



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

MEMORANDUM

DATE:

SUBJECT: Request for a Time-Critical Removal Action at the NECR Residential Site #2, Rural Route 26, McKinley County, New Mexico, Navajo Nation Indian Reservation

FROM: Harry L. Allen, On-Scene Coordinator
Emergency Response Section (SFD-9-2)

AWB for

THROUGH: Richard Martyn, Acting Chief
Emergency Response Section (SFD-9-2)

TO: Daniel Meer, Chief
Response, Planning & Assessment Branch (SFD-9)

I. PURPOSE

The purpose of this Action Memorandum is to obtain approval to spend up to \$867,500 in direct costs to mitigate threats to human health and the environment posed by the presence of hazardous substances at the Northeast Church Rock (NECR) Residential Site #2 (the "Site"). The Site is located within the Navajo Nation Indian Reservation and is situated at Rural Route 26, on Red Water Pond Road, in Coyote Canyon Chapter, McKinley County, New Mexico.

The Action Memorandum would serve as approval for the expenditure required for U.S. EPA to take actions described herein to abate an imminent and substantial endangerment to residents of homesites contaminated by hazardous substances. The proposed removal of hazardous substances would be undertaken pursuant to Section 104(a)(1) of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9604(a)(1), and Section 300.415 of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 CFR § 300.415.

If this memo is approved, this action is expected to occur immediately. Funds obligated for the NECR Residential Site may be deobligated and reobligated for the NECR Residential Site #2.

II. SITE CONDITIONS AND BACKGROUND

Site Status: Non-NPL
Category of Removal: Time-Critical
CERCLIS ID: NNN000906132
SITE ID: 09QM

A. Site Description

1. Physical Location

The Site is located within Township 17 North, Range 16 West, on the east side of Red Water Pond Road near the intersection with State Highway 566. The Site is situated approximately 20 miles northeast of Gallup, McKinley County, New Mexico. See Figure 1 for a Site Location Map.

2. Site Characteristics

The Site consists of one homesite adjacent to a known contaminated former mining area. The area is currently a residential homesite area. The homesite is bounded to the west-southwest by Red Water Pond Road. Across the road to the west is the NECR Residential Site. This NECR Residential Site was addressed in a recent Time-Critical Removal Action. A nearby arroyo and prevailing wind patterns may have transported contaminants from the former Northeast Church Rock (NECR) uranium mine (the "NECR Mine Site") to the NECR Residential Site. Contaminated material originating from the NECR Mine Site has been observed in the unnamed arroyo and throughout the area adjacent to the NECR Residential Site and may have migrated overland to this additional homesite. It is likely that contaminants continued to migrate by wind to this additional homesite as well. The homesite represents approximately ½ acre.

Additionally, the Kerr-McGee Quivira Mine is located within 200 yards of the homesite to the north. The Quivira Mine is also a former uranium mine. It was reportedly addressed under a Nuclear Regulatory Commission (NRC) license closure. It appears that this area Kerr-McGee has been covered with earthen materials and that the cover has experienced thinning due to erosive losses. Kerr-McGee reportedly operated a transfer storage area in close proximity to the homesite. The Quivira mine material haul road was situated in close proximity to the homesite. Mine materials were likely dispersed by the haul trucks during hauling of mine materials in and out of the area. See attachment 2 for the Site Photolog.

3. Removal site evaluation

On April 18, 2007, EPA conducted preliminary radiological scanning of the homesite, during ongoing assessments at the NECR Residential Site. EPA collected biased soil samples at five locations, based on elevated scan readings, and 1 duplicate sample in a manner consistent with the Removal Site Evaluation Work Plan (RSEWP), developed for the nearby NECR Mine Site. The samples were analyzed for radium-226 plus daughters.

Homesite sample locations were selected in the field based on field radiological scans using a NaI scintillation probe. This probe is a gamma radiation detection device. At least 50% of a ½ acre area surrounding the homesite was scanned by hand carrying the instruments and walking in a serpentine pattern and taking constant and discrete real-time surface gamma readings. Five surface samples were collected from the homesite at locations determined by the highest gamma scan readings. Surface samples were collected at 0-6 inches below ground surface (bgs). All of the soil samples were analyzed for radium-226 and daughters using EPA method E901.1.

