/A	2.6

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Ra-226	3.5 \pm 1.3	2 \pm 0.2

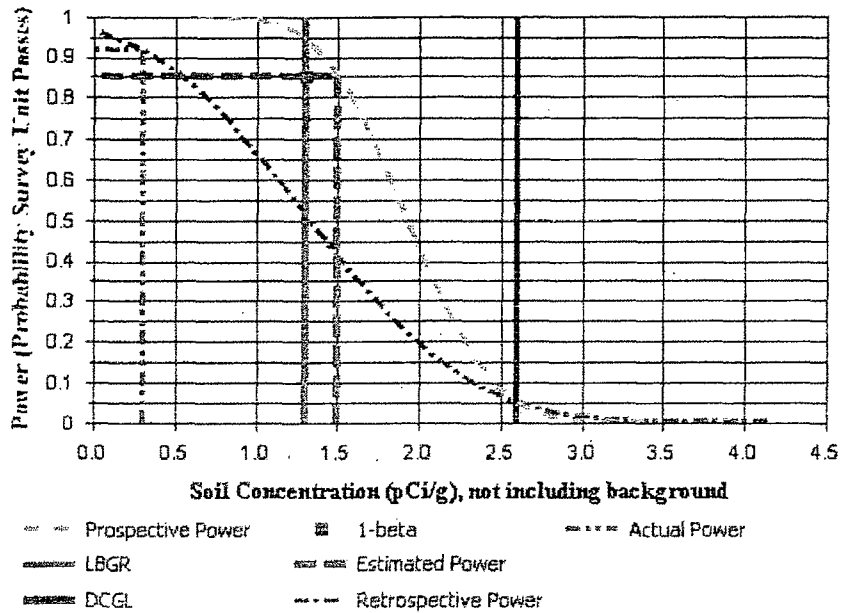


DQA Surface Soil Report

Assessment Summary

Site: Davis Mill Site, Gateway, CO
Planner(s): Randy Whicker
Survey Unit Name: Survey Unit 3
Report Number: 1
Survey Unit Samples: 24
Reference Area Samples: 24
Test Performed: WRS Test Result: Pass
Judgmental Samples: 3 EMC Result: Fail
Assessment Conclusion: **Do NOT Reject Null Hypothesis (Survey Unit FAILS)**

Retrospective Power Curve





DQA Surface Soil Report

Survey Unit Data

NOTE: Type = "S" indicates survey unit sample.
Type = "R" indicates reference area sample.

Sample Number	Type	Ra-226 (pCi/g)
SU3-1	S	2.3
SU3-2	S	2.29
SU3-3	S	1.99
SU3-4	S	12.57
SU3-5	S	2.98
SU3-6	S	3.41
SU3-7	S	2.47
SU3-8	S	2.61
SU3-9	S	1.9
SU3-10	S	2.16
SU3-11	S	1.88
SU3-12	S	2.18
SU3-13	S	2.38
SU3-14	S	2.57
SU3-15	S	9.86
SU3-16	S	2.22
SU3-17	S	2.07
SU3-18	S	2.14
SU3-19	S	2.15
SU3-20	S	2.79
SU3-21	S	2.56
SU3-22	S	3.76
SU3-23	S	3.04
SU3-24	S	2.14
GWB-5	R	1.93
GWB-6	R	1.92
GWB-7	R	1.84
GWB-8	R	2.06
GWB-9	R	1.77
GWB-10	R	1.88
GWB-11	R	1.86
GWB-12	R	2.11
GWB-13	R	2
GWB-14	R	2.03
GWB-15	R	2.05
GWB-16	R	1.8
GWB-17	R	1.84
GWB-18	R	2.04
GWB-19	R	2.17
GWB-20	R	2.65
GWB-21	R	2.2
GWB-22	R	2.18
GWB-23	R	2.18
GWB-24	R	2.37
GWB-25	R	1.96
GWB-26	R	2.07
GWB-27	R	2.34
GWB-28	R	2.09



DQA Surface Soil Report

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	24	24	N/2=22
Mean (pCi/g)	3.18	2.06	1.5
Median (pCi/g)	2.34	2.04	N/A
Std Dev (pCi/g)	2.55	0.20	1.3
High Value (pCi/g)	12.57	2.65	N/A
Low Value (pCi/g)	1.88	1.77	N/A

Statistical Test Summary

Sum of Ranks:	1176
Sum of Reference Ranks:	828
Critical Value:	668
Result:	Pass

Data	Type	Adjusted Data	Rank	Reference Rank
1.77133963850069	R	4.37133963850069	23	23
1.79805311429921	R	4.39805311429921	24	24
1.84006436647869	R	4.44006436647869	25	25
1.84296635988417	R	4.44296635988417	26	26
1.8612314533171	R	4.4612314533171	27	27
1.88212586906523	R	4.48212586906523	28	28
1.91662598293582	R	4.51662598293582	29	29
1.93284946874048	R	4.53284946874048	30	30
1.95832252784789	R	4.55832252784789	31	31
2.0009789340342	R	4.6009789340342	32	32
2.03334570754897	R	4.63334570754897	33	33
2.04007816644093	R	4.64007816644093	34	34
2.04855643617589	R	4.64855643617589	35	35
2.05786128409954	R	4.65786128409954	36	36
2.07104127891348	R	4.67104127891348	37	37
2.0933084703521	R	4.6933084703521	38	38
2.11232241369155	R	4.71232241369155	39	39
2.16512796042125	R	4.76512796042125	40	40
2.18319450888067	R	4.78319450888067	41	41
2.18435105418638	R	4.78435105418638	42	42
2.19648736553904	R	4.79648736553904	43	43
2.34076511666604	R	4.94076511666604	44	44
2.37427973064163	R	4.97427973064163	45	45
2.64847706260998	R	5.24847706260998	46	46
1.87664817758651	S	1.87664817758651	1	0



DQA Surface Soil Report

Statistical Test Summary

Data	Type	Adjusted Data	Rank	Reference Rank
1.90025235481686	S	1.90025235481686	2	0
1.99168655003748	S	1.99168655003748	3	0
2.06786403106736	S	2.06786403106736	4	0
2.13666946444613	S	2.13666946444613	5	0
2.13690516166039	S	2.13690516166039	6	0
2.14547589630663	S	2.14547589630663	7	0
2.15559548524439	S	2.15559548524439	8	0
2.17734597862987	S	2.17734597862987	9	0
2.21665499227009	S	2.21665499227009	10	0
2.2924717608529	S	2.2924717608529	11	0
2.29876233023324	S	2.29876233023324	12	0
2.37780936351712	S	2.37780936351712	13	0
2.46944649875725	S	2.46944649875725	14	0
2.56042050683751	S	2.56042050683751	15	0
2.56655917709901	S	2.56655917709901	16	0
2.61042559483421	S	2.61042559483421	17	0
2.79343184531617	S	2.79343184531617	18	0
2.97600812665248	S	2.97600812665248	19	0
3.03662205976743	S	3.03662205976743	20	0
3.40817294383957	S	3.40817294383957	21	0
3.75808931830039	S	3.75808931830039	22	0
9.86321879782368	S	9.86321879782368	47	0
12.5672139377298	S	12.5672139377298	48	0

Elevated Measurement Comparison (EMC)

Sum of All Contaminants: 1.8
EMC Result: Fail

EMC Description	Area (m ²)	Contaminant	Average Concentration (pCi/g)
SU3-HS1	6	Ra-226	5.3
SU3-HS2	20	Ra-226	10.2
SU3-HS3	9	Ra-226	10.5

Equation 8-2 Result for Ra-226: 1.8

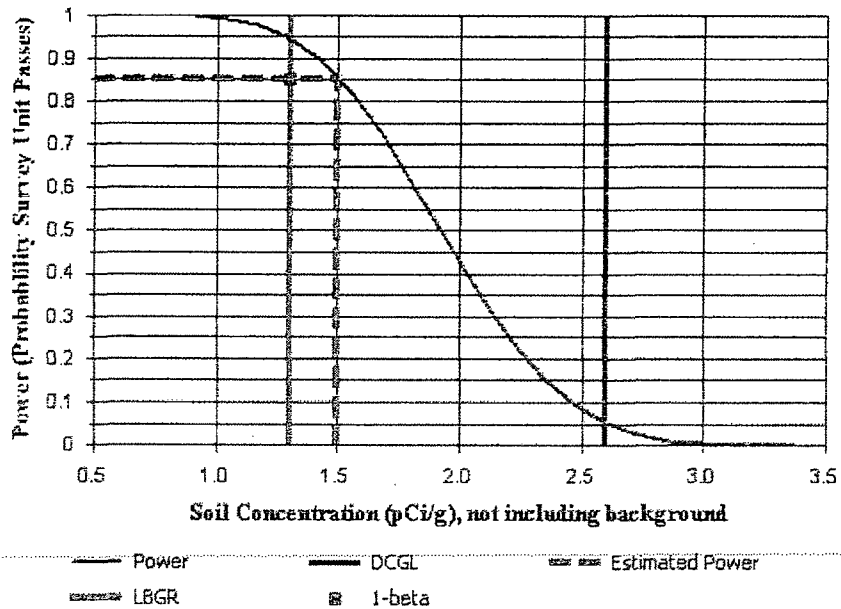


Surface Soil Survey Plan

Survey Plan Summary

Site:	Davis Mill Site, Gateway, CO		
Planner(s):	Randy Whicker		
Survey Unit Name:	Survey Unit 4		
Comments:	Northwest bottomlands area below mill		
Area (m ²):	6,582	Classification:	1
Selected Test:	WRS	Estimated Sigma (pCi/g):	1.3
DCGL (pCi/g):	2.60	Sample Size (N/2):	22
LBGR (pCi/g):	1.3	Estimated Conc. (pCi/g):	1.5
Alpha:	0.050	Estimated Power:	0.85
Beta:	0.150	EMC Sample Size (N):	22
Scanning Instrumentation:	2x2 NaI detector		

Prospective Power Curve





Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Ra-226	2.60	N/A	N/A	N/A	2.6

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Ra-226	3.5 \pm 1.3	2 \pm 0.2

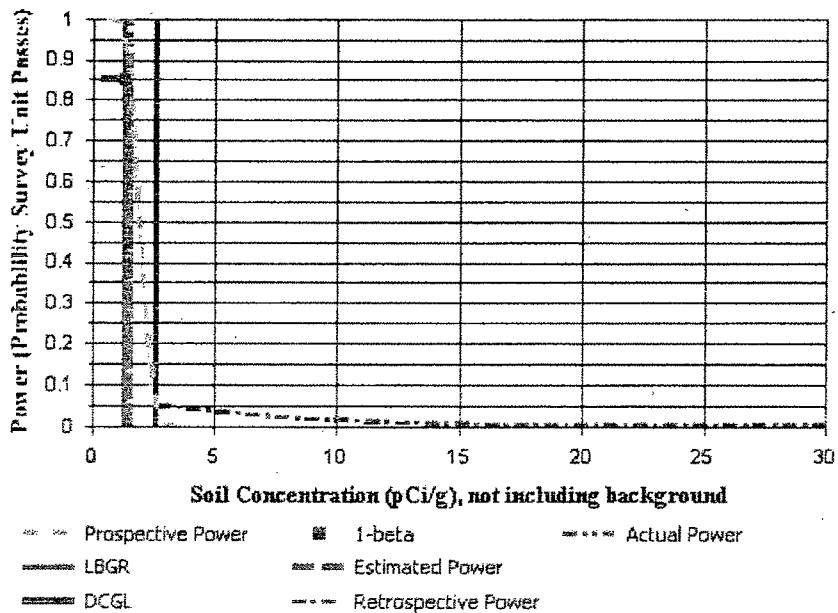


DQA Surface Soil Report

Assessment Summary

Site: Davis Mill Site, Gateway, CO
Planner(s): Randy Whicker
Survey Unit Name: Survey Unit 4
Report Number: 1
Survey Unit Samples: 23
Reference Area Samples: 24
Test Performed: WRS Test Result: Not Performed
Judgmental Samples: 1 EMC Result: Not Performed
Assessment Conclusion: **Do NOT Reject Null Hypothesis (Survey Unit FAILS)**

Retrospective Power Curve





DQA Surface Soil Report

Survey Unit Data

NOTE: Type = "S" indicates survey unit sample.
Type = "R" indicates reference area sample.

Sample Number	Type	Ra-226 (pCi/g)
SU4-1	S	2.26
SU4-2	S	2.41
SU4-3	S	2.53
SU4-4	S	2.81
SU4-5	S	3.19
SU4-6	S	2.93
SU4-7	S	14.3
SU4-8	S	2.19
SU4-9	S	10.39
SU4-10	S	18.85
SU4-11	S	47.12
SU4-12	S	3.97
SU4-13	S	4.49
SU4-14	S	11.47
SU4-15	S	220.77
SU4-16	S	4.31
SU4-17	S	31.73
SU4-18	S	3.58
SU4-19	S	2.37
SU4-20	S	1.65
SU4-21	S	9.76
SU4-22	S	1.74
SU4-23	S	2.01
GWB-5	R	1.93
GWB-6	R	1.92
GWB-7	R	1.84
GWB-8	R	2.06
GWB-9	R	1.77
GWB-10	R	1.88
GWB-11	R	1.86
GWB-12	R	2.11
GWB-13	R	2
GWB-14	R	2.03
GWB-15	R	2.05
GWB-16	R	1.8
GWB-17	R	1.84
GWB-18	R	2.04
GWB-19	R	2.17
GWB-20	R	2.65
GWB-21	R	2.2
GWB-22	R	2.18
GWB-23	R	2.18
GWB-24	R	2.37
GWB-25	R	1.96
GWB-26	R	2.07
GWB-27	R	2.34
GWB-28	R	2.09



DQA Surface Soil Report

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	23	24	N/2=22
Mean (pCi/g)	17.69	2.06	1.5
Median (pCi/g)	3.58	2.04	N/A
Std Dev (pCi/g)	45.62	0.20	1.3
High Value (pCi/g)	220.77	2.65	N/A
Low Value (pCi/g)	1.65	1.77	N/A

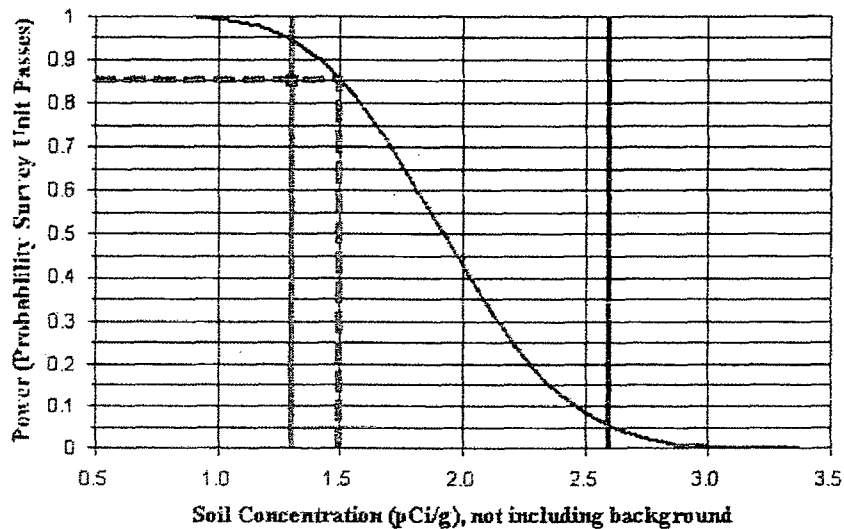


Surface Soil Survey Plan

Survey Plan Summary

Site:	Davis Mill Site, Gateway, CO		
Planner(s):	Randy Whicker		
Survey Unit Name:	Survey Unit 5		
Comments:	Southwest bottomlands area below mill		
Area (m ²):	8,375	Classification:	1
Selected Test:	WRS	Estimated Sigma (pCi/g):	1.3
DCGL (pCi/g):	2.60	Sample Size (N/2):	22
LBGR (pCi/g):	1.3	Estimated Conc. (pCi/g):	1.5
Alpha:	0.050	Estimated Power:	0.85
Beta:	0.150	EMC Sample Size (N):	22
Scanning Instrumentation:	2x2 NaI detector		

Prospective Power Curve



— Power — DCGL - - - - - Estimated Power
- - - - - LBGR ■ 1-beta



Surface Soil Survey Plan

Contaminant Summary

Contaminant	DCGLw (pCi/g)	Inferred Contaminant	Ratio	Modified DCGLw (pCi/g)	Scan MDC (pCi/g)
Ra-226	2.60	N/A	N/A	N/A	2.6

Contaminant	Survey Unit Estimate (Mean \pm 1-Sigma) (pCi/g)	Reference Area Estimate (Mean \pm 1-Sigma) (pCi/g)
Ra-226	3.5 \pm 1.3	2 \pm 0.2

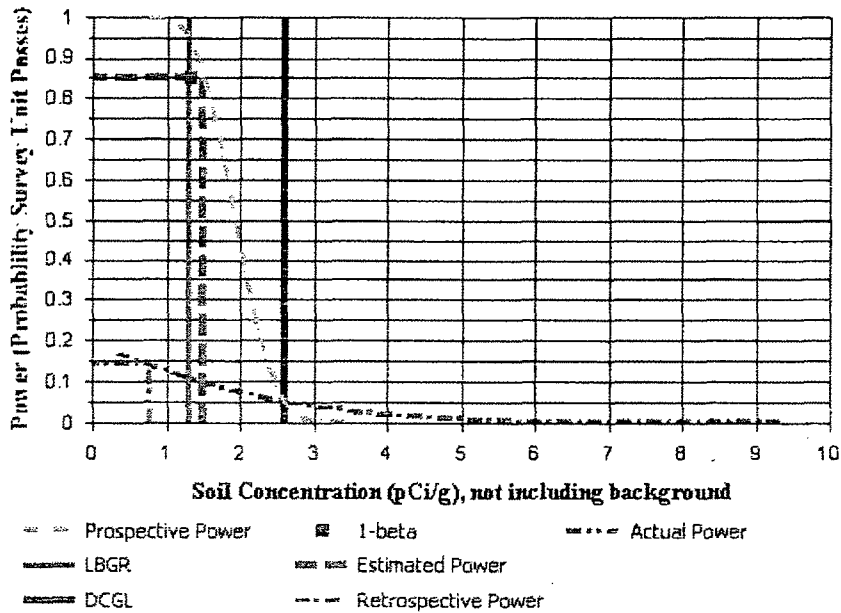


DQA Surface Soil Report

Assessment Summary

Site: Davis Mill Site, Gateway, CO
Planner(s): Randy Whicker
Survey Unit Name: Survey Unit 5
Report Number: 1
Survey Unit Samples: 25
Reference Area Samples: 24
Test Performed: WRS Test Result: Not Performed
Judgmental Samples: 1 EMC Result: Not Performed
Assessment Conclusion: **Do NOT Reject Null Hypothesis (Survey Unit FAILS)**

Retrospective Power Curve





DQA Surface Soil Report

Survey Unit Data

NOTE: Type = "S" indicates survey unit sample.
Type = "R" indicates reference area sample.