USEPA calculated the 95% upper confidence limit (UCL) on the mean concentration of radium-226 in surface samples from the homesite using ProUCL software. The software package generates normal and transformed statistics and recommends the appropriate UCL for a recommended data distribution (see Attachment 3 for the ProUCL data sheet for the homesite). The results were normally distributed and the Student's t-UCL was recommended. The result was 14.1 pCi/g, well above the NECR Site specific screening level. Because these samples were not randomly collected, but rather biased to areas with elevated gamma measurements, this level is not meant to represent an exposure point concentration but rather is representative of a reasonable maximum exposure level. Contaminated areas on the property represent potentially unacceptable exposures, thereby posing an imminent and substantial endangerment to on-site current and future residents including children.

EPA recognizes that the entire homesite footprint may not represent elevated exposures and therefore will further delineate the exceedance areas using field radiological scanning tools. These areas will be excavated and disposed at an off-site facility.

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

The sample UCL for radium-226 at the homesite was compared to a Site-specific background sample UCL, the PRG, and a site-specific screening level concentration for radium-226. Based on this comparison, concentration at the homesite exceed the Site specific background UCL and the PRG for radium-226 of 0.0124 picoCuries per gram (pCi/g). The Site screening level was 2.24 pCi/g.

The Site screening level is the sum of the Site-specific background mean and a risk-based value representing the upper end of the risk range (i.e., the 1 in 10,000 excess cancer risk for radium in residential exposure scenarios). The Site specific background mean was 1.0 pCi/g and the risk-based value was 1.24 pCi/g¹. The

¹ The residential PRG is 0.0124 pCi/g. This represents the 1 in 1,000,000 risk and is below the analytical detection limit (0.1 pCi/g). EPA policy states that a 1 in 10,000 risk is acceptable as a Removal Action objective, therefore, the PRG was scaled up to the 1 in 10,000 risk range to give a risk-based value of 1.24 pCi/g.

statistical analysis software result sheets for all of the homesites are included as attachment 3.

This homesite exceeded the Site screening level and the background UCL. Table 4.1 presents relevant findings of the residential investigation.

Table 4.1 – Removal Site Evaluation Analytical Results

Decision Unit	Mean Radium (pCi/g)	Upper Confidence Limit ($\alpha=0.05$) (pCi/g)	PRG & Risk-based value (pCi/g)	Background UCL ($\alpha=0.05$) (pCi/g)	Screening Level (pCi/g)
Homesite	9.18	14.1	PRG - 0.0124 Risk-based value - 1.24 <i>(expresses the 1 in 10,000 risk range)</i>	1.1 <i>(sample mean of 1)</i>	2.24

Source: Columns 1 & 2 are descriptors of sampling results collected by e&e, Inc., April 2007. Statistical data generated using ProUCL.

Notes: Bold results exceed the Site Screening level. UCL - Upper Confidence Limit; PRG - EPA R9's Preliminary Remediation Goal.

It is notable that the NECR Site-specific background level was determined based on a background survey conducted on August 17, 2006. On that date, 25 surface soil samples were collected from an area located southwest of the NECR Mine Site. The area was judged to be un-impacted by mining activities and situated upwind from the NECR Mine Site. The NECR Mine Site Technical Memorandum background report is included in the Administrative Record for the Site.

5. NPL status

The NECR Residential Site #2, NECR Residential Site and the NECR Mine Site are not on the National Priorities List (NPL). In 2006, Navajo Superfund Program conducted a pre-CERCLIS site screening of the NECR Mine Site (CERCLIS ID No. NNN000906132). The NECR RSE Work Plan determined the need for investigation of the original nine homesites and ultimately expanded the Site definition to include the residential area, adjacent to NECR Residential Site #2.

Current conditions at the Site pose an imminent and substantial endangerment (see Sections III and IV) at this one homesite. The proposed Removal Action will complete all work at the NECR Residential Site #2 but will not complete work at the NECR Mine Site or other potential Sites including the Kerr-McGee Quivira Mine Site.

B. Other Actions to Date

No other response actions have occurred at the Site to date. Federal Nuclear Regulatory Commission actions have taken place at the NECR Mine Site, the UNC NPL site, and reportedly, the Quivira Mine site.