Sample Number	Type	Ra-226 (pCi/g)
SU5-1	S	2.2
SU5-2	S	2.06
SU5-3	S	2.07
SU5-4	S	2.56
SU5-5	S	11.02
SU5-6	S	13.53
SU5-7	S	3.81
SU5-8	S	3.39
SU5-9	S	14.31
SU5-10	S	2.05
SU5-11	S	2.19
SU5-12	S	29.1
SU5-13	S	1.84
SU5-14	S	4.16
SU5-15	S	1.9
SU5-16	S	2.13
SU5-17	S	51.87
SU5-18	S	1.8
SU5-19	S	2.81
SU5-20	S	3.8
SU5-21	S	10.35
SU5-22	S	3.15
SU5-23	S	4.29
SU5-24	S	2.01
SU5-25	S	2.1
GWB-5	R	1.93
GWB-6	R	1.92
GWB-7	R	1.84
GWB-8	R	2.06
GWB-9	R	1.77
GWB-10	R	1.88
GWB-11	R	1.86
GWB-12	R	2.11
GWB-13	R	2
GWB-14	R	2.03
GWB-15	R	2.05
GWB-16	R	1.8
GWB-17	R	1.84
GWB-18	R	2.04
GWB-19	R	2.17
GWB-20	R	2.65
GWB-21	R	2.2
GWB-22	R	2.18
GWB-23	R	2.18
GWB-24	R	2.37
GWB-25	R	1.96
GWB-26	R	2.07
GWB-27	R	2.34
GWB-28	R	2.09



DQA Surface Soil Report

Basic Statistical Quantities Summary

Statistic	Survey Unit	Background	DQO Results
Sample Number	25	24	N/2=22
Mean (pCi/g)	7.22	2.06	1.5
Median (pCi/g)	2.81	2.04	N/A
Std Dev (pCi/g)	11.17	0.20	1.3
High Value (pCi/g)	51.87	2.65	N/A
Low Value (pCi/g)	1.80	1.77	N/A



This is to certify that

Randy D. Whicker

has completed

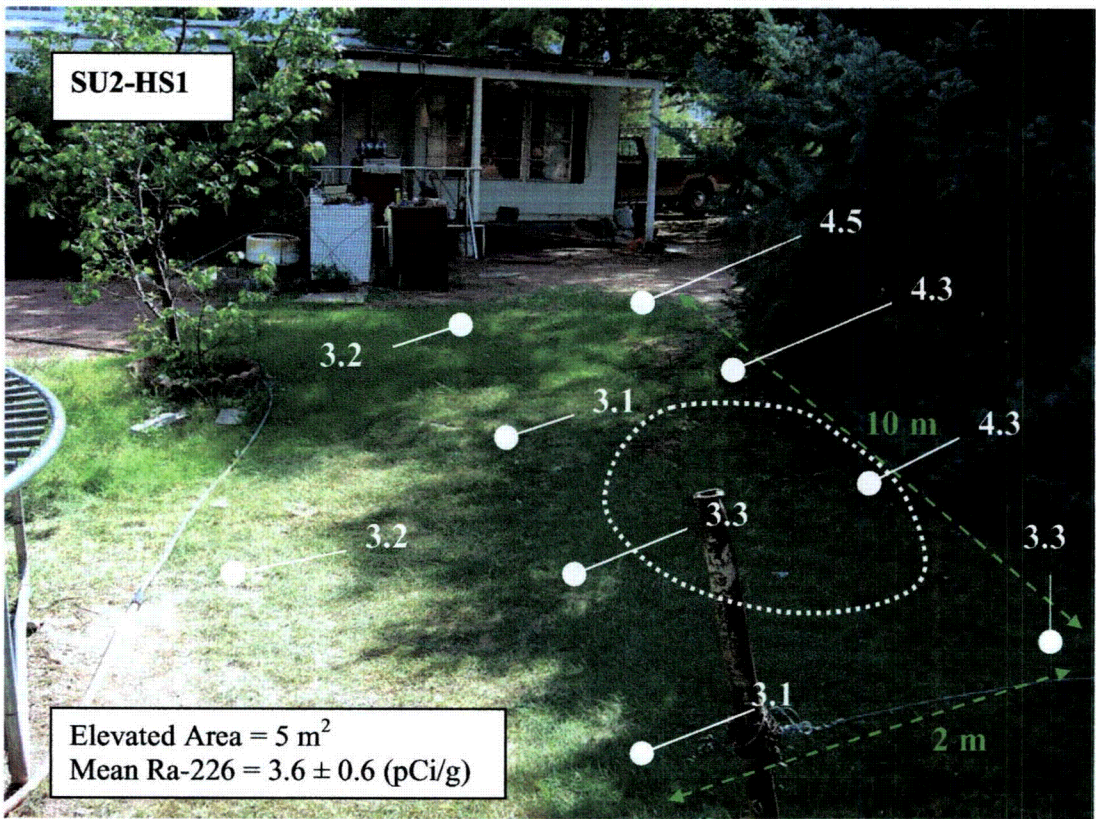
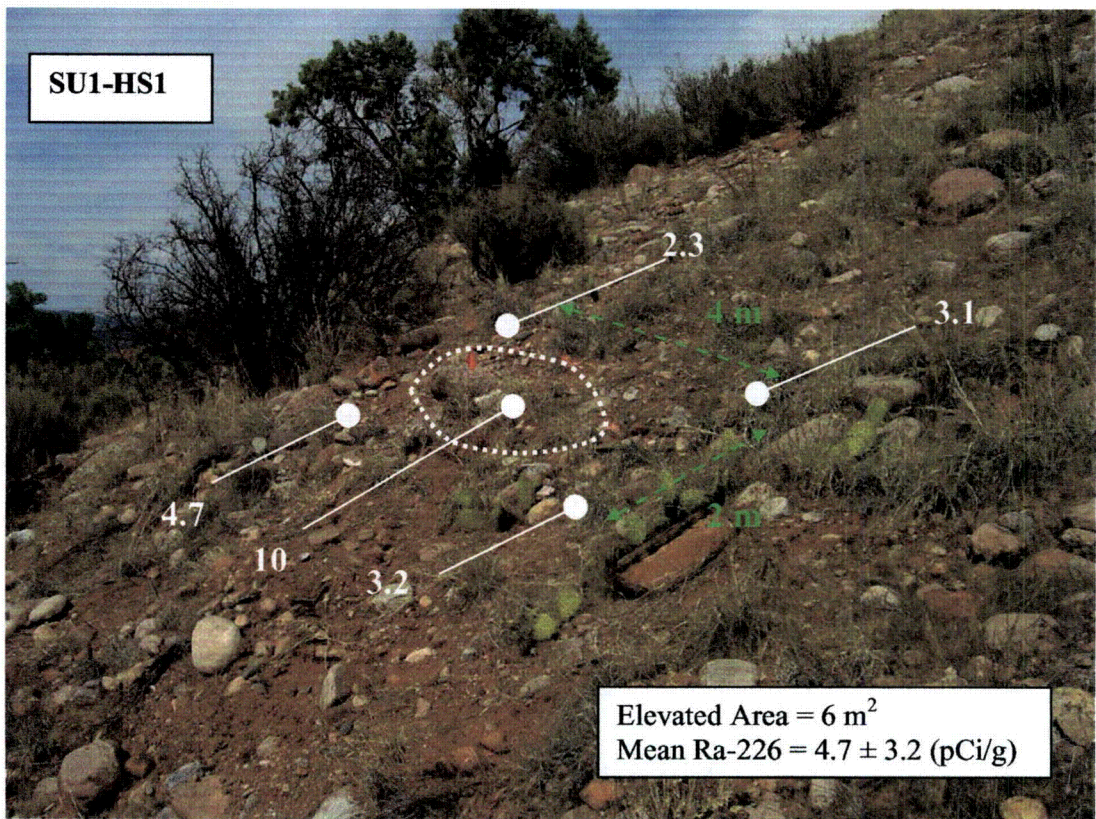
*A 40-HOUR COURSE ON IMPLEMENTING THE MARSSIM APPROACH
FOR DESIGN AND CONDUCT OF RADIOLOGICAL SURVEYS*
conducted by Professional Training Programs
of Oak Ridge Associated Universities

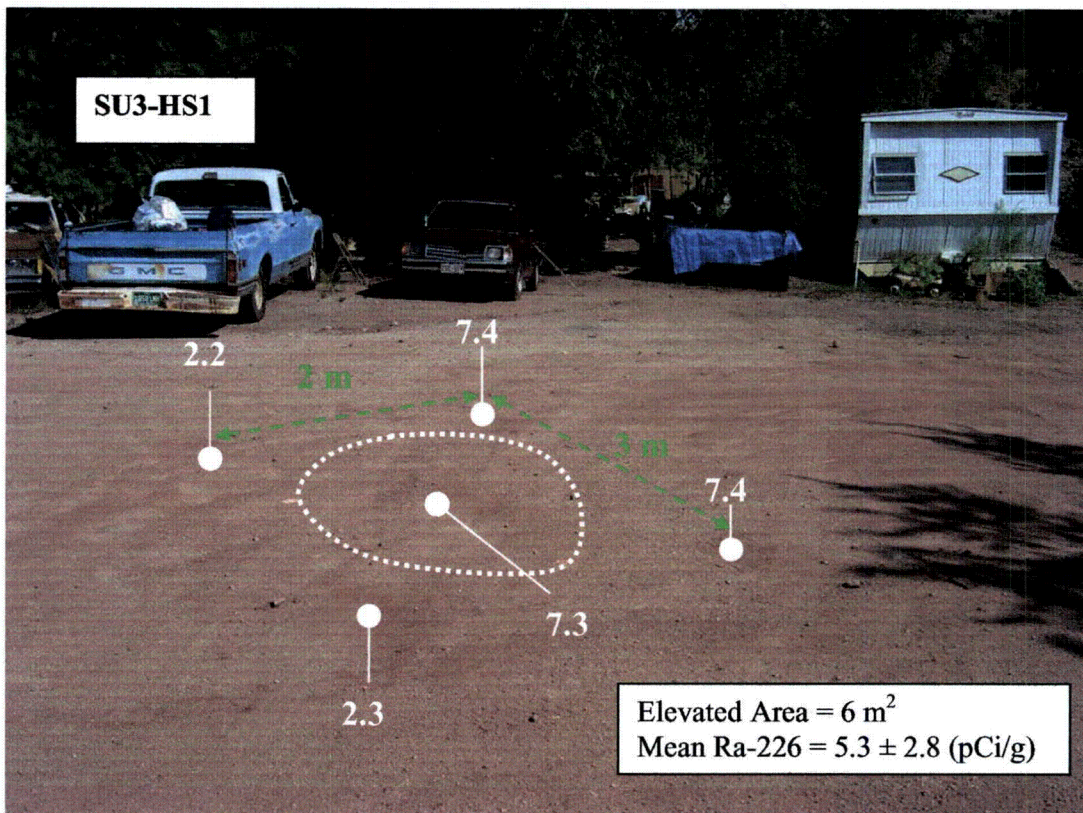
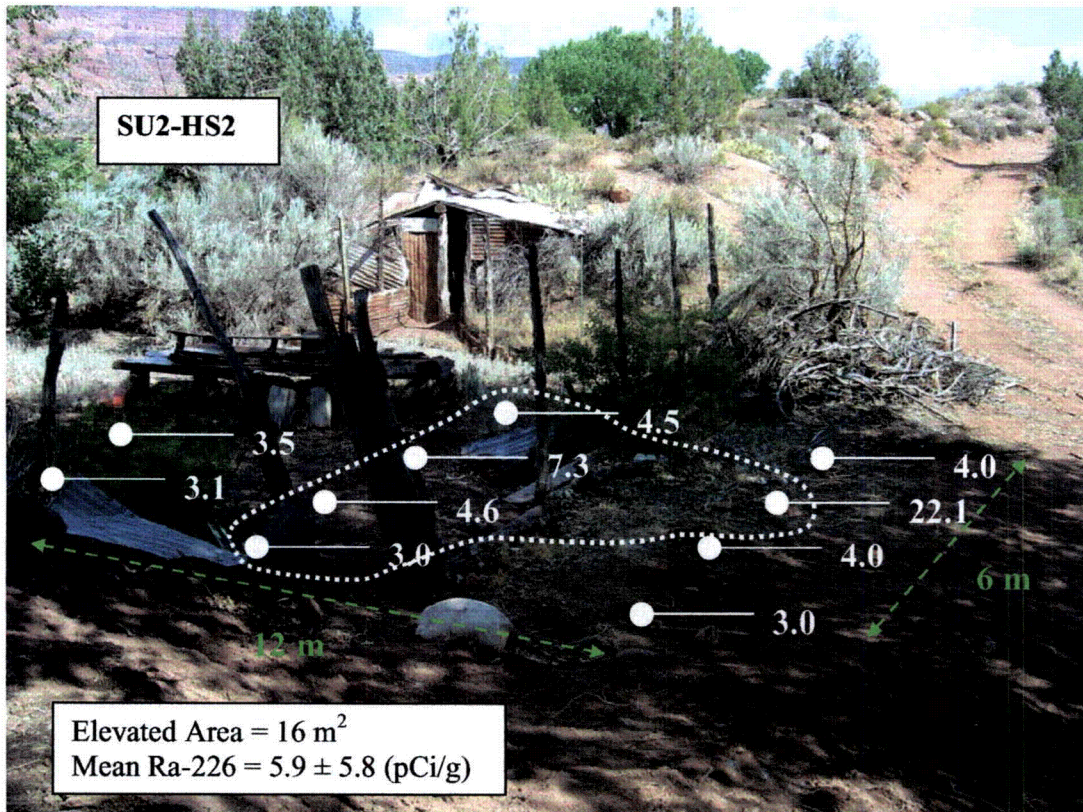
This 10th day of February, 2006
at Oak Ridge, Tennessee

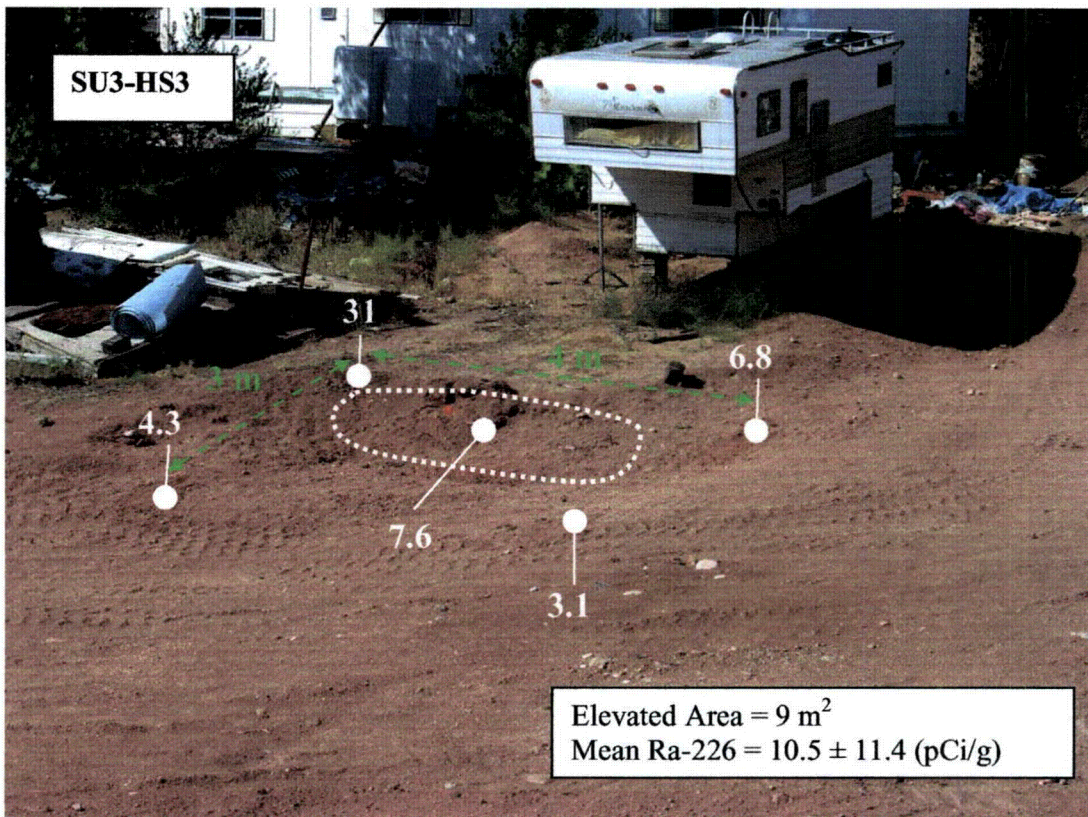
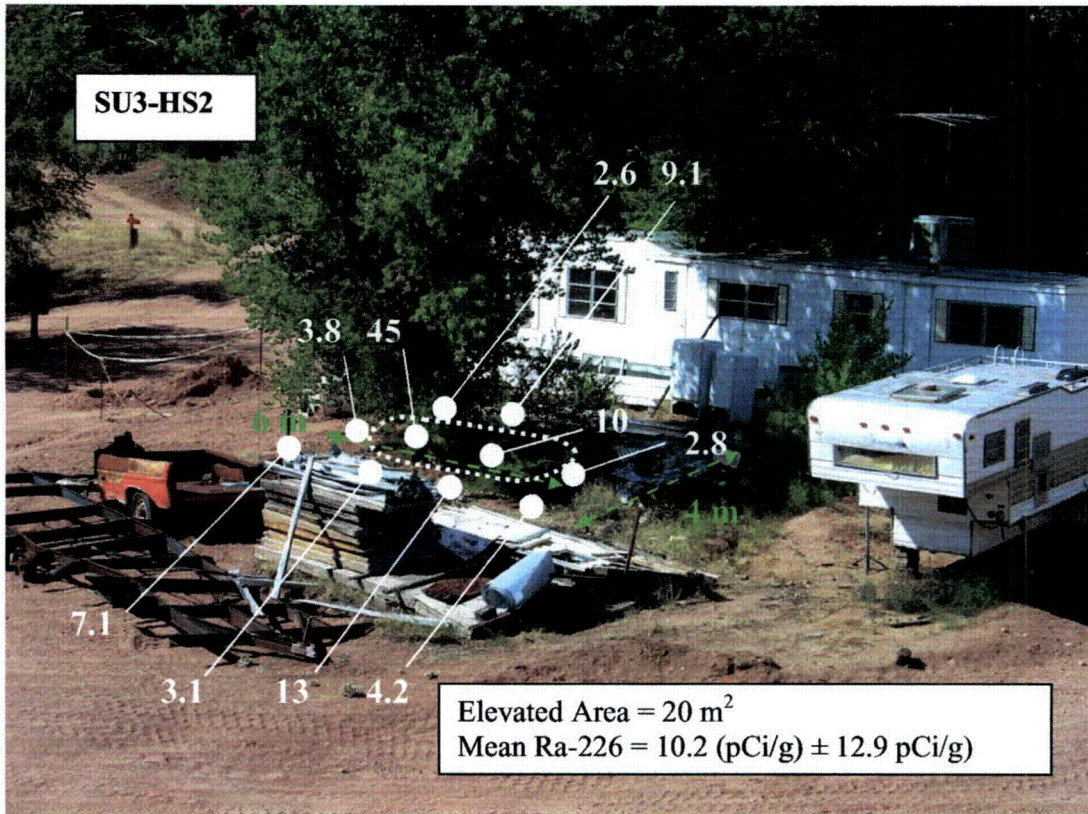
A handwritten signature in black ink, appearing to be "R. Whicker", is written over a horizontal line.

ATTACHMENT H

**PHOTOGRAPH DIAGRAMS:
MARSSIM
HOT SPOT DELINEATIONS**







ATTACHMENT I

**RESRAD OUTPUT RESULTS
FOR
POST-REMEDICATION DOSE ASSESSMENT**

ATTACHMENT J

**INSTRUMENTATION
QUALITY CONTROL RECORDS**

GATEWAY PROJECT DAILY INSTRUMENT LOG

Each survey instrument must be checked daily for reproducibility using the check source (mounted lantern mantle) according to the following procedure:

1. Turn the instrument on.
2. Record the date on the instrument log sheet.
3. Check and record the battery voltage on the appropriate instrument log sheet
4. The battery voltage must be 5 v or greater. If it is less than 5 v replace the batteries or notify the Radiation Safety Officer.
5. Set the meter to "scaler". Set the time switch to 0.5 minutes.
6. Remove the plastic cover from the detector face. Place the detector face down on the table.
7. Push the "count" button. The scaler will automatically record counts for 0.5 minutes.
8. Record the background count on the daily log sheet.
9. Open the check source cover.
10. Place the detector directly on the check source using the red plastic Pringles cover to support the detector handle so the detector is flat against the source..
11. Set the meter to "scaler". Make sure the time switch is on 0.5 minutes.
12. Push the count button. The scaler will record counts for 0.5 minutes.
13. Record the count on the log sheet. Check to make sure the count is within the control limits provided on the log sheet.
14. Add comments to the log sheet if necessary.
15. Initial the log sheet.

INSTRUMENT LOG SHEET

Type Alpha (43-5, 2221)

Meter Serial No. 97282 Probe Serial No. 093648

Instrument control limits (3 sigma) 135 - 197 %0.5m source
< 3 bkg

Date	Batt. Volt.	Count (0.5 min)		Comments	Init.
		Bkg.	Source		
4/4/66	5.5	0	177	nw	JAJ
4/5/66	5.2	0	312	Th-232	JAJ
4/6/66	5.5	0	148	"	BS
4/7/66	5.5	2	185	"	BS
4/11/66	5.5	1	174	"	BS
4/12/66	5.5	1	155	"	BS
4/13/66	5.5	0	187	"	BS
4/25/66	5.5	0	158	"	W/H
5/4/66	5.4	1	181	"	BS
5/4/66	6.3	0	178	"	nw
5/5/66	6.4	0	149	"	BS
5/8/66	6.3	0	149	"	BS
5/9/66	6.3	0	157	"	BS
5/10/66	6.2	0	168	Th-232	W/H
5/11/66	6.1	0	156	Th-232	C.E.C.
5/12/66	6.1	0	152	Th-232	C.E.C.
5/13/66	6.1	0	149	Th-232	C.E.C.
5/14/66	6.1	0	136	Th-232	W/H
5/16/66	6.1	0	167	"	BS
5/17/66	6.0	0	151	"	BS
5/18/66	6.0	2	168	"	BS
5/19/66	6.0	0	160	"	BS
5/20/66	5.9	2	179	Th-232 10	BS
5/23/66	5.9	2	163	"	W/O
5/24/66	5.8	0	155	"	BS
5/24/66	5.8	0	154	test middle of probe	JAJ
5/24/66			144	test distal end of probe	JAJ
5/24/66			169	test proximal end of probe	JAJ
5/26/66	5.8	1	163	Th-232	C.E.C.
5/30/66	5.9	0	160	Th-232	BS
5/4/66	5.9	0	201	"	BS
6/ Jun 06	5.8	0	168	"	W/H
32 Jun 06	5.8	0	157	"	W/H
June 5/66	5.8	1	191	Th-232	BS
6/6/66	5.8	1	180	Th-232	W/H
6/7/66	5.8	0	156	Th-232	TS
6/8/66	5.8	2	134	Th-232	N/A

INSTRUMENT LOG SHEET

Type Alpha (43-5/2221)
 Probe 73680
 Meter 79692
 Serial No. 093651 Probe Serial No. 79692
 Instrument control limits (3 sigma) 141 - 230 / ^{0.5m} source
< 3 bkg

Date	Batt. Volt.	Count (0.5 min)		Comments	Init.
		Bkg.	Source		
4/4/06					
4/4/06	6.2	0	166	Th-232	JAF
4/24/06	6.2	0	149	"	C.E.C.
4/25/06	6.2	1	153	"	C.E.C.
26 Apr 06	6.2	0	187	"	W.F.
4/27/06	6.2	0	205	"	W.F.
5/2/06	6.2	0	177	Th-232	C.E.C.
5/3/06	6.1	1	180	"	W.F.
5/4/06	6.1	1	193	"	BJ
5.5.06	6.1	←		COUNTER NOT WORKING	
5/6/06	6.1	1	154	Th 232	BJ
5/7/06	6.0	1	183	"	BJ
5/10/06	6.2	2	184	Th-232	C.E.C.
5/11/06	6.1	0	152	Th-232	C.E.C.
5/12/06	6.1	0	181	Th-232	C.E.C.
5/13/06	6.1	0	167	Th-232	C.E.C.
5/15/06	6.1	0	154	Th-232	C.E.C.
5/16/06	6.1	1	213	"	BJ
5/17/06	6.1	0	168	"	BJ
5/18/06	6.1	1	220	"	BJ
5/19/06	6.0	0	173	"	W.F.
5/22/06	6.0	2	194	Th-232 to	BJ
5/23/06	6.0	1	167	"	W.F.
5/24/06	6.0	2	182	Th-232 "	BJ
5/25/06	6.0	1	103	" " "	C.E.C.
5/30/06	6.0	1	208	Th 232	BJ
5/31/06	6.0	2	199	Th-232	BJ
02 Jun 06	6.0	2	176	Th-232	W.F.
5 June 06	6.0	1	195	Th-232	BJ
06/6/06	6.0	1	172	Th-232	C.E.C.
6-7-06	6.0	0	180	Th-232	C.E.C.
6-8-06	6.0	2	184	Th-232	W.F.
6-13-06	6.0	1	152	"	W.F.

INSTRUMENT LOG SHEET

Type Beta/Gamma (44-9/2221)

Meter Serial No. 67423 Probe Serial No. 67706

Instrument control limits (3 sigma) 990-1193 source
16-45 Bkg

Date	Batt. Volt.	Count (0.5 min)		Comments	Init.
		Bkg.	Source		
4/4/06	6.3	32	1114	na	ja
4/5/06	6.4	64	2300	Source Th 232	ja
4/11/06	6.3	37	1161	"	BS
4/12/06	6.3	27	1152	"	BS
4/12/06	6.3	44	1121	"	BS
4/25/06	6.3	33	1185	Source Th 232	Call
5/2/06	6.3	35	1092	" "	CEC
5/4/06	6.2	25	1111	" "	MLW
5/5/06	6.3	28	1153	" "	BS
5/8/06	6.2	34	1099	" "	BS
5/9/06	6.2	35	1092	" "	BS
5/10/06	6.2	35	1091	Th 232	Call
5/11/06	6.2	33	1075	"	CEC
5/12/06	6.2	35	1081	"	CEC
5/13/06	6.2	36	1088	"	CEC Call
5/15/06	6.2	34	1101	Th 232	Call
5/16/06	6.2	26	1132	"	BS
5/17/06	6.2	25	1104	"	BS
5/18/06	6.2	27	1122	"	BS
5/19/06	6.2	36	1077	"	BS
5/22/06	6.2	23	1079	Th - 232 10	BS
5/23/06	6.2	27	1035	"	BS
5/24/06	6.2	37	1199	"	BS
5/24/06	6.2	34	1079	test	
5/30/06	6.2	37	1223	Th-232	BS
6/1/06	6.2	38	1223	"	BS
6/8/06	6.2	29	1067	Th - 232	N 40
6/15/06	6.2	33	1091	"	N 6

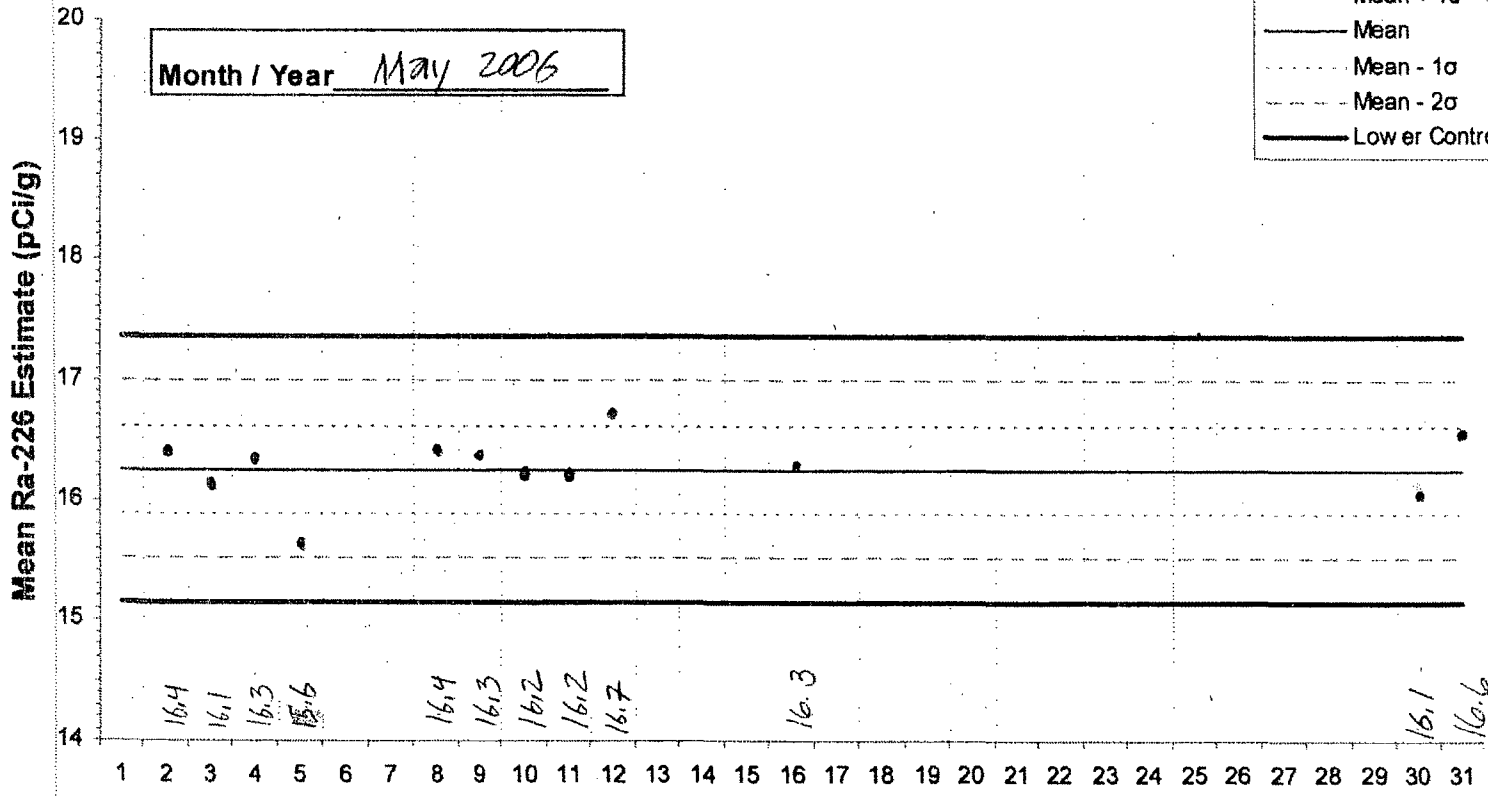
1 minute count

(ALCOA-1)

Gateway SOURCE check control chart for MCA system

Month / Year May 2006

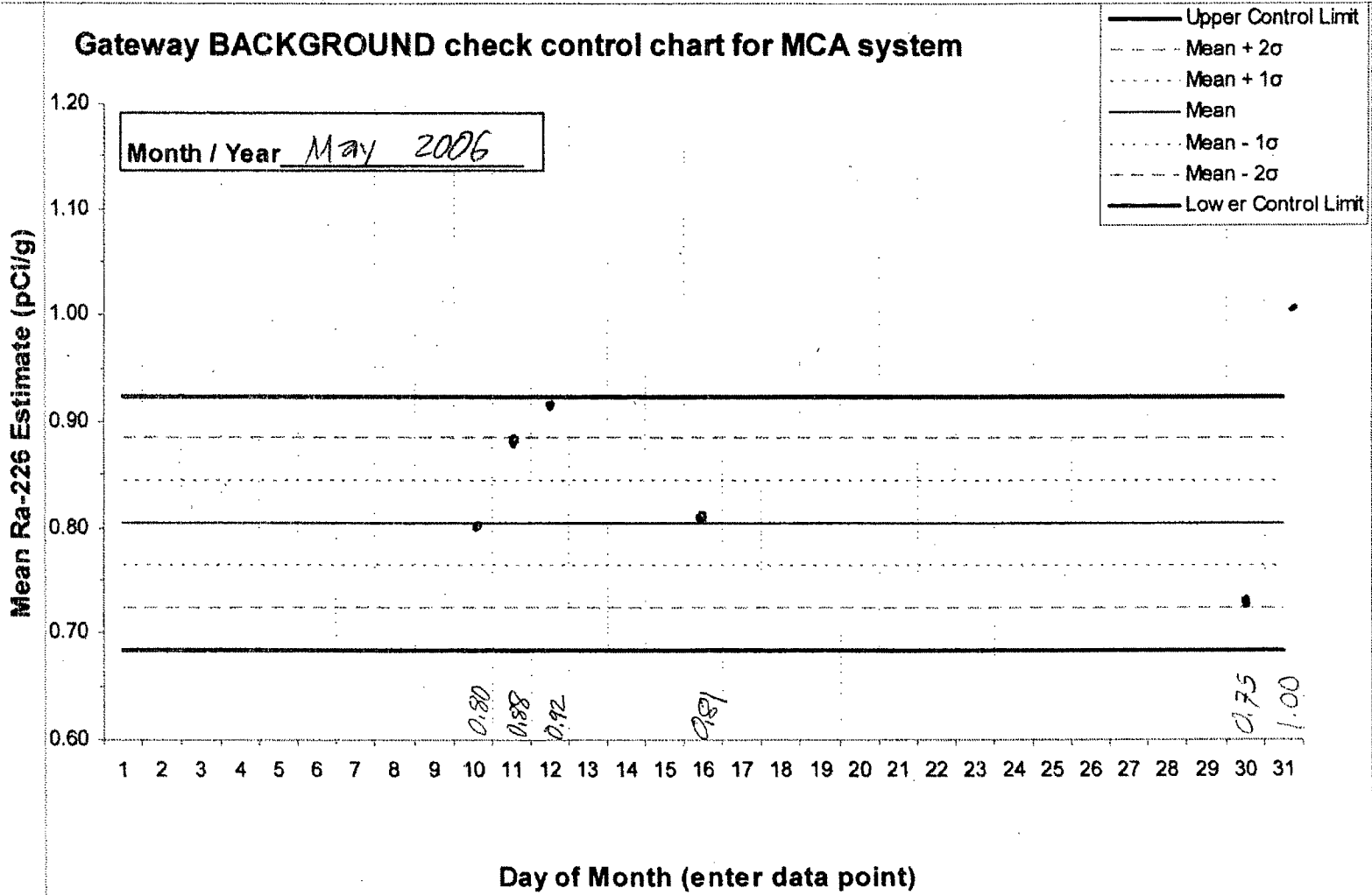
- Upper Control Limit
- - - Mean + 2σ
- · · Mean + 1σ
- Mean
- · · Mean - 1σ
- - - Mean - 2σ
- Lower Control Limit



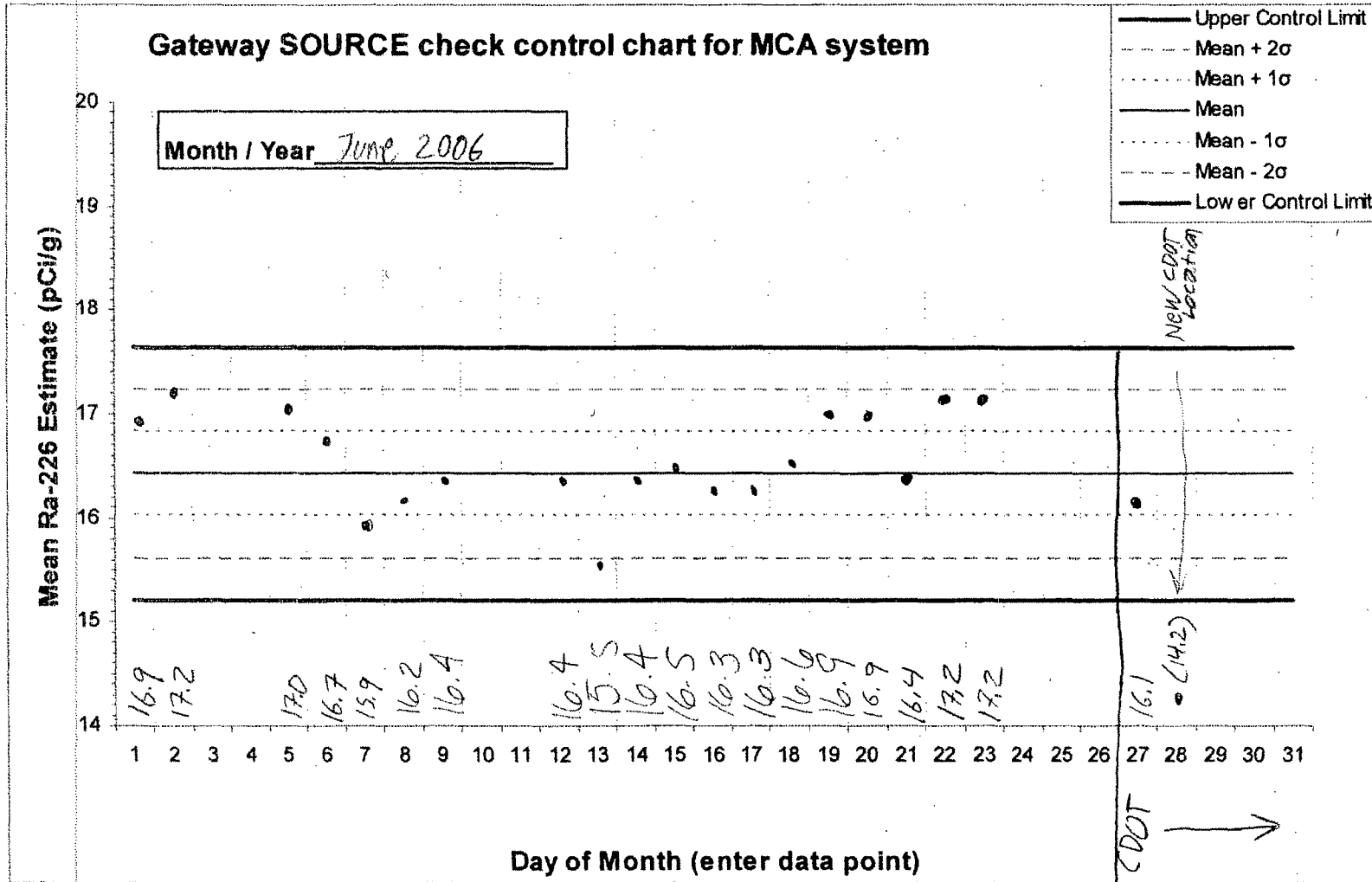
Day of Month (enter data point)

(GW-7)