C. State and Local Authorities Roles

1. State and local actions to date

No State actions have taken place at the Site; however, some of the State and local actions at the NECR Mine Site may be relevant to the NECR Residential Site #2. Reportedly, NNEPA has also conducted radon sampling in the home. NNEPA sent a letter to U.S. EPA Region 9 formally requesting that U.S. EPA become the lead agency, per a Memorandum of Understanding between Region 9 and the Navajo Nation. Consultations with the State of New Mexico and Navajo Nation in 2005 resulted in correspondence that referred the lead to Region 9. Region 9 issued a letter formally accepting Site lead on November 7, 2005. The Navajo Nation later sent an email specifically requesting that EPA take action for removal of soils around the residences at the NECR site, including the home that is the subject of this Action Memorandum.

A copy of this correspondence will be included in the Administrative Record.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Current Site conditions pose the threat of potential future releases of a hazardous substance, namely radium-226. The likelihood of direct human exposure, via ingestion and/or inhalation of hazardous substances, and the threat of potential future releases and migration of those substances, pose an imminent and substantial endangerment to public health, and/or welfare, or the environment based on the factors set forth in the NCP, 40 CFR § 300.415(b)(2). These factors include:

1. Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations or the food chain

As described in Section II.A.4, high concentrations of radium-226 have been detected in samples of residential soils at the Site. Radium is formed when uranium and thorium break down in the environment. Two of the main radium isotopes found in the environment are radium-226 and radium-228. During the decay process, alpha, beta, and gamma radiation are released. Radium may be found in air and water. Radium in the soil may be absorbed by plants.

Analytical results indicate that concentrations of radium-226 identified in these media exceed background and U.S. EPA's PRGs. Acute inhalation exposure to high

levels of radium can cause adverse effects to the blood (anemia) and eyes (cataracts). It also has been shown to affect the teeth, causing an increase in broken teeth and cavities. Exposure to high levels of radium results in an increased incidence of bone, liver, and breast cancer. The U.S. EPA and the National Academy of Sciences, Committee on Biological Effects of Ionizing Radiation, has stated that radium is a known human carcinogen (ATSDR, 1999). Inhalation of radium contaminated particulates is of particular concern. Radium emits alpha radiation, which, when inhaled, becomes a source of ionizing radiation in the lung and throat, possibly leading to toxic effects.

Much of the contaminated material in the NECR Residential Site #2 is fine-grained and therefore likely to result in human exposure via inhalation or ingestion. Contamination is readily accessible to on-site full-time residents and potentially nearby part-time and/or full-time residents. Persons occupying or traversing the Site may be exposed to contaminated dust by inhalation or ingestion of contamination sorbed to particulate matter. Incidences of direct contact with natural and mechanically generated dust during these activities account for known contamination exposure scenarios faced at the Site. Radium-226 may be entrained in naturally and mechanically generated dust and/or transported on shoes and clothing of residents passing over contaminated areas. Gardening and other yard work also may result in exposure to contamination.

Activities that occur in contaminated areas that may put persons at risk include walking or hiking, livestock grazing, and modes of transportation including all-terrain vehicle, motorcycle, or on-horseback. Persons may drive their vehicles over contaminated areas as well. This activity may also contribute to exposure pathways via dust generation. Contamination in yards where children play may also be ingested. Children may eat contaminated soils during play activities.

2. High levels of hazardous substances in soils at or near the surface, that may migrate

Contaminated soils from the Site may migrate off-site via wind and water transport mechanisms including mechanical dust generation. It is believed that radium in soils at the homesites was transported there from sources including the upgradient NECR Mine Site and the Kerr McGee Quivira Mine Site. It is likely that this contamination could continue to migrate beyond the NECR Residential Site #2 boundary. Some of the radium daughter particles, such as radon, also have a specific tendency to adhere to dust particles and migrate and may have traveled off-site in historic surface water flows.

3. Weather conditions that may cause hazardous substances to migrate or be released

Rainfall events may lead to transport of the contamination from the homesites. High soil erosion rates may indicate transport of contamination from the Site constituting a release of hazardous substances and resulting in secondary contamination sources.

NECR Mine Site and the Kerr McGee Quivira Mine Site. It is likely that this contamination could continue to migrate beyond the NECR Residential Site #2 boundary. Some of the radium daughter particles, such as radon, also have a specific tendency to adhere to dust particles and migrate and may have traveled off-site in historic surface water flows.

3. Weather conditions that may cause hazardous substances to migrate or be released

Rainfall events may lead to transport of the contamination from the homesites. High soil erosion rates may indicate transport of contamination from the Site constituting a release of hazardous substances and resulting in secondary contamination sources. In addition, contaminants may migrate during high wind events due to the propensity for contaminants to adhere to windborne dust particles.

4. Availability of other appropriate federal or state response mechanisms to respond to the release

The NNEPA has informed EPA that it does not have the authority or resources to address the Site. Further, the NNEPA has sent a formal request to U.S. EPA, requesting that U.S. EPA address this area through a Time-Critical Removal Action.

IV. ENDANGERMENT DETERMINATION

Actual and threatened releases of hazardous substances from this site, if not addressed by implementing a Time-Critical Removal Action, may continue to present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed action description

U.S.EPA proposes to mitigate the imminent and substantial threats to human health, welfare, or the environment by taking steps to prevent the release of radium-226. The removal action will include the following objectives to prevent direct human contact with environmental radium-226 in residential soils at the homesite:

- Remove surficial contamination by excavating soil within the existing sampling and scanning grids based on historical sampling results and real-time field gamma scans. Unvegetated areas contiguous to the contaminated homesite (1/2 acre area) will also be delineated and excavated if necessary.
- Conduct confirmation scanning, sampling and analysis.

- Conduct scanning inside the buildings on the homesite. Mitigate contamination in house dust by cleaning and/or vacuuming surfaces. Conduct confirmation scanning and possibly sampling to confirm decontamination in specific areas.
- Transport and dispose excavated material at an alternate facility. The facility will be determined by the EPA planning team in consultation with NNEPA.
- Replace excavated material with clean fill and restore property to pre-removal conditions by replacing fences, trees and shrubs if necessary.
- Requested funding also will include payment for voluntary temporary lodging for the family of the affected homesite pursuant to the Uniform Relocation Act.

Excavation and removal of contaminated soils will achieve the ultimate goal of reducing the UCL 95% radium concentration in the excavation footprint to a concentration that is less than the Site screening level.

2. Contribution to remedial performance

This removal action would complete all clean-up activities at the NECR Residential Site #2.

The long-term cleanup plan for the site:

It is expected that this removal action will eliminate any threat of direct or indirect contact with or inhalation of hazardous substances at this residential property. As discussed below, EPA expects to conduct subsequent response actions at the larger mine site.

Threats that will require attention prior to the start of a long-term cleanup:

USEPA has identified imminent threats posed by radium-226 contamination at the NECR Residential Site #2. The mitigation actions described above will constitute a permanent remedy for the Site.

Sources of the contamination may require long-term cleanup. In future actions, these sources will comprise the NECR Mine Site. USEPA will continue to coordinate with NNEPA to evaluate the risk of human health effects based on mine wastes exposure pathways that may be present at the NECR Mine Site. The RSE that was conducted in November 2006, constitutes the basis for further action at the NECR Mine Site.

The extent to which the removal will ensure that threats are adequately abated:

The removal of surficial hazardous substances contamination by excavation and disposal will abate the threats described in Section III.

Consistency with the long-term remedy:

or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a CERCLA site.

Section 300.5 of the NCP defines relevant and appropriate requirements as cleanup standards, standards of control and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not “applicable” to a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site and are well-suited to the particular site.

Because CERCLA on-site response actions do not require permitting, only substantive requirements are considered as possible ARARs. Administrative requirements such as approval of, or consultation with administrative bodies, issuance of permits, documentation, reporting, record keeping, and enforcement are not ARARs for the CERCLA actions confined to the site.

Federal ARARs determined to be practicable for the Site are:

- U.S. Department of Transportation of Hazardous Materials Regulations 49 CFR Part 171, 172 and 173.
- The RCRA Land Disposal Restrictions (LDRs) 40 CFR 268.40 Subpart D implemented through Title 22 Section 66268.40.
- Uranium Mill Tailings Radiation Control Act (40 CFR Part 192.12 subparts B and C) requirements for residential cleanup levels of tailings sands.
- Native American Graves Protection and Repatriation Act, 25 USC Section 3001 *et seq.* and its implementing regulations, 43 CFR Part 10.
- Protection of Historic and Cultural Properties, Section 106 (36 CFR section 800.4 (b) (1)).
- American Indian Religious Freedom Act, 42 USC Section 1996 *et seq.*

Additional Federal guidance to be considered:

- U.S. EPA Directive on Protective Cleanup Levels for Radioactive Contamination at CERCLA sites. OSWER Directive 9200.4-18.