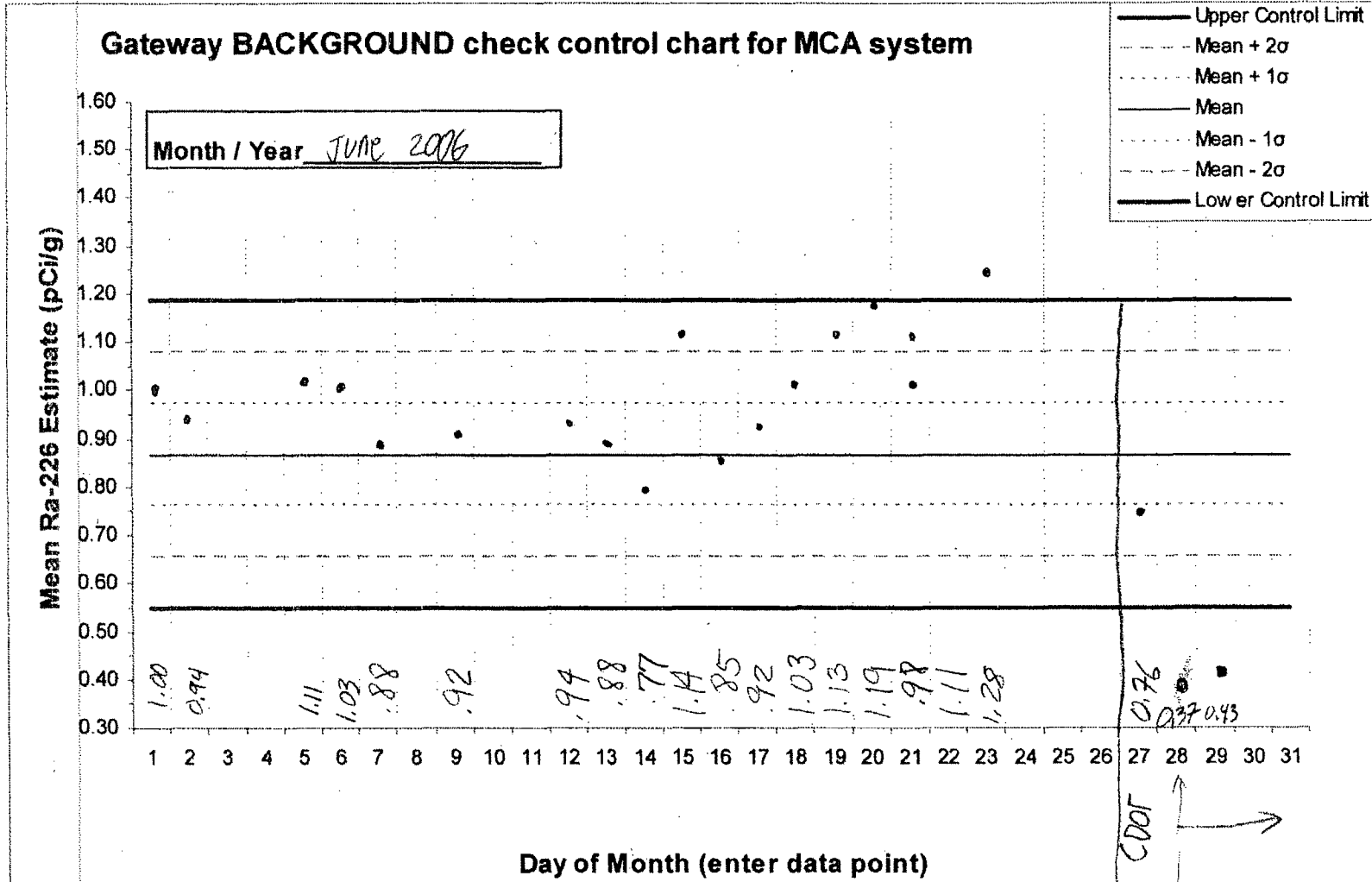
Gateway BACKGROUND check control chart for MCA system



(ALCOA-1)

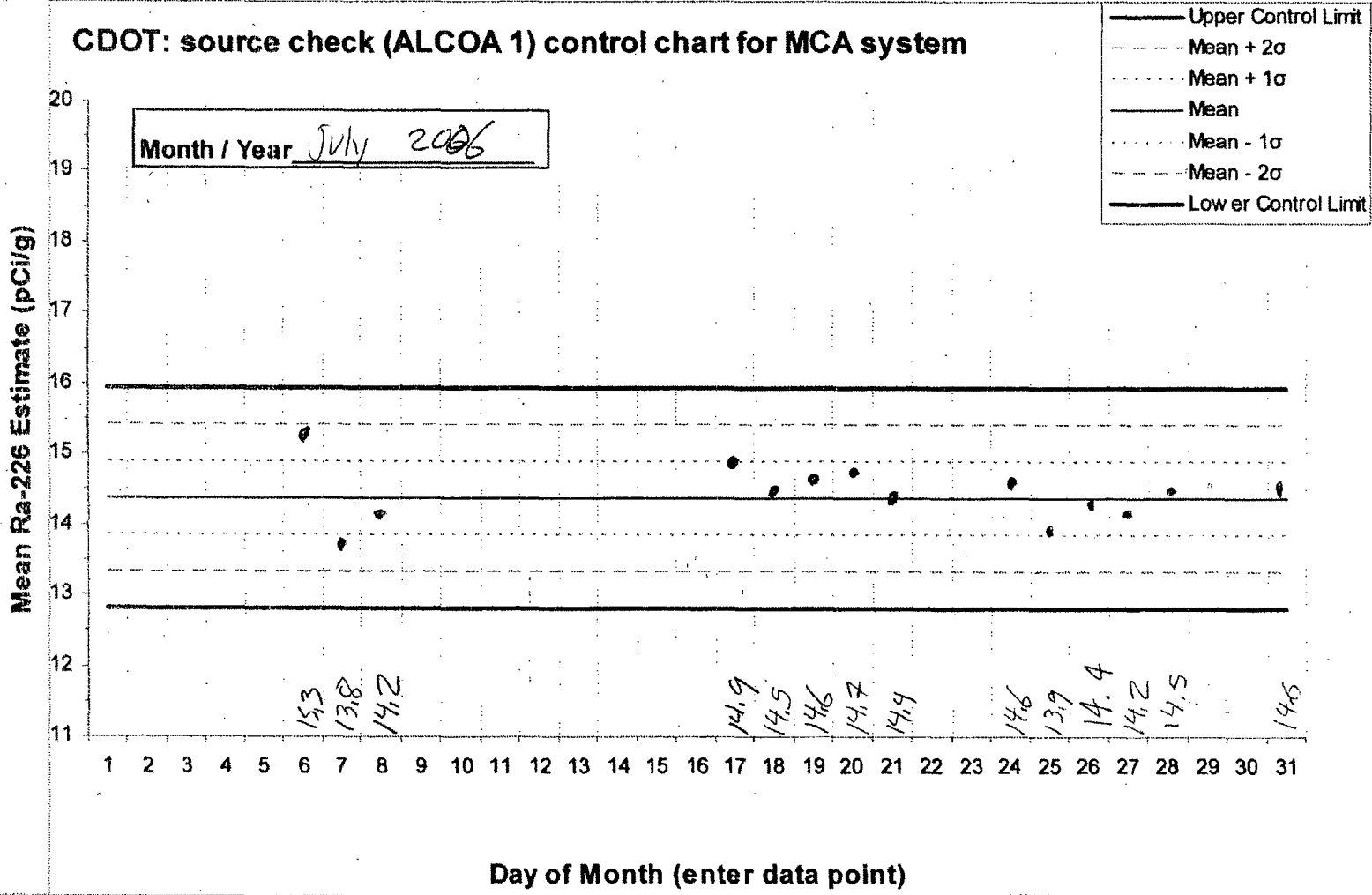


(GW-7)



New location on CDOT

CDOT: source check (ALCOA 1) control chart for MCA system



CDOT: background check (GW-7) control chart for MCA system

Month / Year July 2006

- Upper Control Limit
- Mean + 2 σ
- Mean + 1 σ
- Mean
- Mean - 1 σ
- Mean - 2 σ
- Lower Control Limit

Mean Ra-226 Estimate (pCi/g)

0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

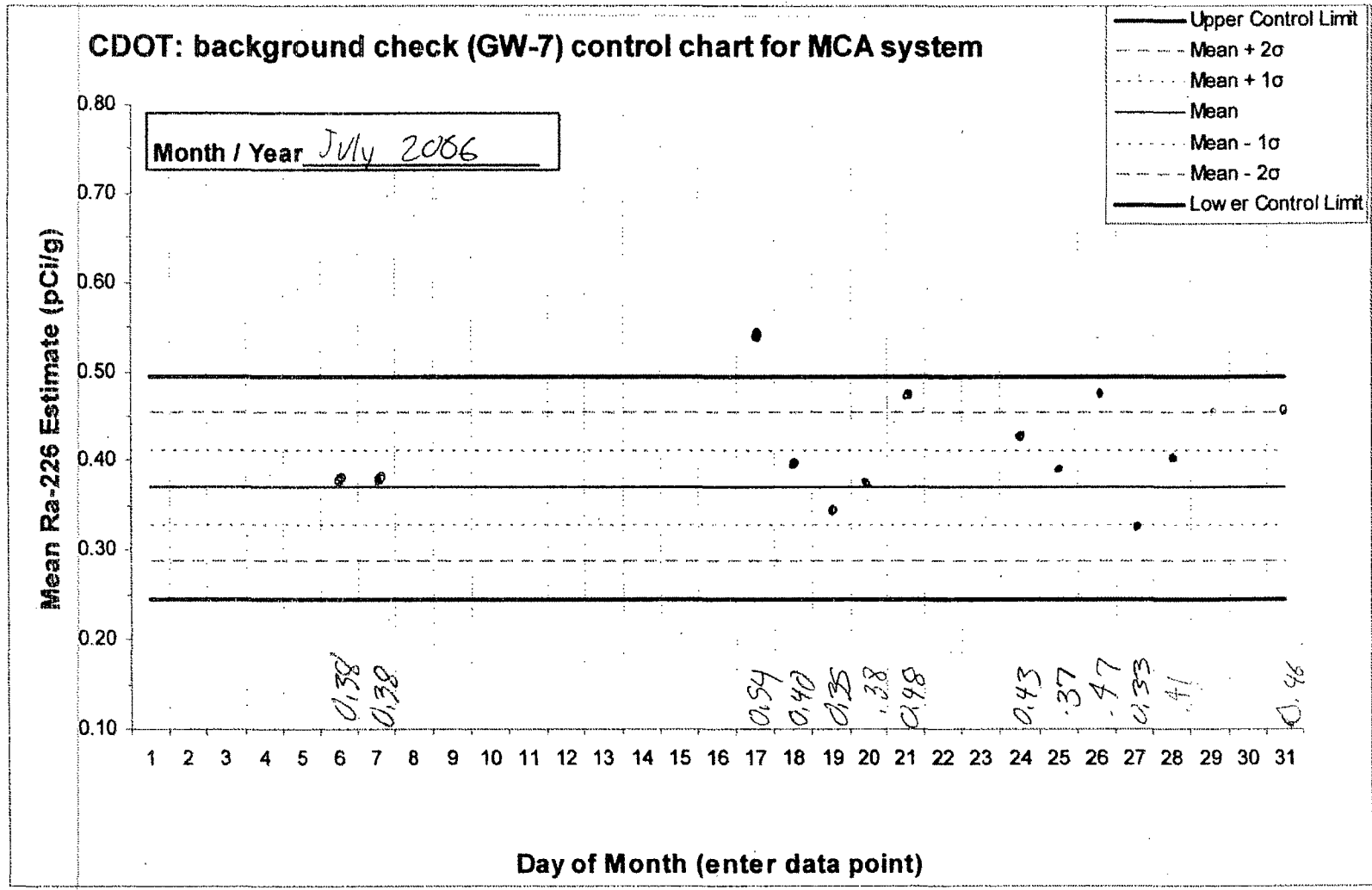
Day of Month (enter data point)

0.38
0.38

0.54
0.40
0.35
0.38
0.48

0.43
0.37
0.47
0.33
0.41

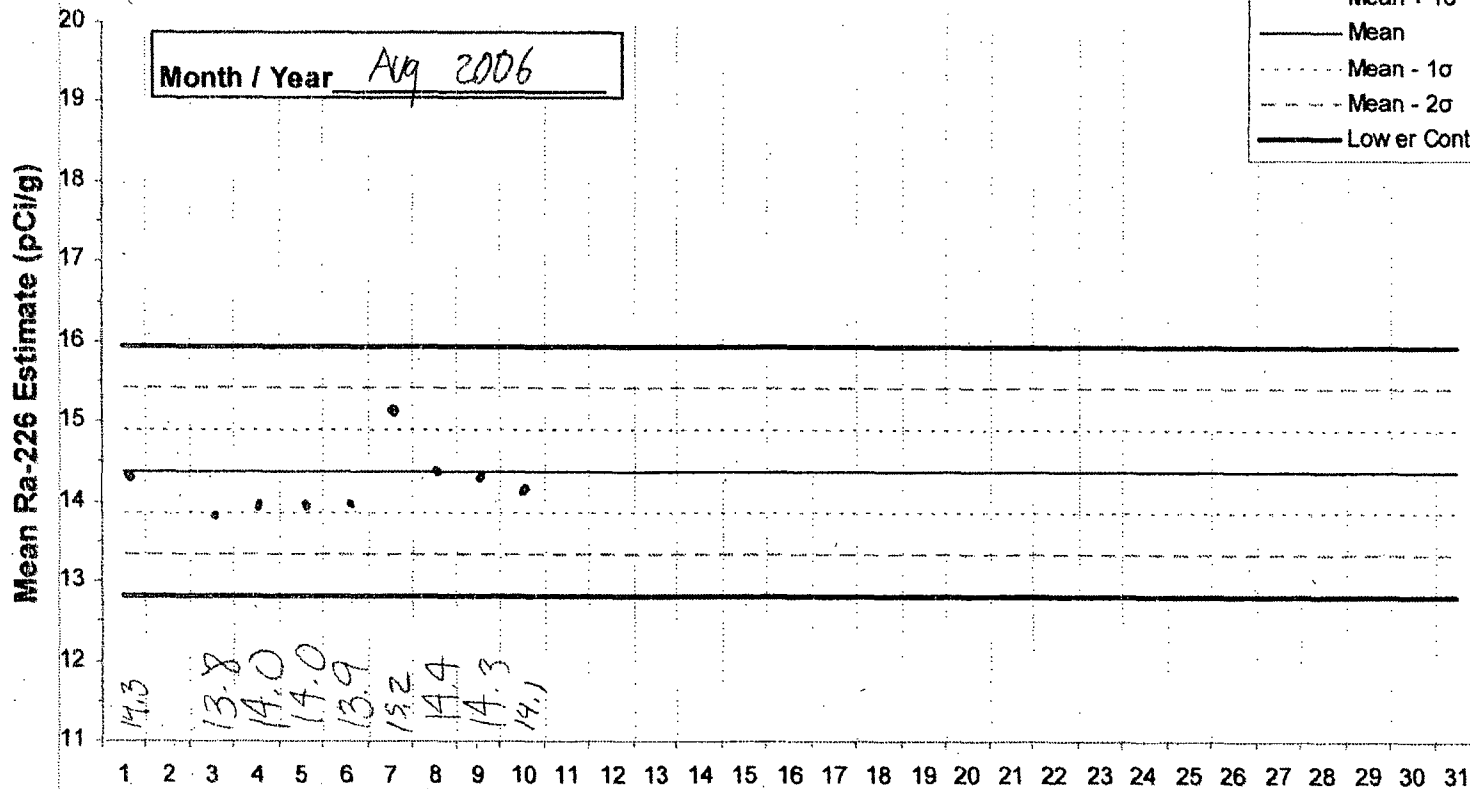
0.46



CDOT: source check (ALCOA 1) control chart for MCA system

Month / Year Aug 2006

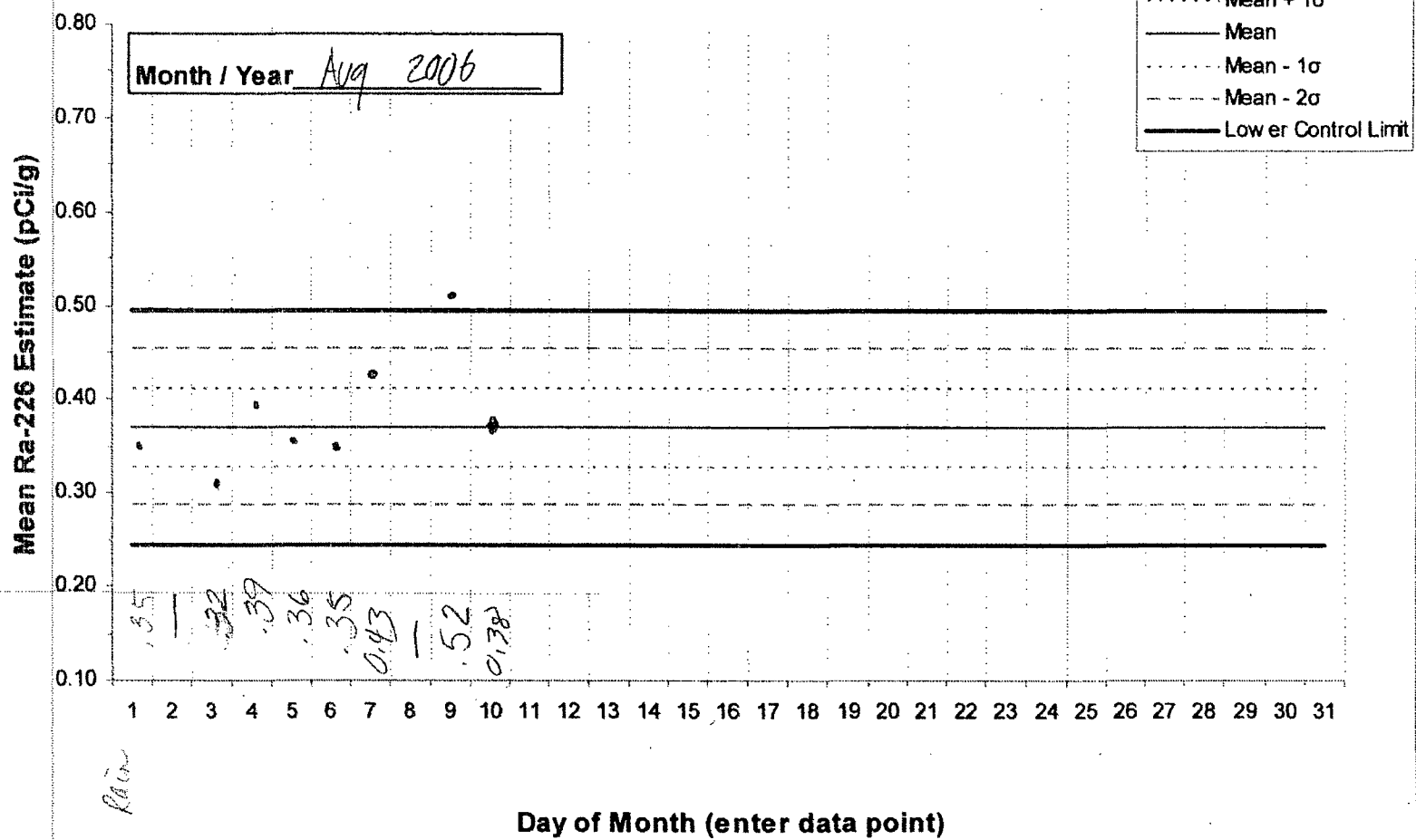
- Upper Control Limit
- - - Mean + 2σ
- · · Mean + 1σ
- Mean
- · · Mean - 1σ
- - - Mean - 2σ
- Lower Control Limit



Rain

Day of Month (enter data point)

CDOT: background check (GW-7) control chart for MCA system





Designer and Manufacturer
of
Scientific and Industrial
Instruments

MFG-6
CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MFG INC ORDER NO. 239613/293765
238783/293308

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 152361

Cal. Date 26-Jul-05 Cal Due Date 26-Jul-06 Cal. Interval 1 Year Meterface N/A

Check mark applies to applicable Instr. and/or detector IAW mfg. spec. T. 73 °F RH 47 % Alt 699.8 mm Hg

New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical check Input Sens. Linearity

F/S Resp. check Reset check Window Operation

Audio check Alarm Setting check Battery check (Min. Volt) 4.4 VDC

Ratemeter Linearity check Integrated Dose check Recycle Mode check

Data Log check Overload check Scaler Readout check Threshold Dial Ratio 100 = 10 mV

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

HV Readout (2 points) Ref./Inst. 500 1 500 V Ref./Inst. 2000 1 1997 V

COMMENTS: Firmware: 37122N24
V/O Firmware: 37123N09
Calibrated w/ 39" cable
(No as-found, loss of memory)
Resolution for Cs-137 \approx 11%

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

Detector #	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity $\pm 10\%$ *
Detector # 1	LMI44-10	PR-121036	1050	100	7 / 1	1.490037E-05	1.000000E+00	
Detector # 2	LMI44-10	PR-121036	1050	100	4 / 2	1.490037E-05	5.171726E+10	<input checked="" type="checkbox"/>
Detector # 3	PEAK	CS-137	811	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

MFG-6

Units: 0 - rad, 1 - Gray, 2 - rem, 3 - Sv, 4 - R, 5 - C/Kg, 6 - Disintegrations, 7 - Counts, 8 - Ci/cm sq., 9 - Bq/cm sq.
Time Base: 0 - Seconds, 1 - Minutes, 2 - Hours * See attached detector documentation, if applicable.