4. Project schedule

It is estimated that removal activities will take approximately 21 working days to complete excavation and transport to a temporary staging area. Disposal will continue beyond 35 days to no more than 75 days.

B. Estimated Costs

Regional Removal Allowance Costs

Cleanup Contractor	\$ 350,000
Disposal Costs	\$ 250,000

Extramural Costs Not Funded
from the Regional Allowance

USACE Relocation Work Assignment	\$ 15,000
START Contractor/USCG PST	\$ <u>25,000</u>

Extramural Subtotal	\$ 40,000
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TOTAL, Removal Action Project Ceiling \$ 640,000

EPA expects there to be cost savings as a result of performing this removal at this time, while personnel and equipment are still mobilized for the first NECR Residential Removal.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Given the site conditions, the nature of the hazardous substances documented on site, and the potential exposure pathways to nearby populations described in Sections III and IV above, actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

VII. OUTSTANDING POLICY ISSUES

There are no outstanding policy issues with the Site identified at this time.

VIII. ENFORCEMENT

Please see the attached Confidential Enforcement Addendum for a discussion regarding potentially responsible parties (PRPs). The following intramural costs are also recoverable:

Intramural Costs²

² Direct costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site-specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgement interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a removal action. The estimates are for illustrative purposes only and their use is not intended to create

Because conditions at the site meet the NCP criteria for a Time-Critical Removal Action, USEPA enforcement staff recommends the approval of the removal action proposed in this Action Memorandum. The total project ceiling if approved will be \$867,500, of which an estimated \$640,000 comes from the Regional Removal Allowance. Approval may be indicated by signing below.

Approve:  29 May 2007
Daniel Meer, Chief Date
Response, Planning and Assessment Branch

Disapprove: _____ Date
Daniel Meer, Chief
Response, Planning and Assessment Branch

Enforcement Addendum

Attachments:

1. Index to the Administrative Record
2. Photograph Log
3. ProUCL Data Sheets for the Homesite

U.S. EPA Direct Costs	\$ 10,000
U.S. EPA Indirect Costs (35.28%)	<u>\$ 227,500</u>
TOTAL Intramural Costs	\$ 237,500

The total USEPA extramural and intramural costs for this removal action, based on full-cost accounting practices that will be eligible for cost recovery are estimated to be \$867,500.

IX. U.S. EPA RECOMMENDATION

This decision document represents the selected removal action for the NECR Residential Site #2, Coyote Canyon Chapter, Navajo Nation, McKinley County, New Mexico developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site.

any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual costs from this estimate will affect the United States' right to cost recovery.

cc: Sherry Fielding, USEPA, OERR, HQ
Steven Etsitty, Navajo Nation Environmental Protection Agency
David Taylor, Navajo Nation Department of Justice
Steven Spencer, U.S. Department of Interior