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400kcpm	N/A	400.35	400cpm	N/A	40
	40kcpm	S	3999	40cpm	S	4
	4kcpm	S	400			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other international Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL 2540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 Gamma S/N
 1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304
 Alpha S/N Beta S/N Other Am 241 \approx Cs-137, Ci
 m 500 S/N 50800 Multimeter S/N 83990502

Calibrated By: Charles Dick Date 26-Jul-05
Reviewed By: [Signature] Date 26-Jul-05



Designer and Manufacturer
of
Scientific and Industrial
Instruments

MFG-7
CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MFG INC ORDER NO. 238783/293308

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 129438

Cal. Date 25-Jul-05 Cal Due Date 25-Jul-06 Cal. Interval 1 Year Meterface N/A

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 47 % Alt 699.8 mm Hg

- New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments
- Mechanical check Input Sens. Linearity
- F/S Resp. check Reset check Window Operation
- Audio check Alarm Setting check Battery check (Min. Volt) 4.4 VDC
- Ratemeter Linearity check Integrated Dose check Recycle Mode check
- Data Log check Overload check Scaler Readout check Threshold Dial Ratio 100 = 10 mV
- Calibrated In accordance with LMI SOP 14.8 rev 12/05/89. Calibrated In accordance with LMI SOP 14.9 rev 02/07/97.

HV Readout (2 points) Ref./Inst. 500 1 501 V Ref./Inst. 2000 1 2004 V

COMMENTS:

Firmware: 37122N21

I/O Firmware: 37123N05

Calibrated w/ 39" cable

No as-founds (Loss of memory)

Resolution for Cs-137 ≈ 12%

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

Detector #	Probe Model	Serial #	High Voltage	Threshold	Units/Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI44-10	PR-121033	1100	100	7 / 1	1.552968E-05	1.000000E+00	
Detector # 2	LMI44-10	PR-121033	1100	100	4 / 2	1.552968E-05	5.024622E+10	✓
Detector # 3	PEAK	CS-137	816	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

MFG-7

Units: 0 - rad, 1 - Gray, 2 - rem, 3 - Sv, 4 - R, 5 - Ci/Kg, 6 - Disintegrations, 7 - Counts, 8 - Ci/cm sq., 9 - Bq/cm sq.
Time Base: 0 - Seconds, 1 - Minutes, 2 - Hours

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
400kcpm	N/A	40036 (0)	400cpm	N/A	40 (0)
40kcpm	✓	3999	40cpm	✓	4
4kcpm	✓	400			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

- Reference Instruments and/or Sources:** Cs-137 Gamma S/N
- 1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304
- Alpha S/N Beta S/N Other Am 241 geo. tool
- m 500 S/N 50800 Multimeter S/N 83990502

Calibrated By: [Signature] Date 25 Jul 05
Reviewed By: [Signature] Date 26 Jul 05



Designer and Manufacturer
of
Scientific and Industrial
Instruments

MFB-8

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MFG INC ORDER NO. 242752/295372

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 134759

Cal. Date 21-Sep-05 Cal Due Date 21-Sep-06 Cal. Interval 1 Year Meterface N/A

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 75 °F RH 45 % Alt. 697.8 mm Hg

New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical check Input Sens. Linearity

F/S Resp. check Reset check Window Operation

Audio check Alarm Setting check Battery check (Min. Volt) 4.4 VDC

Ratemeter Linearity check Integrated Dose check Recycle Mode check

Data Log check Overload check Scaler Readout check Threshold Dial Ratio 100 = 10 mV

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

HV Readout (2 points) Ref./Inst. 500 / 499 V Ref./Inst. 2000 / 1995 V

COMMENTS: Firmware: 37122N28
I/O Firmware: 37123N05

Resolution for Cs-137 \approx 10%

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

Detector #	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity $\pm 10\%$ *
Detector # 1	LMI44-10	PR139483	950	100	4 / 2	1.368264E-05	5.545344E+10	<input checked="" type="checkbox"/>
Detector # 2	LMI44-10	PR139483	950	100	7 / 1	1.368264E-05	1.000000E+00	
Detector # 3	PK/CS-137	PR139483	646	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 - rad, 1 - Gray, 2 - rem, 3 - Sv, 4 - R, 5 - C/Kg, 6 - Disintegrations, 7 - Counts, 8 - Ci/cm sq., 9 - Bq/cm sq.

Time Base: 0 - Seconds, 1 - Minutes, 2 - Hours

* See attached detector documentation, if applicable.

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
400kcpm	39975 (0)	39975 (0)	400cpm	40 (0)	40 (0)
40kcpm	3997 6	3997 6	40cpm	4 3	4 3
4kcpm	400 7	400 7			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other international Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference instruments and/or Sources: Cs-137 Gamma S/N

1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Beta S/N Other Am241-0.76uCi

m 500 S/N 50800 Multimeter S/N 83990502

Calibrated By: Charles Date 21 Sep 05

Reviewed By: WJH Date 22 Sep 05



Designer and Manufacturer
of
Scientific and Industrial
Instruments

MIF6-9
CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MFG INC ORDER NO. 242259 / 295159

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 129403

Cal. Date 20-Sep-05 Cal Due Date 20-Sep-06 Cal. Interval 1 Year Meterface N/A

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 47 % Alt 702.8 mm Hg

New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical check Input Sens. Linearity

F/S Resp. check Reset check Window Operation

Audio check Alarm Setting check Battery check (Min. Volt) 4.4 VDC

Ratemeter Linearity check Integrated Dose check Recycle Mode check

Data Log check Overload check Scaler Readout check Threshold Dial Ratio 100 = 10 mV

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

HV Readout (2 points) Ref./Inst. 500 / 499 V Ref./Inst. 2000 / 1995 V

COMMENTS: Firmware: 37122N21

I/O Firmware: 37123N05

Resolution for Cs137 = 10.57 %

MIF6-9

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

Detector #	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI44-10	PR-135858	950	100	4 / 2	1.587509E-05	5.666091E+10	<input checked="" type="checkbox"/>
Detector # 2	LMI44-10	PR-135858	950	100	7 / 1	1.587509E-05	1.000000E+00	
Detector # 3	CS-137	PEAK	692	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 - rad, 1 - Gray, 2 - rem, 3 - Sv, 4 - R, 5 - C/Kg, 6 - Disintegrations, 7 - Counts, 8 - Ci/cm sq., 9 - Bq/cm sq.

Time Base: 0 - Seconds, 1 - Minutes, 2 - Hours

* See attached detector documentation, if applicable.

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400kcpm	39917(0)	39917(0)	400cpm	40(0)	40(0)
	40kcpm	3989	3989	40cpm	4	4
	4kcpm	399	399			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other international Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference instruments and/or Sources: Cs-137 Gamma S/N

1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Beta S/N Other Am 241 20.83 uCi

m 500 S/N 81084 Multimeter S/N 78401030

Calibrated By: Sebastian Abellan Date 20-Sep-05

Reviewed By: [Signature] Date 20-Sep-05



Designer and Manufacturer of Scientific and Industrial Instruments

Meter-12 CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MFG INC ORDER NO. 240345/294147

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 134764

Cal. Date 8-Aug-05 Cal Due Date 8-Aug-06 Cal. Interval 1 Year Meterface N/A

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 54 % Alt 700.8 mm Hg

New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical check Input Sens. Linearity

F/S Resp. check Reset check Window Operation

Audio check Alarm Setting check Battery check (Min. Volt) 4.4 VDC

Rateometer Linearity check Integrated Dose check Recycle Mode check

Data Log check Overload check Scaler Readout check Threshold Dial Ratio 100 = 10 mV

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 1996 V

COMMENTS: Firmware: 37122N21

I/O Firmware# 37123n05.

Resolution for Cs-137 is 9%.

No "AS FOUNDS" due to no memory./ NO CABLE.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-0 in which the front of probe faces source.

Detector #	Probe Model	Serial #	High Voltage	Threshold	Units/Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector #1	LMI44-10	PR138484	900	100	4 / 2	1.288141E-06	5.683448E+10	<input checked="" type="checkbox"/>
Detector #2	LMI44-10	PR138484	900	100	7 / 1	1.288141E-06	1.000000E+00	
Detector #3	PK/CS-137	682 KEV	688	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 - rad, 1 - Gray, 2 - rem, 3 - Sv, 4 - R, 5 - C/kg, 6 - Disintegrations, 7 - Counts, 8 - C/cm sq, 9 - Bq/cm sq

Time Base: 0 - Seconds, 1 - Minutes, 2 - Hours

* See attached detector documentation, if applicable.

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
400cpm	N/A	400.2 (0)	400cpm	N/A	40 (0)
40cpm	N/A	39.8 (0)	40cpm	N/A	4 (0)
4cpm	N/A	3.99 (0)			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/MCSL 2540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LC-1963

Reference Instruments and/or Sources: Cs-137 Gamma S/N

1162 G112 M565 5105 T11008 T879 E552 E551 720 734 1616 Neutron Am-241 Ba S/N T-304

Alpha S/N Beta S/N Other Am-241/Co-60,75,137

m 500 S/N 189509 Multimeter S/N 80820360

Calibrated By: Mark Camp

Date 8-Aug-05

Reviewed By: L. Fullinsbee

Date 9 Aug 05



Designer and Manufacturer
of
Scientific and Industrial
Instruments

Meter-10
CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MFG INC ORDER NO. 242595 / 295298

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 134771

Cal. Date 27-Sep-05 Cal Due Date 27-Sep-06 Cal. Interval 1 Year Meterface N/A

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 77 °F RH 38 % Alt 703.8 mm Hg

New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical check Input Sens. Linearity

F/S Resp. check Reset check Window Operation

Audio check Alarm Setting check Battery check (Min. Volt) 4.4 VDC

Ratemeter Linearity check Integrated Dose check Recycle Mode check

Data Log check Overload check Scaler Readout check Threshold Dial Ratio 100 = 10 mV

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 1997 V

COMMENTS: Firmware: 37122N28

I/O Firmware: 37123N05

Calibrated using 39" C-cable.

Resolution for Cs137 = 9.97%

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-B in which the front of probe faces source.

Detector #	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%
Detector # 1	LMI44-10	PR135850	900	100	4 / 2	1.286674E-05	5.601303E+10	<input checked="" type="checkbox"/>
Detector # 2	LMI44-10	PR135850	900	100	7 / 1	1.286674E-05	1.000000E+00	
Detector # 3	LMI44-10	CS137/PK	576	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 - rad, 1 - Gray, 2 - rem, 3 - Sv, 4 - R, 5 - C/Kg, 6 - Disintegrations, 7 - Counts, 8 - Ci/cm sq., 9 - Bq/cm sq.

Time Base: 0 - Seconds, 1 - Minutes, 2 - Hours

* See attached detector documentation, if applicable.

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400kcpm	1	399.15(0)	400cpm	N/A	40(0)
	40kcpm	N/A	399.1	40cpm	1	40
	4kcpm	1	399.1			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 Gamma S/N

1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Beta S/N Other Am241 ≈ 0.83 μCi

m 500 S/N 81084 Multimeter S/N 78401030

Calibrated By: Sebasth Caballo Date 27-Sep-05
Reviewed By: WAL Date 27 Sept 06



Designer and Manufacturer
of
Scientific and Industrial
Instruments

MFG-11

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MFG INC ORDER NO. 257272/303277-A

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 120635

Cal. Date 22-Jun-06 Cal Due Date 22-Jun-07 Cal. Interval 1 Year Meterface N/A

check mark applies to applicable Instr. and/or detector IAW mfg. spec. T. 72 °F RH 48 % Alt 697.8 mm Hg

New Instrument Instrument Received Within Toler. $\pm 10\%$ 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical check Input Sens. Linearity

F/S Resp. check Reset check Window Operation

Audio check Alarm Setting check Battery check (Min. Volt) 4.4 VDC

Ratemeter Linearity check Integrated Dose check Recycle Mode check

Data Log check Overload check Scaier Readout check Threshold Dial Ratio 100 = 10 mV

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

HV Readout (2 points) Ref./Inst. 500 / 498 V Ref./Inst. 2000 / 1999 V

COMMENTS: Firmware: 37122N28

I/O Firmware: 37123N05

Calibrated using 39" C-cable.

Resolution for Cs137 = 9.82%

MFG-11

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

Detector #	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity $\pm 10\%$
Detector # 1	LMI44-10	PR102507	1150	100	4 / 2	1.589964E-05	5.372660E+10	<input checked="" type="checkbox"/>
Detector # 2	LMI44-10	PR102507	1150	100	7 / 1	1.589964E-05	1.000000E+00	
Detector # 3	CS137PK	662KEV	796	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 - rad, 1 - Gray, 2 - rem, 3 - Sv, 4 - R, 5 - C/Kg, 6 - Disintegrations, 7 - Counts, 8 - Ci/cm sq., 9 - Bq/cm sq.

Time Base: 0 - Seconds, 1 - Minutes, 2 - Hours

* See attached detector documentation, if applicable.

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400kcpm	39945 (o)	39945 (o)	400cpm	40 (o)	40 (o)
	40kcpm	3992	3992	40cpm	4	4
	4kcpm	400	400			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 Gamma S/N

T1162 G112 M565 S105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Beta S/N Other Am241 = 0.83 µCi

m 500 S/N 81084 Multimeter S/N 78401030

Calibrated By: Sebastien Caballer Date 22-Jun-06
Reviewed By: W.C. Allen Date 23-Jun-06



Designer and Manufacturer
of
Scientific and Industrial
Instruments

MFG-13
CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MFG INC ORDER NO. 257272/303277-A

mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 129434

Cal. Date 22-Jun-06 Cal Due Date 22-Jun-07 Cal. Interval 1 Year Meterface N/A

check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 48 % Alt 697.8 mm Hg

New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical check Input Sens. Linearity

F/S Resp. check Reset check Window Operation

Audio check Alarm Setting check Battery check (Min. Volt) 4.4 VDC

Ratemeter Linearity check Integrated Dose check Recycle Mode check

Data Log check Overload check Scaler Readout check Threshold 100 = 10 mV

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

HV Readout (2 points) Ref./Inst. 500 / 499 V Ref./Inst. 2000 / 1998 V

COMMENTS: Firmware: 37122N21

/O Firmware: 37123N05

Calibrated using 39" C-cable.

Resolution for Cs137 ≈ 10.27%

MFG-13

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

Detector #	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI44-10	PR135854	1050	100	4 / 2	1.616440E-05	5.534491E+10	<input checked="" type="checkbox"/>
Detector # 2	LMI44-10	PR135854	1050	100	7 / 1	1.616440E-05	1.000000E+00	
Detector # 3	CS137PK	662KEV	715	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 - rad, 1 - Gray, 2 - rem, 3 - Sv, 4 - R, 5 - C/Kg, 6 - Disintegrations, 7 - Counts, 8 - Ci/cm sq., 9 - Bq/cm sq.

Time Base: 0 - Seconds, 1 - Minutes, 2 - Hours

* See attached detector documentation, if applicable.

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400kcpm	39977 (o)	39977 (o)	400cpm	40 (o)	40 (o)
	40kcpm	3996 ↓	3996 ↓	40cpm	4 ↓	4 ↓
	4kcpm	399 ↓	399 ↓			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LC-1963

Reference Instruments and/or Sources: Cs-137 Gamma S/N

T162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Beta S/N Other Am241 ≈ 0.93 μCi

m 500 S/N 81084 Multimeter S/N 78401030

Calibrated By: Sebastia Caballero Date 22-Jun-06

Reviewed By: [Signature] Date 23 Jun 06



Designer and Manufacturer
of
Scientific and Industrial
Instruments

MFG-15
CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MFG INC ORDER NO. 237348/292580

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 134768

Cal. Date 19-Jun-05 Cal Due Date 19-Jun-06 Cal. Interval 1 Year Meterface n/a

Check mark applies to applicable Instr. and/or detector IAW mfg. spec. T. 73 °F RH 46 % Alt 698.8 mm Hg

- New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments
- Mechanical check Input Sens. Linearity
- F/S Resp. check Reset check Window Operation
- Audio check Alarm Setting check Battery check (Min. Volt) 4.4 VDC
- Ratemeter Linearity check Integrated Dose check Recycle Mode check
- Data Log check Overload check Scaler Readout check Threshold Dial Ratio 100 = 10 mV
- Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 1997 V

COMMENTS: Firmware: 37122N21

I/O Firmware# 37123n05
Resolution for Cs-137 is 10%.

MFG-15

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-B in which the front of probe faces source.

Detector #	Probe Model	Serial #	High Voltage	Threshold	Units/ Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI44-10	PR139491	1000	100	4 / 2	1.498443E-05	5.266030E+10	<input checked="" type="checkbox"/>
Detector # 2	LMI44-10	PR139491	1000	100	7 / 1	1.498443E-05	1.000000E+00	
Detector # 3	PK/CS-137	662 KEV	747	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 - rad, 1 - Gray, 2 - rem, 3 - Sv, 4 - R, 5 - CKg, 6 - Disintegrations, 7 - Counts, 8 - Ci/cm sq., 9 - Bq/cm sq.
Time Base: 0 - Seconds, 1 - Minutes, 2 - Hours

* See attached detector documentation, if applicable.

REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
400 kcpm	39943(0)	39957(0)	400 cpm	40(0)	40(0)
40 kcpm	3984(0)	3986(0)	40 cpm	4(0)	4(0)
4 kcpm	399(0)	399(0)			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Source: Cs-137 Gamma S/N

- 1162 G112 M565 S105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304
- Alpha S/N Beta S/N Other AM-241/Be 0.75µCi
- m 500 S/N 189509 Multimeter S/N 80820360

Calibrated By: Moses Camp Date: 19-Jun-05
Reviewed By: LA R Date: 20-Jun-05



Designer and Manufacturer
of
Scientific and Industrial
Instruments

Meter-19
CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER MFG INC ORDER NO. 249547/299054

Mfg. Ludlum Measurements, Inc. Model 2350-1 Serial No. 120580

Cal. Date 7-Feb-06 Cal Due Date 7-Feb-07 Cal. Interval 1 Year Meterface N/A

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 31 % Alt 706.8 mm Hg

New Instrument Instrument Received Within Toler., +-10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical check Input Sens. Linearity

F/S Resp. check Reset check Window Operation

Audio check Alarm Setting check Battery check (Min. Volt) 4.4 VDC

Ratemeter Linearity check Integrated Dose check Recycle Mode check

Data Log check Overload check Scaler Readout check Threshold Dial Ratio 100 = 10 mV

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

HV Readout (2 points) Ref./Inst. 500 1 500 V Ref./Inst. 2000 1 1995 V

COMMENTS: *Firmware: 37122N27 Resolution for Cs-137 ≈ 12%*
I/O Firmware: 37123N05
No as-founds (Memory loss)

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-B in which the front of probe faces source.

Detector #	Probe Model	Serial #	High Voltage	Threshold	Units/Time Base	Dead Time Correction Factor	Calibration Constant	Linearity ±10%*
Detector # 1	LMI44-10	PR-138177	950	100	7 / 1	1.466405E-05	1.000000E+00	
Detector # 2	LMI44-10	PR-138177	950	100	4 / 2	1.466405E-05	5.542768E+10	<input checked="" type="checkbox"/>
Detector # 3	PEAK	CS-137	688	642	7 / 1	0.000000E+00	1.000000E+00	
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								
Detector #								

Units: 0 - rad, 1 - Gray, 2 - rem, 3 - Sv, 4 - R, 5 - C/Kg, 6 - Disintegrations, 7 - Counts, 8 - Ci/cm sq, 9 - Bq/cm sq.

Time Base: 0 - Seconds, 1 - Minutes, 2 - Hours

* See attached detector documentation, if applicable.

Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	<u>400kcpm</u>	<u>N/A</u>	<u>40046 107</u>	<u>400cpm</u>	<u>N/A</u>	<u>40 107</u>
	<u>40kcpm</u>	<u>5</u>	<u>4006 5</u>	<u>40cpm</u>	<u>5</u>	<u>4 5</u>
	<u>4kcpm</u>	<u>7</u>	<u>400 2</u>			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL 2540-1-1994 and ANSI N323-197B. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 Gamma S/N

1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Am241 ≈ 0.76 μCi Beta S/N Other

m 500 S/N 50800 Multimeter S/N 83990502

Calibrated By: Charles Dick Date 7 Feb 06
Reviewed By: W. R. Blue Date 7 Feb 06

Manufacturer
of
and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-46
SWEETWATER, TEXAS 79556, U.S.A.

DAWN MINING CO

ORDER NO. 237276/292528

Ludlum Measurements, Inc. Model 2221

Serial No. 67423

Ludlum Measurements, Inc. Model 44-9

Serial No. PK067706

Date 14-Jun-05 Cal Due Date 14-Jun-06 Cal. Interval 1 Year Meterface 202-159

check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 72 °F RH 48 % AH 693.8 mm H

New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical ck. Meter Zeroed Background Subtract Input Sens. Linearity
 F/S Resp. ck. Reset ck. Window Operation Geotropism
 Audio ck. Alarm Setting ck. Batt. ck. (Min. Volt) 4.4 VDC

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 900 V Input Sens. 50 mV Det. Oper. 900 V at 50 mV Threshold Dial Ratio 1.0 = 10

HV Readout (2 points) Ref./Inst. 500 / 500 V Ref./Inst. 2000 / 2000 V

COMMENTS:

Instrument calibrated with 39" coax cable
Firmware: 261010

MFG-25

Normal Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1k	400kcpm	400	400
x1k	100kcpm	100	100
x100	40kcpm	400	400
x100	10kcpm	100	100
x10	4kcpm	400	400
x10	1kcpm	100	100
x1	400cpm	400	400
x1	100cpm	100	100

*Uncertainty within ± 10% C.F. within ± 20%

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
400kcpm	398787	398787	500kcpm	500k	500k
40kcpm	39881	39881	50kcpm	50k	50k
4kcpm	3988	3988	5kcpm	5k	5k
400cpm	398	398	500cpm	500	500
40cpm	40	40	50cpm	50	50

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration technique. Calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-19

Reference Instruments and/or Sources:

37 Gamma S/N 1162 G112 M565 S105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-3

Alpha S/N Beta S/N Other

500 S/N 121025 Oscilloscope S/N Multimeter S/N 78846185

Calibrated By: *Ronald*

Date 14-Jun-05

Reviewed By: *W. Rubin*

Date 14 Jun 05

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

AC Inst. Passed Dielectric (Hi-Pol) and Continuity Test

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
 POST OFFICE BOX 810 PH. 325-235-5494
 501 OAK STREET FAX NO. 325-235-4672
 SWEETWATER, TEXAS 79556, U.S.A.

Client: DAWN MINING CO ORDER NO. 237280 / 292530

Ludlum Measurements, Inc. Model 2221 Serial No. 97292
 Ludlum Measurements, Inc. Model 43-5 Serial No. PR 093648

Cal. Date 27-Jun-05 Cal Due Date 27-Jun-06 Cal. Interval 1 Year Meterface 202-159

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 38 % Alt 700.8 mm Hg

New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical ck. Meter Zeroed Background Subtract Input Sens. Linearity

F/S Resp. ck. Reset ck. Window Operation Geotropism

Audio ck. Alarm Setting ck. Batt. ck. (Min. Volt) 5.0 VDC

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 750 V Input Sens. 35 mV Det. Oper. 750 V at 35 mV Threshold Dial Ratio = mV

HV Readout (2 points) Ref./Inst. 500 / 502 1 1995 V

COMMENTS:

Firmware: 261010
 cal'd with a 37" c-cable:

MFG-28

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 1000	400 Kcpm	390	400
X 1000	100 Kcpm	100	100
X 100	40 Kcpm	390	400
X 100	10 Kcpm	100	100
X 10	4 Kcpm	390	400
X 10	1 Kcpm	100	374/100
X 1	400 cpm	390	400
X 1	100 cpm	100	100

*Uncertainty within ± 10% C.F. within ± 20%

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
400 K cpm	39767 (6)	39767 (6)		500 K cpm	500k	500k
40 K cpm	3977	3977		50 K cpm	50k	50k
4 K cpm	397	397		5 K cpm	5k	5k
400 cpm	39	39		500 cpm	500	500
40 cpm	4	4		50 cpm	50	50

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N 1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Pu-239 12,600cpm Beta S/N Other

 m 500 S/N 134709 Oscilloscope S/N Multimeter S/N 86250390

Calibrated By: Jeremy Maxwell Date 27 Jun 05

Reviewed By: [Signature] Date 27 Jun 05

AC Inst. Passed Dielectric (Hi-Pot) and Continuity Test
 Only Failed:

Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER DAWN MINING CO ORDER NO. 237280 / 292530

Ludlum Measurements, Inc. Model 2221 Serial No. 73680

Ludlum Measurements, Inc. Model 43-5 Serial No. PR 093651

Cal. Date 27-Jun-05 Cal Due Date 27-Jun-06 Cal. Interval 1 Year Meterface 202-159

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 38 % Alt 700.8 mm Hg

New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical ck. Meter Zeroed Background Subtract Input Sens. Linearity

F/S Resp. ck. Reset ck. Window Operation Geotropism

Audio ck. Alarm Setting ck. Batt. ck. (Min. Volt) 5.0 VDC

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 750 V Input Sens. 35 mV Det. Oper. 750 V at 35 mV Threshold Dial Ratio = mV

HV Readout (2 points) Ref./Inst. 500 / 495 V Ref./Inst. 2000 / 1966 V

COMMENTS:

Firmware: 261010
Cal'd with a 39" C-cable

MFG-29

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
X 1000	400 Kcpm	390	400
X 1000	100 Kcpm	100	100
X 100	40 Kcpm	390	400
X 100	10 Kcpm	100	100
X 10	4 Kcpm	390	400
X 10	1 Kcpm	100	100
X 1	400 cpm	390	400
X 1	100 cpm	100	100

*Uncertainty within ± 10% C.F. within ± 20%

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
400 K cpm	39731 (6)	39731 (6)	500 K cpm	500K	500K
40 K cpm	3973	3973	50 K cpm	50K	50K
4 K cpm	399	399	5 K cpm	5K	5K
400 cpm	40	40	500 cpm	500	500
40 cpm	4	4	50 cpm	50	50

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:

Cs-137 Gamma S/N 1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Pu-239 12,600cpm Beta S/N Other

500 S/N 134709 Oscilloscope S/N Multimeter S/N 86250390

Calibrated By: Jeremy Maxwell Date 27 Jun 05
Reviewed By: [Signature] Date 27 Jun 05

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc. FORM C22A 11/26/2003

AC Inst. Passed Dielectric (HI-Pot) and Continuity Test
Only Failed:



CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

MFG, Inc.
3801 Automation Way #100
Fort Collins, CO 80525
(970) 223-9600 Fax (970) 223-7171

 consulting scientists and engineers	Client/Project Name: <i>MFG, Inc. / Davis Mill Site Remediation (Gatchman, CO)</i>	MFG, Inc. Contact / Phone Number: <i>Randy Whicker / 970-556-1174</i>	Analysis Requested
Project Number: <i>181316</i>	P.O. Number: <i>181316-6-23-06</i>	Delivery Method / Shipping Document Number: <div style="border: 1px solid black; padding: 5px; transform: rotate(-45deg); display: inline-block;"> <i>U-102 by VET (WATER) K2-226 by VET (WATER) U-102 by VET (WATER) Gross Alpha/Beta</i> </div>	
Send Results / Report To: <i>Randy Whicker MFG, Inc. 3801 Automation Way, Suite 100 Ft. Collins, CO 80525</i>		Sampler (Print Name / Affiliation): <i>Randy Whicker</i>	Preservative Container Type and Size
		Signature: 	

Field Sample No./ Identification	Date	Time	Sample Matrix	Total No. of Cont.	Filt. Y		Filt. N		Filt. Y		Filt. N		Remarks
					Y	N	Y	N	Y	N	Y	N	
1 <i>GWB-8</i>	<i>5-4-06</i>		<i>S</i>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Gamma spec's sent date listed on counting tabs - allow 21 days for</i>
2 <i>GWB-20</i>	<i>5-4-06</i>		<i>S</i>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Rn-223 equilibration before performing</i>
3 <i>SU1-12</i>	<i>6-14-06</i>		<i>S</i>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Gamma spec analysis</i>
4 <i>SU1-17</i>	<i>6-14-06</i>		<i>S</i>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5 <i>SU2-4</i>	<i>6-14-06</i>		<i>S</i>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6 <i>SU2-15</i>	<i>6-14-06</i>		<i>S</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Wet Radiochems</i>
7 <i>SU3-1</i>	<i>6-18-06</i>		<i>S</i>		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Discal counting tabs after gamma-spec</i>
8 <i>SU3-9</i>	<i>6-18-06</i>		<i>S</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>analysis, process sample by standard</i>
9 <i>SU3-22</i>	<i>6-18-06</i>		<i>S</i>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Wet radiochem methods for</i>
10 <i>SU4-1</i>	<i>6-21-06</i>		<i>S</i>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Ra-226, U-235, and Gross Alpha/Beta</i>

Relinquished by: (Print Name/Affiliation) <i>Randy Whicker</i>	Date: <i>6-23-06</i>	Received by: (Print Name/Affiliation)	Date:	Analytical Laboratory (Destination): <i>Energy Laboratories, Inc 3393 Salt Creek Hwy Casper, WY 82601</i>
Signature: 	Time:	Signature:	Time:	
Relinquished by: (Print Name/Affiliation)	Date:	Received by: (Print Name/Affiliation)	Date:	
Signature:	Time:	Signature:	Time:	Condition/Temperature of Samples when Received:
Relinquished by: (Print Name/Affiliation)	Date:	Received by: (Print Name/Affiliation)	Date:	Serial No.: <div style="font-size: 24px; font-weight: bold;">N^o 005659</div>
Signature:	Time:	Signature:	Time:	



CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

MFG, Inc.
3801 Automation Way #100
Fort Collins, CO 80525
(970) 223-9600 Fax (970) 223-7171

 consulting scientists and engineers	Client/Project Name: <i>MFG, INC. / Dams Mill Site Remediation / (Fairway), CO</i>	MFG, Inc. Contact / Phone Number: 	Analysis Requested:
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Project Number: <i>181316</i>	P.O. Number: <i>181316-6-23-06</i>	Delivery Method / Shipping Document Number:
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Send Results / Report To: 	Sampler (Print Name / Affiliation): 	Signature:
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MFG COMPANY SPEC. ANALYSIS
 Counting Laboratories
 Na-226 by Wet Radiochem
 U-238 by Wet Radiochem
 Gross Alpha/Beta

Field Sample No./ Identification	Date	Time	Sample Matrix	Total No. of Cont.	Filter				Filter				Remarks	
					Y	N	Y	N	Y	N	Y	N		
<i>11</i> <i>SD4-7</i>	<i>6-21-06</i>		<i>S</i>		<i>X</i>		<i>X</i>							<i>*see special instructions on page 1 of 2</i>
<i>12</i> <i>SD5-1</i>	<i>6-16-06</i>		<i>S</i>		<i>X</i>	<i>X</i>	<i>X</i>	<i>X</i>						
<i>13</i> <i>SD5-5</i>	<i>6-16-06</i>		<i>S</i>		<i>X</i>	<i>X</i>	<i>X</i>	<i>X</i>						

Relinquished by: (Print Name/Affiliation) <i>Randy Whicker</i> Signature: <i>[Signature]</i>	Date: <i>6-29-06</i>	Received by: (Print Name/Affiliation) Signature: 	Date: 	Analytical Laboratory (Destination):
Relinquished by: (Print Name/Affiliation) Signature:	Date: 	Received by: (Print Name/Affiliation) Signature:	Date: 	Condition/Temperature of Samples when Received: Serial No.: No 005660
Relinquished by: (Print Name/Affiliation) Signature:	Date: 	Received by: (Print Name/Affiliation) Signature:	Date: 	



Chain of Custody and Analytical Request Record

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: MFG INC.			Project Name, PWS #, Permit #, Etc.: Davis Mill Site Remediation Gateway CO														
Report Mail Address: MFG, INC. 3801 Automation Way, Suite 100 Ft. Collins, CO 80525			Contact Name, Phone, Fax, E-mail: Randy Whicker 970 556 1174 randy.whicker@mfgenv.com					Sampler Name if other than Contact:									
Invoice Address: MFG, INC. 3801 Automation Way, Suite 100 Ft. Collins, CO 80525			Invoice Contact & Phone #: Randy Whicker 970 233 9600					Purchase Order #: 181316-6-20-06		ELI Quote #:							
Report Required For: <input type="checkbox"/> POTW/WWTP <input type="checkbox"/> DW <input type="checkbox"/> Other _____			ANALYSIS REQUESTED														
Special Report Formats - ELI must be notified prior to sample submittal for the following: NELAC <input type="checkbox"/> A2LA <input type="checkbox"/> Level IV <input type="checkbox"/> Other _____ EDD/EDT <input type="checkbox"/> Format _____			Number of Containers Sample Type: A W S V B O Air Water Soils/Solids Vegetation Bioassay Other	SEE ATTACHED													
				U-Natural Pa-226 GROSS ALPHA GROSS BETA PH Cyanide Nitrate Nitrite Sulfate					Normal Turnaround (TAT) RUSH Turnaround (TAT)								
Notify ELI prior to RUSH sample submittal for additional charges and scheduling			Shipped by: _____														
Comments:			Cooler ID(s) _____														
Receipt Temp _____ °C			Custody Seal Y N														
Intact Y N			Signature Y N														
Match Y N			Lab ID _____														
LABORATORY USE ONLY			SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	U-Natural	Pa-226	GROSS ALPHA	GROSS BETA	PH	Cyanide	Nitrate	Nitrite	Sulfate		
			1 Well 1	6-20-06	11 am	W	X	X	X	X	X	X	X	X	X	X	
			2 Well 2	6-20-06	11 am	W	X	X	X	X	X	X	X	X	X	X	X
			3 C DOT Well	6-20-06	11 am	W	X	X	X	X	X	X	X	X	X	X	X
			4 Pond	6-20-06	11 am	W	X	X	X	X	X	X	X	X	X	X	X
			5														
			6														
			7														
			8														
			9														
10																	
Custody Record MUST be Signed			Relinquished by (print): Randy Whicker		Date/Time: 6-20-06 11:00 am		Signature: <i>Randy Whicker</i>		Received by (print):		Date/Time:		Signature:				
			Relinquished by (print):		Date/Time:		Signature:		Received by (print):		Date/Time:		Signature:				
LABORATORY USE ONLY			Sample Disposal: Return to client: _____		Lab Disposal: _____		Sample Type: _____		# of fractions _____								

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, & links.

Linear Regression Analysis			General Area Air Sampler			Calibrated By: <i>M. Williams</i>			(SLPM Flow Rate * F = LPM Flow Rate)		
Sampler ID #			F&J #003219								
Calibration Date:			03/13/2008			Calibrator F&J			CD-802 #312		
Calibration Due Date:			09/13/2008			DUE FOR CALIBRATION			1/27/2007		
CALIBRATION DATA			Regression Output:			Constant			2.355 (b)		
Ind. Flow			Std Err of Y Est			0.321			Ave. Amb. Temp.		
Reading			SLPM			LPM			R Squared		
20.0			17.6			19.18			0.999		
25.0			21.8			23.76			F=(P2)(T3)		
30.0			25.5			27.80			(P3)(T2)		
35.0			30.0			32.70			F= 1.09		
40.0			33.4			36.41			No. of Observations		
45.0			37.1			40.44			Degrees of Freedom		
									6		
									4		
									X Coefficient(s)		
									0.852 (m)		
									Std Err of Coef		
									0.015		
									Coefficient of Corr.		
									0.999		
									P3 = Avg. Barometric Pressure		
									P2 = Std. Pressure(29.92 in. Hg)		
									T2 = Std. Temp(298 Kelvin)		
									T3 = Avg. Ambient Temp in Kelvin		
			As found using pre set point			32.5 = 30 lpm					
			New set point			32.5 = 30 (30.05) lpm					

LINEAR REGRESSION: Predicted LPM = Ind. Reading(X) * Coefficient(m) + Constant(b) Y = mX + b

X	Y	X	Y	X	Y	X	Y	X	Y
Ind. Flow Reading	Predicted LPM	Ind. Flow Reading	Predicted LPM	Ind. Flow Reading	Predicted LPM	Ind. Flow Reading	Predicted LPM	Ind. Flow Reading	Predicted LPM
10.0	10.9	27.5	25.8	45.0	40.7	62.5	55.6	80.0	70.5
10.5	11.3	28.0	26.2	45.5	41.1	63.0	56.0	80.5	70.9
11.0	11.7	28.5	26.6	46.0	41.6	63.5	56.5	81.0	71.4
11.5	12.2	29.0	27.1	46.5	42.0	64.0	56.9	81.5	71.8
12.0	12.6	29.5	27.5	47.0	42.4	64.5	57.3	82.0	72.2
12.5	13.0	30.0	27.9	47.5	42.8	65.0	57.7	82.5	72.7
13.0	13.4	30.5	28.3	48.0	43.3	65.5	58.2	83.0	73.1
13.5	13.8	31.0	28.8	48.5	43.7	66.0	58.6	83.5	73.6
14.0	14.3	31.5	29.2	49.0	44.1	66.5	59.0	84.0	73.9
14.5	14.7	32.0	29.6	49.5	44.5	67.0	59.4	84.5	74.4
15.0	15.1	32.5	30.05	50.0	45.0	67.5	59.9	85.0	74.8
15.5	15.6	33.0	30.5	50.5	45.4	68.0	60.3	85.5	75.2
16.0	16.0	33.5	30.9	51.0	45.8	68.5	60.7	86.0	75.6
16.5	16.4	34.0	31.3	51.5	46.2	69.0	61.1	86.5	76.1
17.0	16.8	34.5	31.8	52.0	46.7	69.5	61.6	87.0	76.5
17.5	17.3	35.0	32.2	52.5	47.1	70.0	62.0	87.5	76.9
18.0	17.7	35.5	32.6	53.0	47.5	70.5	62.4	88.0	77.3
18.5	18.1	36.0	33.0	53.5	47.9	71.0	62.9	88.5	77.8
19.0	18.5	36.5	33.5	54.0	48.4	71.5	63.3	89.0	78.2
19.5	19.0	37.0	33.9	54.5	48.8	72.0	63.7	89.5	78.6
20.0	19.4	37.5	34.3	55.0	49.2	72.5	64.1	90.0	79.0
20.5	19.8	38.0	34.7	55.5	49.6	73.0	64.6	90.5	79.5
21.0	20.2	38.5	35.2	56.0	50.1	73.5	65.0	91.0	79.9
21.5	20.7	39.0	35.6	56.5	50.5	74.0	65.4	91.5	80.3
22.0	21.1	39.5	36.0	57.0	50.9	74.5	65.8	92.0	80.7
22.5	21.5	40.0	36.4	57.5	51.3	75.0	66.3	92.5	81.2
23.0	22.0	40.5	36.9	58.0	51.8	75.5	66.7	93.0	81.6
23.5	22.4	41.0	37.3	58.5	52.2	76.0	67.1	93.5	82.0
24.0	22.8	41.5	37.7	59.0	52.6	76.5	67.5	94.0	82.4
24.5	23.2	42.0	38.1	59.5	53.1	77.0	68.0	94.5	82.9
25.0	23.7	42.5	38.6	60.0	53.5	77.5	68.4	95.0	83.3
25.5	24.1	43.0	39.0	60.5	53.9	78.0	68.8	95.5	83.7
26.0	24.5	43.5	39.4	61.0	54.3	78.5	69.2	96.0	84.2
26.5	24.9	44.0	39.8	61.5	54.8	79.0	69.7	96.5	84.6
27.0	25.4	44.5	40.3	62.0	55.2	79.5	70.1	97.0	85.0

Areza Air Monitor Calibration sheet

RECEIVED
COTTER CORP
Radiation Safety Dept.