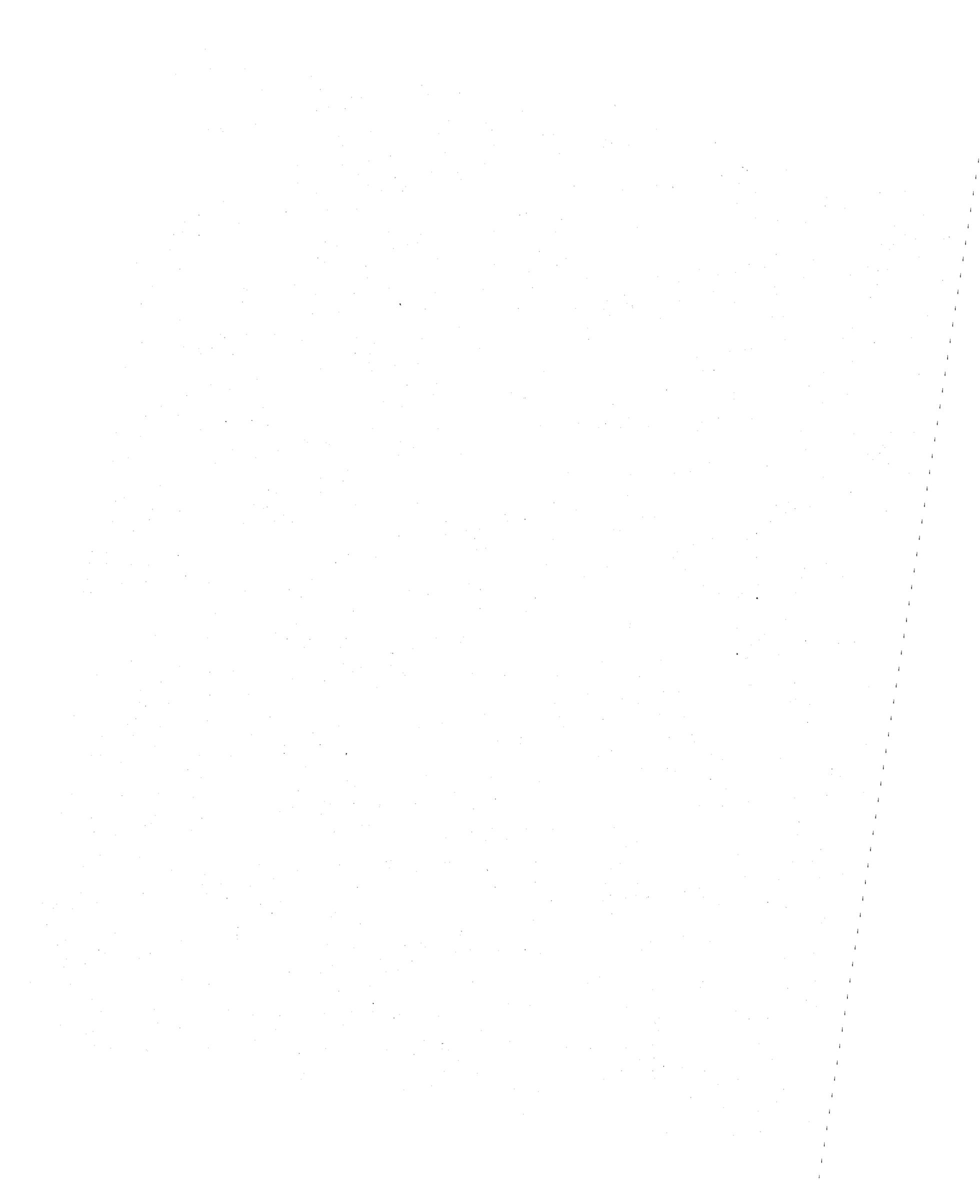
bcc: H. Allen, SFD-9-2
A. Bain, SFD-8-2
H. Karr, ORC-3
C. Reiner, SFD-9-2
C. Temple, SFD-9-2
Site File

**ATTACHMENT I
INDEX TO THE ADMINISTRATIVE RECORD**

1. Final Removal Site Evaluation Work Plan Draft, Northeast Church Rock (NECR) Mine. Prepared by: MWH, Inc. August 2006.
2. Technical Memorandum, Results of Background and Radium-226 Correlation Sampling, NECR Mine Site, United Nuclear Corporation. Prepared by: MWH, Inc. October 2006.
3. Letter from NN regarding residential removal, req. fund lead
4. Agency for Toxic Substances and Disease Registry (ATSDR) ToxFAQs, Radium CAS#7440-14-4. ATSDR. July 1999.

**ATTACHMENT II
PHOTOGRAPH LOG
NECR RESIDENTIAL SITE**

ATTACHMENT III
ProUCL DATASHEETS FOR INDIVIDUAL HOMESITES
NECR RESIDENTIAL SITE



General Statistics

Raw Statistics		Normal Distribution Test	
Number of Valid Samples	6	Shapiro-Wilk Test Statistic	0.843089
Number of Unique Samples	6	Shapiro-Wilk 5% Critical Value	0.788
Minimum	1.04	Data are normal at 5% significance level	
Maximum	14.4		
Mean	9.918333	95% UCL (Assuming Normal Distribution)	
Median	12.25	Student	14.1813
Standard Deviation	5.182055		
Variance	26.8537	Gamma Distribution Test	
Coefficient of Variation	0.522472	A-D Test Statistic	0.809807
Skewness	-1.263166	A-D 5% Critical Value	0.704205
		K-S Test Statistic	0.340153
		K-S 5% Critical Value	0.335828
Gamma Statistics		Data do not follow gamma distribution at 5% significance level	
k hat	2.001645		
k star (bias corrected)	1.111934		
Theta hat	4.955091		
Theta star	8.919897	95% UCLs (Assuming Gamma Distribution)	
nu hat	24.01974	Approximate Gamma UCL	21.61349
nu star	13.3432	Adjusted Gamma UCL	29.55622
Approx. Chi Square Value (.05)	6.123136		
Adjusted Level of Significance	0.01222	Lognormal Distribution Test	
Adjusted Chi Square Value	4.477648	Shapiro-Wilk Test Statistic	0.703507
		Shapiro-Wilk 5% Critical Value	0.788
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	0.039221		
Maximum of log data	2.667228	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.02426	95% H-UCL	91.84706
Standard Deviation of log data	1.015857	95% Chebyshev (MVUE) UCL	31.55613
Variance of log data	1.031966	97.5% Chebyshev (MVUE) UCL	40.2918
		99% Chebyshev (MVUE) UCL	57.45133
		95% Non-parametric UCLs	
		CLT UCL	13.39813
		Adj-CLT UCL (Adjusted for skewness)	12.23242
		Mod-t UCL (Adjusted for skewness)	13.99947
		Jackknife UCL	14.1813
		Standard Bootstrap UCL	13.04781
		Bootstrap-t UCL	12.93037
R		Hall's Bootstrap UCL	12.22803
Da		Percentile Bootstrap UCL	12.95
		BCA Bootstrap UCL	12.37833
Use Stu		95% Chebyshev (Mean, Sd) UCL	19.13987
		97.5% Chebyshev (Mean, Sd) UCL	23.13003
		99% Chebyshev (Mean, Sd) UCL	30.96794

GEL LABORATORIES LLC

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Certificate of Analysis

Company: Environmental Quality Management
Address: 6825 216th Street SW
Suite J
Lynnwood, Washington 98036
Contact: Ms. Cheryl Cox
Project: NECR Homesites Analytical

Report Date: May 14, 2007

Client Sample ID: NECR-GH-01
Sample ID: 184794001
Matrix: Soil
Collect Date: 19-APR-07 11:00
Receive Date: 23-APR-07
Collector: Client
Project: EOMA00107
Client ID: EOMA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
<i>Gamma, Ra226, Solid</i>											
Cesium-137	UI	0.00	+/-0.0668	0.110	0.100	pCi/g		MJH1 05/09/07 0902 629911			1
Radium-226		14.4	+/-1.36	0.189	0.500	pCi/g					
Radium-228		0.965	+/-0.364	0.350	0.500	pCi/g					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	

GEL LABORATORIES LLC

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Certificate of Analysis

Company : Environmental Quality Management
 Address : 6825 216th Street SW
 Suite J
 Lynnwood, Washington 98036
 Contact: Ms. Cheryl Cox
 Project: **NECR Homesites Analytical**

Report Date: May 14, 2007

Client Sample ID:	NECR-GH-02	Project:	EOMA00107
Sample ID:	184794002	Client ID:	EOMA001
Matrix:	Soil		
Collect Date:	19-APR-07 11:15		
Receive Date:	23-APR-07		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
<i>Gamma, Ra226, Solid</i>												
Cesium-137		0.382	+/-0.0934	0.0912	0.100	pCi/g		MJH1	05/09/07	1107	629911	1
Radium-226		13.0	+/-1.25	0.187	0.500	pCi/g						
Radium-228		1.00	+/-0.427	0.329	0.500	pCi/g						

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MPX2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst	Comments
1	EML HASL 300, 4.5.2.3		

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2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Environmental Quality Management
Address : 6825 216th Street SW
Suite J
Lynnwood, Washington 98036
Contact: Ms. Cheryl Cox
Project: NECR Homesites Analytical