MAR 21 2006

DISTRIBUTION

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3/24/06
APL

ATTACHMENT K

**RADIATION SAFETY PLAN
IMPLEMENTATION RECORDS**

Gateway Projects: Area Sampler Calculation Spreadsheet

☐ = Location near Willis Trailer @ site perimeter

Collect Date	Time on	Meter Start (min)	Meter Stop (min)	Elapsed Time (min)	Flow rate (L/m)	Total Vol (L)	Count Date	Sample Filter (counts)	Bkg Filter (counts)	Count Time (min)	Filter (c/m)	Bkg (c/m)	Eff. (plate)	Conc. d/m ³ L	Conc. uCi/ml	% DAC
Davis Mill Site																
6/1/2006	12:30	24988.7	25748.6	759.9	32.7	24848.73	6/5/2006	16	8	10	1.6	0.8	0.24	0.000134	6.0975E-14	0.1
6/5/2006	8:45	25749.5	26254.8	505.1	32.7	16516.77	6/6/2006	38	12	10	3.8	1.2	0.24	0.000667	3.02963E-13	0.5
6/6/2006	8:30	26254.8	26728.3	473.4	34.0	16095.60	6/7/2006	46	6	10	4.6	0.6	0.24	0.001042	4.73445E-13	0.8
6/7/2006	9:04	26728.4	27168.7	440.3	35	15410.5	6/8/2006	42	9	10	4.2	0.9	0.24	0.000898	4.07956E-13	0.7
6/8/2006	8:36	27169.1	27464.4	295.3	35	10335.5	6/9/2006	30	7	10	3	0.7	0.24	0.000942	4.28259E-13	0.7
6/9/2006	8:37	27464.6	27921.7	457.1	34.5	15770.0	6/10/2006	6	14	10	0.6	1.4	0.24	-0.000211	-9.59477E-14	-0.2
6/12/2006	9:05	27921.9	28359.5	437.6	34.5	15097.2	6/13/2006	58	8	10	5.8	0.8	0.23	0.00141	6.41085E-13	1.1
6/13/2006	8:45	28359.5	28814.7	455.2	34.5	15704.4	6/14/2006	50	7	10	5.0	0.7	0.24	0.001146	5.20846E-13	0.9
6/14/2006	8:48	28814.9	29268.8	453.9	34.5	15659.5	6/15/2006	53	6	10	5.3	0.6	0.24	0.001256	5.70928E-13	1.0
6/21/2006	1:47	29635.2	29830.6	195.4	34.5	6741.3	6/22/2006	27	16	10	2.7	1.6	0.24	0.00069	3.13805E-13	0.5
6/22/2006	9:03	29830.7	30336.4	505.7	34.5	17446.7	6/23/2006	40	8	10	4.0	0.8	0.24	0.000772	3.50988E-13	0.6
6/23/2006	Terminated air sampling as excavations were completed and the final status survey required all available time and resources															
CDOT Resumed area air sampling as new remediation began on adjacent CDOT property																
7/6/2006	9:20	30336.6	30445.7	109.1	34.5	3764.0	7/7/2006	19	8	10	1.9	0.8	0.24	0.001219	5.54062E-13	0.9
7/7/2006	9:20	30445.9	30853.8	407.9	34.5	14072.5	7/17/2006	10	2	10	1.0	0.2	0.24	0.000237	1.07777E-13	0.2
7/17/2006	9:22	30854.1	31307.7	453.6	34.5	15649.2	7/18/2006	69	7	10	6.9	0.7	0.24	0.00164	7.45531E-13	1.2
7/18/2006	10:00	31307.9	31564.2	256.3	34.5	8842.3	7/19/2006	33	3	10	3.3	0.3	0.24	0.001405	6.38439E-13	1.1
7/24/2006	10:00	31564.3	32022.5	458.2	34.5	15807.9	7/25/2006	37	4	10	3.7	0.4	0.24	0.000864	3.92831E-13	0.7
7/26/2006	10:00	32022.6	32561.8	539.2	34.5	18602.4	7/25/2006	60	3	10	6.0	0.3	0.24	0.001269	5.76597E-13	1.0

Notes:

- 1) General air monitoring station was centrally located in the work zone (2 days were monitored near Willis residence on NE corner of property during excavations in that area)
- 2) Initial results for Davis Mill Site project were all well below action levels (10% or DAC) even on very dusty/windy days
- 3) As a result of very low initial results, low lapel sampling results, and constraints on time and resources in performing all aspects of the scope of work, general air monitoring was selectively performed on days of high temperatures, strong winds, or any other reason for which a high degree of visible dust generation was anticipated or observed.

FRONTIER ENVIRONMENTAL SERVICES, INC.
 5171 Ward Road, Unit 1
 Wheat Ridge, CO 80033
 (303) 234-9350

Project Remediation
 Control Program

FRONTIER PERSONNEL LOG	Date: 5-15-06
Project: CDPHE Davis Mill Remediation Project	Project No.: 060214
Location: Gateway; MESA County; Colorado	

NAME	REF.	COMPANY	TIME IN	SCAN OUT				SCAN OUT				TIME OUT	
				MORNING	LUNCH				EVENING				
					RH	LH	RF	LF	RH	LH	RF		LF
Clay Cambria	LD10	FESI	0630	1	0	0	0	0	1	0	0	1745	
John Allen	5086	FESI	0645	0	1	1	1	1	1	0	0	1745	
Don	5020	FESI	0645	0	3	0	2	1	2	1	0	1745	
Nick Ochs	5091(?)	FESI	0645	0	0	0	0	0	1	0	0	17:30	
Dave / S. Hinds	1001	FESI	0630	0	0	3	1	2	3	4	3	1745	
Steve McKenzie	5031	FESI	0645	2	1	0	3	0	1	0	1	1745	
Randy Whicker		MFL	0830	0	1	2	1	0	0	2	0	17:00	

COPY TO: Robert Terry; Colorado of Public Health & Environment

FRONTIER ENVIRONMENTAL SERVICES, INC.
 5171 Ward Road, Unit 1
 Wheat Ridge, CO 80033
 (303) 234-9350

Project Remediation
 Control Program

FRONTIER PERSONNEL LOG	Date: 6-21-2006
Project: CDPHE Davis Mill Remediation Project	Project No.: 060214
Location: Gateway; MESA County; Colorado	

NAME	REF.	COMPANY	TIME IN	SCAN OUT				SCAN OUT				TIME OUT		
				MORNING	LUNCH				EVENING				EVENING	
					RH	LH	RF	LF	RH	LH	RF			LF
Clay Cambink	1010	FESI	0645	1	3	6	1					1800		
Clay Cambink	5026	FESI	645	0	0	0	1	0	1	0	0	515		
JOE FEILER	1015	FESI	0645	0	1	0	0	0	1	0	0	1730		
Bret Scarborough	1011	FESI	0645	1	0	0	0	0	0	0	0	1730		
Chris Hoyer	5086	FESI	0645	1	0	2	1	1	0	0	1	1715		
Travis Snyder	5098	FESI	0645	1	0	0	0	0	0	0	0	1730		
Mike Ochs	5091	FESI	0645	1	0	0	0	1	1	1	0	1730		
Steve McKenzie	5031	FESI	0645	1	0	0	1	1	0	1	0	1730		
R. Whicker		MFG	0815	0	0	1	1	3	1	1	0	1730		
M. Whicker		MFG	9:15	0	1	0	2	0	1	1	1	16:00		
Wendy S. Hinds	1001	FESI	1445					1	1	2	1	1715		

COPY TO: Robert Terry; Colorado of Public Health & Environment

Frontier Environmental Services, Inc.
CDOT Facility: Site Remediation
Gateway, Colorado

060622 0288

Trucking Company: Sutherland Brothers
Larsen Transportation

Date: 7/27/2006

Driver Stan Barber

Truck Number 36

Trailer Number 42

Site of Origin: Gateway, Colorado

Destination: Uravan, Colorado

Gross: 23.8 Tons Gross: 19.2 Cubic Yards

Time in: 0545 Time out: 0620 Loader Operator: S. McKenzie

Visual inspection for loose material on vehicle runners and trailer ledges OK

Liner installed? N Tarp in place? Y Entrance Scan 4 (α) Exit Scan 4 (α)

Trailer Scan (μR/hr.) Right Side 34 Left Side 42 Rear 69

Total Activity 576 pCi/Truck

Scanned By: [Signature]

COPY TO: CDOT - Grand Junction, UMETCO; Transportor

Frontier Environmental Services, Inc.
CDOT Facility: Site Remediation
Gateway, Colorado

060622 0293

Trucking Company: Sutherland Brothers
Larsen Transportation

Date: 7/27/2006

Driver Doug Paxton

Truck Number 42

Trailer Number 05

Site of Origin: Gateway, Colorado

Destination: Uravan, Colorado

Gross: 23.3 Tons Gross: 18.8 Cubic Yards

Time in: 0845 Time out: 0905 Loader Operator: S. McKenzie

Visual inspection for loose material on vehicle runners and trailer ledges NW

Liner installed? Y Tarp in place? Y Entrance Scan 7 (α) Exit Scan 6 (α)

Trailer Scan (μR/hr.) Right Side 45 Left Side 68 Rear 54

Total Activity 679 pCi/Truck

Scanned By: [Signature]

COPY TO: CDOT - Grand Junction, UMETCO; Transportor

EQUIPMENT EXIT SURVEY FORM

Swipe Test Area = 10x10 cm²

Counting Equipment: Ludlum 2221 rate meter (SN# 97289) with Ludlum 43-1 probe (SN# 140040) and 2nd shelf holder geometry

Release Limit for Net Alpha Measurement = 20 cpm
100cpm

Date	Equipment Description / ID	Swipe Test Location	Background Swipe (clean) (cpm)	Sample swipe (cpm)	Net Sample Result (cpm)	Surveyor Initials
5/5/2006	Dozer 966G	Left front wheel	2	0	-2	RW
"	"	Bucket	2	4	2	RW
"	"	Cab floor	2	0	-2	RW
6/12/2006	Loader 950G	Bucket	0	1	1	RW
"	"	Cab floor	0	0	0	RW
"	"	Wheel well	0	2	2	RW
6/12/2006	Truck 388 / Trailer T-223	Cab floor	1	2	1	RW
"	"	Box	1	0	-1	RW
"	"	Tire	1	0	-1	RW
6/13/2006	Truck 93 / Trailer T-93	Cab	1	0	-1	RW
"	"	Wheel well	1	1	0	RW
"	"	Trailer bed	1	1	0	RW
6/16/2006	Truck / trailer 36	Wheel well	0	4	4	RW
		Cab	0	3	3	RW
		Trailer bed	0	1	1	RW
6/16/2006	Truck / trailer 009	Wheel well	0	3	3	RW
		Cab	0	1	1	RW
		Trailer bed	0	0	0	RW
6/21/06	Truck 01 / Trailer P1	Wheel well	1	1	0	RW
		Cab Floor	1	3	2	RW
		Trailer bed	1	2	1	RW
6/21/06	Truck 28 / trailer P28	Wheel well	1	1	0	RW
		Cab Floor	1	2	1	RW
		Trailer bed	1	3	2	RW
6/21/06	Truck 40 / Trailer 400	Wheel well	1	2	1	RW
		Cab Floor	1	1	0	RW
		Trailer Bed	1	3	2	RW

EQUIPMENT EXIT SURVEY FORM

Swipe Test Area = 10x10 cm²

Counting Equipment: Ludlum 2221 rate meter (SN# 97289) with Ludlum 43-1 probe (SN# 140040) and 2nd shelf holder geometry

Release Limit for Net Alpha Measurement = 20 cpm
10 cpm

Date	Equipment Description / ID	Swipe Test Location	Background Swipe (clean) (cpm)	Sample swipe (cpm)	Net Sample Result (cpm)	Surveyor Initials
6-21-01	Truck 30 / Trailer P30	wheel well	1	0	-1	AW
		cab floor	1	1	0	AW
		trailer bed	1	1	0	AW
6-29-01	Backhoe 420 D	rear bucket	1	0	-1	AW
		cab floor	1	2	1	AW
		front bucket	1	1	0	AW
7-7-06	Truck / Trailer 009	wheel well	1	0	-1	AW
		cab floor	1	0	-1	AW
		trailer bed	1	0	-1	AW
7-7-06	Trk. 36 / Trl. 44	wheel well	1	1	0	C.E.C.
		cab floor	1	0	-1	C.E.C.
		trailer bed	1	0	-1	C.E.C.
7-7-06	Trk. 308 / Trl. 223	wheel well	2	0	-2	C.E.C.
		cab floor	2	0	-2	C.E.C.
		trailer bed	2	0	-2	C.E.C.
7-7-06	Trk. 30 / P30	wheel well	0	1	-1	C.E.C.
		cab floor	0	0	0	C.E.C.
		trailer bed	0	2	-2	C.E.C.
7-7-06	Trk. 2 / Trl. 2a	wheel well	0	1	-1	C.E.C.
		cab floor	0	1	-1	C.E.C.
		trailer bed	0	0	0	C.E.C.
7-8-06	Trk. 801 / Trl. 801	wheel well	3	2	1	C.E.C.
		cab floor	3	1	2	C.E.C.
		trailer bed	3	0	-3	C.E.C.
7-8-06	Trk 93 / Trl. 93	wheel well	0	1	-1	C.E.C.
		cab floor	0	1	-1	C.E.C.
		trailer bed	0	0	0	C.E.C.

EQUIPMENT EXIT SURVEY FORM

Swipe Test Area = 10x10 cm²

Counting Equipment: Ludlum 2221 rate meter (SN# 97289) with Ludlum 43-1 probe (SN# 140040) and 2nd shelf holder geometry
Release Limit for Net Alpha Measurement = 10 cpm

Date	Equipment Description / ID	Swipe Test Location	Background Swipe (clean) (cpm)	Sample swipe (cpm)	Net Sample Result (cpm)	Surveyor Initials
7-8-06	Trk. 42 / Trl. 05	wheel well	0	0	0	C.E.C.
		cab floor	0	1	-1	C.E.C.
		trailer bed	0	2	-2	C.E.C.
7-8-06	D-6N XL Dozer	Blade	0	0	0	C.E.C.
		cab floor	0	2	-2	C.E.C.
		wheel well	0	1	-1	C.E.C.
7-8-06	Trk. 01 / Trl. 01	wheel well	1	0	-1	C.E.C.
		cab floor	1	1	0	C.E.C.
		trailer bed	1	0	-1	C.E.C.
7-8-06	Trk. 40 / Trl. 200	wheel well	1	0	-1	C.E.C.
		cab floor	1	1	0	C.E.C.
		trailer bed	1	2	1	C.E.C.
7-8-06	Trk. 28 / Trl. 28	wheel well	0	0	0	C.E.C.
		cab floor	0	1	-1	C.E.C.
		trailer bed	0	0	0	C.E.C.
8-3-06	TRUCK 103	cab	0	1	1	ML
		wheel well	0	0	0	ML
		trailer bed	0	10	10	ML
8-4-06	TRUCK 308	wheel well	0	2	2	ML
		cab floor	0	1	1	ML
		trailer bed	0	4	4	ML
8-4-06	TRUCK 93	wheel well	0	3	3	ML
		cab floor	0	4	4	ML
		trailer bed	0	5	5	ML
8-8-06	TRUCK 801	Trailer bed	0		1	ML
		wheel well	0	0	0	ML
		cab floor	0	1	1	ML

EQUIPMENT EXIT SURVEY FORM

Swipe Test Area = 10x10 cm²

Counting Equipment: Ludlum 2221 rate meter (SN# 97289) with Ludlum 43-1 probe (SN# 140040) and 2nd shelf holder geometry
 Release Limit for Net Alpha Measurement = 10 cpm

Date	Equipment Description / ID	Swipe Test Location	Background Swipe (clean) (cpm)	Sample swipe (cpm)	Net Sample Result (cpm)	Surveyor Initials
8.8.06	TRUCK 3644	Trunk Bed	0	1	1	MW
		Wheel Well	0	1	1	MW
		Trunk Cab	0	3	3	MW
"	TRUCK 01-24701	Bed	0	0	0	MW
		Wheel Well	0	1	1	MW
		Cab	0	2	2	MW
"	T-28 / Pup 28	Bed	0	4	4	MW
		Cab	0	1	1	MW
		Wheel Well	0	0	0	MW
"	TRUCK 40	Bed	0	2	2	MW
		Wheel Well	0	2	2	MW
		Cab	0	0	0	MW
"	TRUCK 03	Bed	0	1	1	MW
		Wheel Well	0	2	2	MW
		Cab	0	0	0	MW
"	TRUCK 42	Bed	0	1	1	MW
		Wheel Well	0	1	1	MW
		Cab	0	2	2	MW
"	TRUCK 02 25	Bed	0	0	0	MW
		Wheel Well	0	1	1	MW
		Cab	0	0	0	MW
	TRUCK 30					
		Cab	0	3	3	RW
		Wheel Well	0	2	2	RW
		Bed	0	0	0	RW

RADIATION TRAINING ATTENDANCE SHEET

PROJECT: Davis Mill Site remediation, Gateway, CO, 2006

INSTRUCTOR: Jan Johnson, Randy Whicker or Craig Little from MFG Inc.

ATTENDEE

Date	Name (PLEASE PRINT)	Signature
3/23/06	Daniel S. Hinds	[Signature]
3/23/06	Gloria A. McKenzie	[Signature]
3/23/06	Brent A. Scarborough	[Signature]
3/23/06	Clay E. Combrink	[Signature]
3-23-06	Don Levaskevich	[Signature]
23 MAR 06	JOE FEILER	[Signature]
23 MAR 06	Randy Whicker	[Signature]
5-1-06	Stan Bailey	[Signature]
5-1-06	Michelle Whicker	[Signature]
5-1-06	Carl Taylor	[Signature]
5-1-06	FRANCIS L. WOODS	[Signature]
5-1-06	Roy Cressler	[Signature]
5-1-05	BERRY RANDOL PH	[Signature]
5-1-05	Malcolm Young	[Signature]
5-1-05	Christopher Hater	[Signature]
5-1-06	Trent Sutherland	[Signature]
5-1-06	Billy GayNE	[Signature]
5-1-06	Doreen P. Arsen	[Signature]
5-1-06	Jason Willard	[Signature]
5-1-06	Glade Young	[Signature]
5-15-06	Nick Ochs	[Signature]
6-5-06	Travis Snyder	[Signature]
6-27-06	Glenn Colombo	[Signature]
6-27-06	John David	[Signature]
6-27-06	Mike Bowker	[Signature]

CDOT Personnel

6/27/06 Ken Tandif

6-27-06 Mike Feathers

Ken [Signature]

Mike Feathers

instru.

no test necessary observer only

ATTACHMENT L

**FIELD ACTIVITY
LOG BOOK
NOTES**

FIELD ACTIVITY LOG BOOK NOTES

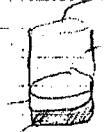
5-4-06 RW SUNNY = 78°F

- collected 24 background soil samples in Background Reference area
- sample processing / counting
- establish new control limits for MF67 gamma system for Background:

Date: 5-4-06 (BK6) (source) Geometry: detector shielded
Battery = 58V 20-count 20-count on Cs-137
average average button in can, stacked on empty can

1	23.26	55.81
2	21.44	58.03
3	21.03	56.05
4	21.89	57.53
5	21.25	56.91
6	22.39	56.16
7	21.69	57.06
8	22.67	57.22
9	22.42	56.42
10	21.56	55.93
mean =	21.96	54.91
std =	0.70	0.62
mean ± 3σ =	19.8	54.7
mean ± 2σ =	24.1	58.4

empty can
can w/ button source



5-5-06: RW Partly cloudy, ≈ 65°F

- control Label Printer for Chgs. H. (got system working properly)
- QC for EXPE SCAN system: Battery = 5.2V
Source: 56.08 UR/In (mean)
PK9: 21.55
system OK (start of SU-1)
- Soil sample processing / analysis
- MCA Systems development

~~SW~~ SURVEY OUT DOZER WITH SWIPE TESTS

5-9-06 RW Partly cloudy ≈ 70°F

- QC for BACKPACK system: Battery = 5.6V
Source: 54.91
PK9: 20.96 → additional pre-cleanup scan of search matrix.
system OK
- collected screening soil samples in parking area (Survey Unit-1 area) after initial cleanup - goal was to establish gamma correlation with Ra-226 conc. of explosive cleanup thus far
- Soil sample processing / analysis
- Instrument issues & RSO duties (label sampling) etc.

2	3-21-06	RW	Partly cloudy, cool = 70°F
Activity	- Initial pre-cleanup scans of areas on North side of property using MFG Backpack System w/ Ludlum 2221 Model 44-10 NaI detector & Ludlum 2350 mR meter (MFG 7 system)		
Notes	- All systems working properly met John Willis & Douglas - nice fellows		
	3-22-06	RW	Sunny, mild = 58°F
Activity	- Finished site scans		
	3-23-06	RW	Sunny, mild = 55°F
Activity	- Collected 7 soil samples (surface composite) GW-1 through GW-7 for MCA spectral logging		

	4-30-06	RW	
	Soils Lab Mobilization to Gateway		
	5-1-06	RW	
	- Soils Rad Lab setup - Rad safety training for truckers		
	5-2-06	RW	Sunny = 70°F
	- Soils Lab Setup continued - instrument QC checks - calibration investigations - Lapel sampler initiation		
	5-3-06	RW	Sunny = 65°F
	- Soils Lab setup cont... - instr. QC checks - test counts on standards		

5-16-06 RW sunny HOT ~ 90°F

- swipe tests in mill building after
initial pressure wash

• Background (clean filter) (counts in 1 min.)
CPM = 0

Mill Location:	ID	Gross CPM	Net CPM
Floor, 1st level	1A	5	4
stairs from 1st to 2nd level	1B	1	0
Wall, 1st level	1C	3	2
Wall, 2nd level	2A	8	7
Floor, 2nd level	2B	8	7
Floor near stairs to 3rd level	2C	3	2
Railing, 2nd level	2D	4	3
Wall, 3rd level (over)	3A	21	20
Wall, 3rd level (over)	3B	4	3
Floor, 3rd level	3C	4	3
Floor, 3rd level	3D	5	4
Floor, 3rd level	3E	3	2

- Screening measurements for trenches in bedrock
below Mill:

Trench 1	N 38. 67932	W 108. 97860
" 2	N 38. 67950	W 108. 97875
" 3	N 38. 67962	W 108. 97894
" 4	N 38. 67780	W 108. 97872

5-17-06 RW sunny, warm ~ 80°F

- counting test pit samples from
below Mill

6

5-9-06 RW Partly Cloudy, windy, ~70°F

- Instrument QC measurements (MCA) & development of control chart for (MCA)
- Soil sample processing / analyses
- RSO tasks (Lapel sampling)
- Data Analysis (development of Galaxy-specific calibration curve adjustment algorithms for MCA measurement of Ra-226 concentrations)

5-10-06 RW sunny, cool -- 60°F

- Instrument QC (MCA), cont. development of control chart measurements (ALCA-1 & GW-7)
 - Phil Igidi with CDPHE visited site - we walked the site & discussed emerging issues.
 - Collected 4 more Background samples GMB 25-28
 - ^{INTERNAL} Scan of excavated areas nearest mill building
- Nas Battery = 5.7V
 source = 55.51 V/RHC
 Background = 21.00
 systems QC okay.

5-11-06 RW cool, sunny ~ 65-70°F

- QC Measurements (MCA)
- QC chart development
- Lapel Sample counts.

5-12-06 RW warm, sunny ~ 80°F

- QC Measurements (MCA)
- Sample processing / counting (25-28 through 28)
- Lapel sampling & filter counting

↳ Having trouble last 2 days with Background filter counts - they seem very high @ 12-15 counts in 10 min - am trying Background of just empty chamber - will consult with Jan. next week. Nevertheless, worker filters are coming in @ low levels. (@ Background or less)

5-15-06 RW Hot, sunny ~ 90°F

- New worker training (Nick Ochs) & Badging
- Lapel sampling (Nick Ochs)

Up the road

16-18 up the

Center of observatory

2:30 AM 3:30 PM

30 40.813 40.814

108 58.618 58.620

KL 4614 4621

Back side of mesa top

13-15 up the

rock pile

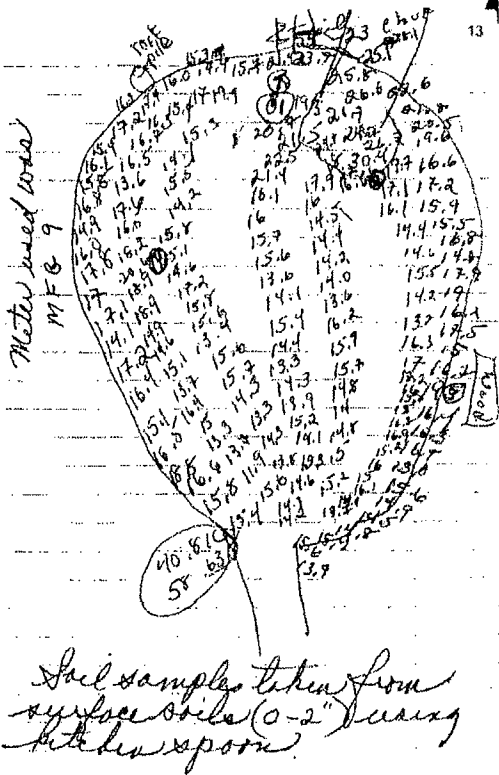
40.787

58.663

wood slash pile

40.807

58.656



5/24/06

sunny warm, light
breeze

New GPS

Readings at trailer lab
~~at home~~

2:15 PM

N 38 40.819

W 108 58.682

elevation 4601

2:15 PM

N 38 40.819

W 108 58.686

3:15 PM

N. 38. 40.825

W 108 58.688

Elev. 4616

16

5-30-06 RW sunny, warm $\approx 85^{\circ}\text{F}$

- resumed counting & lab operations
- QC checks on MCA
- began 721-day counts on Bkg samples
- QC check on Backpack scanning system for scan of mesa after excavations (results indicate one small spot > 3 UR/hr remains - I believe this is a single ore rock that was missed - will go collect it later)

5-31-06 RW sunny, hot $85-90^{\circ}\text{F}$

- QC checks on MCA (Bkg fluctuation high)
- 721-day counts cont...
- QC check on Bkpk system for scan of mesa side slopes & bottom land interim cleanup

6-1-06 RW sunny, hot $\approx 90^{\circ}\text{F}$

- QC checks on MCA & sample counting
- sample processing / counting
- QC check on Bkpk system for re-scan of mesa top / side slopes where ore rocks removed

Jan J. visited site - checked off air sampler

started air sampler meter (min) (L/m)

6/1 start:	12:39 PM	24958.7	32.7
end:	5:13	25208.3	32.7

6/2 start:	6:51	25748.6	32.7
end:	2:47	25748.6	32.7

- sampled & analyzed rocks near tailings pond below Mill (45-350 UR/hr)
- conf. call with Jan, Dan, Rob Terry

6-2-06 RW sunny, hot

- conf. call with Jan, Dan, Brent
- air sampling / lapel sampling
- Lapel sampler clipped out after few hours, but reading came up @ $> 11.9\%$ of DAC
- summoned crew to start watering slatpile as well as bucket loads
- excavator clearing tailings near pond made "pond" larger

- counted area filter for 1 min = 119 CPM

- counted Bkg (clean) filter 1 min = 0 CPM

- sample time = 759.9 m

- volume = $(32.7 \text{ L/m})(759.9 \text{ m}) = 24848.7 \text{ L}$

- efficiency = 0.224 (calcd)

(81)	5-24-06-01	40.784 58.673	21.4
(82)	5-24-06-02	40.794 58.670	17.2
(83)	5-24-06-03	40.808 58.656	19.7
(84)	5-24-06-04	40.793 58.655	19.2

Survey and soil sampling
complete at 3:15 PM

All radiation safety
requirements are being
met.
Dust suppression generally
good. One area needed
more water.

Truck deliveries to
Amtec temporarily
shut down due to
problems at Chascom
site not related to
Gateway disposal
activities.

Phil Elgidi on site
with COPITE public
relations person to
guide reporters from
Grand Junction Channel
11. Reported, videotaped
the site and interviewed
Dan Poff and me.
Visitors were briefed
on site safety and
had protection prior to
entering work area.
Geiger scanned out
but did not ~~scan~~
record scan results.
All scans were below
action levels. 5/24/06
5:25 PM JG

6-9-06 Partly Sunny 80-90°F

- Area Sampler Time Meter Flow
 Start: 8:32 2744.6 35
 End: 4:12 2792.7 34

- QC on MCA of Counting
- Tapelias sampling
- Guided cleanup of pits in SU-2 & SU-3

6-11-06 RW Sunny, Hot

- Final status scan of SU-2
- Sampled ~~the~~ pits in SU-2 & SU-3 for Final status subsurface samples

6-12-06 RW Sunny, Hot

- QC on MCA / sample processing / counting
- Area sampler Time Meter Flow
 Start: 9:23 2839.9 35
 End: 4:20 2839.5 35

- QC on MCA + sample processing / counting
- Established survey unit sample locations

Survey Unit	Survey Unit sample Locations			
	SU-1 N 28L	SU-1 W 102L	SU-2 N 28L	SU-2 W 102L
1 ^x	68105	97731	68120	97709
2 ^x	68087	97715	68133	97724
3 ^x	68069	97704	68140	97704
4 ^x	68050	97694	68143	97763
5 ^x	68032	97681	68152	97751
6 ^x	68010	97664	68141	97742
7 ^x	68067	97727	68128	97752
8 ^x	68046	97720	68125	97775
9 ^x	68028	97708	68113	97770
10 ^x	68002	97689	68101	97791
11 ^x	68029	97742	68112	97772
12 ^x	68011	97729	68121	97759
13 ^x	67774	97714	68121	97742
14 ^x	68032	97756	68129	97731
15 ^x	68015	97754	68112	97720
16 ^x	67798	97745	68112	97730
17 ^x	68024	97781	68100	97752
18 ^x	68003	97778	68078	97762
19 ^x	67784	97765	68085	97764
20 ^x	68013	97700	68087	97752
21 ^x	67789	97795	68081	97733
22 ^x	67773	97786	68072	97744

6-5-06 SUNNY, HOT, > 90°F

Area Sampler	Time	meter	Flow
start:	8:24	25749.5	32.7
End:	5:17	26291.6	32.7

- GC measurements on MCA system
- Sampled pit @ foot of mesa access Road (hot steam to separate content)
- Sampled NE corner of property near Willis trailer (WYNE-1 & 2) - both came out @ or above cut-off (4 & 12 ml/g)
- Trained new FESI worker (Cecilia Snyder)
- issued badge & tapel sampler for ~~demo~~
- guided cleanup of pits near parking lot access road (Copper Trailers) and near Willis trailer

6-6-06 sunny, hot, 95-100°F

Area Air Sampler	Time	meter	Flow	(Willis Trailer Area)
start:	8:31	27254.9	35	
end:	4:48	26728.3	32.7	

- Area & tapel sampling & counting
- GC measurements on MCA system
- guiding cleanup near Willis trailer

6-7-06 RW Partly sunny, ~ 90°F

Area Sampler	Time	meter	Flow	(Willis Trailer Area)
start:	2:04	27728.4	35	
End:	4:25	27468.7	35	

- GC on MCA system
- new 2950 meters arrived MFG-12 & MFG-15
- ~~sent~~ meters MFG-6 & 7 to Ludlum
- cleanup continues near Willis trailer
- Appears excavations near Willis trailer parking area (NE corner) were mistakenly cleaned - they appear to be off Mrs. Willis' property line
- Root balls of large Cottonwoods returned from UNMETCO (requested for disposal)

6-8-06 RW Partly sunny, cloudy, ~ 80°F

Area Sampler	Time	meter	Flow
start:	8:30	27169.1	35
end:	?	27469.4	?

- GC on MCA, sample processing / counting
- collected samples in pits near Willis' trailer believed to be cleaned up (control samples)

6-17-06 RW Sunny, Hot

- MCA QC, Soil sample Processing/Counting
- Final scan of SU-3
- staked out SU-3 sample locations

#	N38	W108	#	N38	W108
x 1	68027	97830	21	68087	97877
2	68033	97816	22	68087	97862
3	68046	97797	23	68100	97860
4	68057	97788	24	68109	97831
x 5	68048	97786	x 25	68073	97796
x 6	68088	97788			
7	68069	97793	* Hot spot composite sample (x10 m.)		
8	68060	97812			
9	68048	97829			
10	68040	97844			
11	68052	97857			
12	68062	97840			
13	68074	97829			
x 14	68028	97808			
x 15	68088	97792	→ 68095 97792		
x 16	68085	97804			
17	68097	97820			
18	68087	97839			
19	68074	97851			
20	68063	97867			

6-18-06 RW Sunny, Hot

- collected SU-3 samples
- MCA QC & sample processing/counting

6-19-06 RW Sunny, Hot

- MCA QC, sample processing/counting
- Hot spot cleanup in su-1, su-5
- re-scans of small hot spots after additional cleanup
- gave #40 to Mrs. Willis for dating USC. Air sampler * drilled wells for GW

6-20-06 RW Sunny, Hot

- MCA QC, sample processing/counting
- groundwater sampling (d. 1 surface sample)

Well	N38	W108	Depth (below surface)
1	67982	97877	6.7 ft bgs
2	67960	97897	1.0 ft BGS
CDOT 3	68029	97883	
Pond	67998	97820	surface water

- Began staking out sample locations for SU-4

22

6-13-06 RW Sunny, Hot 90+ windy

- Meter Sample Time Meter Flow
 start 8:45 28771.5 35
 end 4:17 28841.7 34

- collected samples (Final status) in
 SU-1

- Rob Terry on site, co-sampling

- MCA QC, soil sample processing/counting

6-14-06 RW Sunny, Hot, Windy

- Meter Sample Time Meter Flow
 start 8:48 28841.9 35
 end 4:20 29268.8 34

- QC / sample collection (SU-2), sample
 processing / analysis

- guiding cleanup in SU-3

6-15-06 RW P. Sunny 80-90F

- Meter Sample Time Meter Flow
 start 10:43 29268.9 35
 end 4:48 29675.1 35

- QC on MCA, sample processing/counting

- wk. calls w/ Jan, Dan, Rob Terry

- staked out SU-5 sample locations

- All AEW excavation stopped by
 crews early!

- will discontinue all sampling unless needed

Survey unit: SU-5 SU-5 SU-5 SU-5 SU-5

Sample #	N28	W108	#	N28	W108
1	67909	97912	* 27	67932	97833
2	67900	97894	* 28	67919	97861
3	67900	97894			
4	67900	97865			
5	67912	97876			
6	67927	97890			* extra grid samples
7	67995	97868			because scan indicated
8	67905	97855			SU-5 threat was larger
9	67908	97841			than anticipated
10	67914	97823	* 28		anticipated hot spot
11	67929	97832			samples taken because
12	67943	97845			there was pouring in
13	67950	97825			directional splash across
14	67936	97816			direction of substructure
15	67918	97805			sampling may not
16	67922	97787			be possible - there
17	67941	97799			were composite
18	67958	97803			samples over
19	67964	97777			3 x 3 m
20	67949	97776			
21	67929	97768			
22	67947	97741			
* 23	67896	71814			
* 24	67891	71836			
* 25	67885	97864			
* 26	67875	97854			

6-21-06 RW Partly Sunny, Hot = 95°

- RC on MCA, sample processing / counting
- continued staking out & collecting SU-4 samples:

ID#	N 32	W 108	
1	67926	97948	* SU-4 (whole pond)
2	67926	97957	N 88 87952
3	67913	97926	W 08 97872
4	67926	97920	
* 5	67937	97919	
* 6	67949	97931	
7	67953	97915	
8	67945	97906	
* 9	67989	97873	
10	67944	97876	
* 11	67963	97869	
12	67972	97876	
13	67920	97882	
* 14	67962	97878	
* 15	67995	97860	
16	67960	97849	
17	67976	97857	
18	67989	97869	
19	67976	97849	
20	67924	97879	# N 88 W 108
* 21	67983	97863	23 8207 97877
22	67925	97823	

- run air sampler in pm due to mowing contaminated material from load-out
 - area down to pond
 - decontam. release surveys of 4 trucks
 - area sampler time meter flow
- start → 1:47 29635.2 35
end → 5:01 29820.6 35

6-22-06 RW Sunny, Hot > 90°F

- RC on MCA, sample processing / counting
- new control measurements for Peak system:

Source	BEA
1	53.4 18.0
2	52.8 18.0
3	53.8 18.4
4	52.8 18.5
5	53.3 18.5
6	53.4 18.1
7	52.5 17.9
8	52.9 18.1
9	52.9 18.7
10	52.8 18.7


Time	meter	flow
start	9:03 29820.7	35
end	5:27 30352.4	35

5-4-06 RW SUNNY $\approx 78^{\circ}\text{F}$

- collected 24 Background soil samples in Background Reference area
- sample processing / counting
- establish new control limits for MF67 Gamma system for Background:

Date: 5-4-06 (BKG) (SOURCE) Geometry: detector shield

	20-count AVERAGE	20-count AVERAGE	on button in can, stacked on empty can
1	23.26	55.81	
2	21.44	50.03	
3	21.03	56.05	
4	21.89	57.53	
5	21.25	56.91	empty can
6	22.39	56.16	
7	21.69	57.06	
8	22.67	57.22	
9	22.42	56.42	
10	21.56	55.93	can w/ button source
mean:	21.96	56.91	
std =	0.70	0.62	
mean - 3σ =	19.8	54.7	
mean + 3σ =	24.1	59.4	



5-5-06: RW Partly cloudy, $\approx 65^{\circ}\text{F}$

- Contact Laurel Alter for Chris H (opt. system working properly)
- QC for EXPE SCAN SYSTEM: battery = 5.2V
source: 56.08 U/L/hr (mean)
Bkg: 21.55
system OKAY. (shield of SU-1)
- Soil sample processing / analysis
- NCA Systems development
- ~~Survey~~ Surveyed out DOEER with swipe tests

5-9-06 RW Partly cloudy $\approx 70^{\circ}\text{F}$

- QC for Background system: Battery = 5.6V
source: 54.91
Bkg: 20.96
system OKAY \Rightarrow additional pre-cleanup scan of search matrix.
- Collected screening soil samples in panning area (Survey Unit-1 area) after initial cleanup - goal was to establish gamma correlation with Ra-226 conc. & explosive cleanup thus far
- Soil sample processing / analysis
- Instrument issues & RSD values (lapel sampling)

ATTACHMENT M

**SELECT PHOTOGRAPHS
BY
SURVEY UNIT (SU)
OF THE
2006 GEORGE E. DAVIS MILL
REMEDICATION**



SU-1: Temporary stockpile of excavated material on hill top above mill building



SU-1: Hill top above mill building after excavations



SU-2: Excavated trench next to resident trailer



SU-2: Excavated pit at Willis root cellar trailer



SU-2: Spot excavation pit in Willis yard



SU-3: General excavations near resident trailer



SU-3: Excavated pit near FESI trailer



SU-3: Excavated pit near resident trailer



SU-3: Excavated pit near upper resident parking area



SU-3: Excavated pit near resident trailer



SU-4: General excavations below mill and near load-out area



SU-4: Excavations next to CDOT fence



SU-4: Excavations next to CDOT fence (tree was later removed)



SU-4: Interim excavation and stockpiling of material in Survey Unit 4



SU-4: Interim excavations near mill building and temporary haul road to load-out area



SU-4: Late excavations directly below mill building



SU-4: Late excavations directly below mill building (groundwater level is where pond has formed)



SU-4: Pond below mill after excavation and re-grading



SU-5: Early excavations southwest of mill building



SU-5: Temporary stockpile of material south of mill building



SU-5: Late excavations southwest of mill building



SU-5: Temporary pond formed southwest of mill building as excavations reached a little below groundwater table



SU-5: Post-cleanup re-grading in Survey Unit 5



SU-5: New ditch constructed in Survey Unit 5 during re-grading