Report Date: May 14, 2007

Client Sample ID: NECR-GH-03
Sample ID: 184794003
Matrix: Soil
Collect Date: 19-APR-07 11:25
Receive Date: 23-APR-07
Collector: Client
Project: EOMA00107
Client ID: EOMA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
<i>Gamma, Ra226, Solid</i>												
Cesium-137		0.359	+/-0.0895	0.0886	0.100	pCi/g		MJH1	05/09/07	1312	629911	1
Radium-226		13.2	+/-1.26	0.190	0.500	pCi/g						
Radium-228		0.978	+/-0.415	0.387	0.500	pCi/g						

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Environmental Quality Management
 Address : 6825 216th Street SW
 Suite J
 Lynnwood, Washington 98036
 Contact: Ms. Cheryl Cox
 Project: **NECR Homesites Analytical**

Report Date: May 14, 2007

Client Sample ID:	NECR-GH-04 (MS.MSD)	Project:	EOMA00107
Sample ID:	184794004	Client ID:	EOMA001
Matrix:	Soil		
Collect Date:	19-APR-07 13:15		
Receive Date:	23-APR-07		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
<i>Gamma, Ra226, Solid</i>												
Cesium-137		0.193	+/-0.0662	0.0688	0.100	pCi/g		MJH1	05/09/07	1517	629911	1
Radium-226		6.37	+/-0.650	0.151	0.500	pCi/g						
Radium-228		0.908	+/-0.286	0.269	0.500	pCi/g						

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst	Comments
1	EML HASL 300, 4.5.2.3		

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Report Date: May 14, 2007

Client Sample ID:	NECR-GH-05	Project:	EOMA00107
Sample ID:	184794005	Client ID:	EOMA001
Matrix:	Soil		
Collect Date:	19-APR-07 13:00		
Receive Date:	23-APR-07		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
<i>Gamma, Ra226, Solid</i>											
Cesium-137	U	-0.0176	+/-0.0385	0.0615	0.100	pCi/g		MJH1 05/09/07	1722	629911	1
Radium-226		1.04	+/-0.162	0.112	0.500	pCi/g					
Radium-228		1.20	+/-0.296	0.197	0.500	pCi/g					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst Comments
I	EML HASL 300, 4.5.2.3	

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Report Date: May 14, 2007

Client Sample ID:	NECR-GH-06	Project:	EOMA00107
Sample ID:	184794006	Client ID:	EOMA001
Matrix:	Soil		
Collect Date:	19-APR-07 11:30		
Receive Date:	23-APR-07		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
<i>Gamma, Ra226, Solid</i>												
Cesium-137		0.278	+/-0.0886	0.0956	0.100	pCi/g		MJH1	05/09/07	1926	629911	1
Radium-226		11.5	+/-1.11	0.181	0.500	pCi/g						
Radium-228		1.09	+/-0.356	0.374	0.500	pCi/g						

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst	Comments
1	EML HASL 300, 4.5.2.3		

**Radiochemistry Case Narrative
Environmental Quality Management (EQMA)
Work Order 184794**

Method/Analysis Information

Product: Gamma, Ra226, Solid
Analytical Method: EML HASL 300, 4.5.2.3
Prep Method: Dry Soil Prep
Analytical Batch Number: 629911
Prep Batch Number: 628449

Sample ID	Client ID
184794001	NECR-GH-01
184794002	NECR-GH-02
184794003	NECR-GH-03
184794004	NECR-GH-04 (MS.MSD)
184794005	NECR-GH-05
184794006	NECR-GH-06
1201325820	Method Blank (MB)
1201325821	184794001(NECR-GH-01) Sample Duplicate (DUP)
1201325822	Laboratory Control Sample (LCS)

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-013 REV# 14.

Calibration Information:

Calibration Information

All initial and continuing calibration requirements have been met.

Standards Information

Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry

All counting sources were prepared in the same geometry as the calibration standards.

SAMPLE DATA SUMMARY

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

**Certificate of Analysis Report
for**

EQMA001 Environmental Quality Management

Client SDG: 184794 GEL Work Order: 184794

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a surrogate compound.

U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

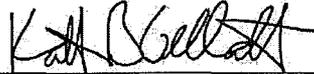
UI Gamma Spectroscopy--Uncertain identification

ND The analyte concentration is not detected above the detection limit.

The above sample is reported on a dry weight basis except where prohibited by the analytical procedure.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Jake Crook.



Reviewed by _____



SAMPLE RECEIPT & REVIEW FORM

Jake

PM use only *gr*

Client: <u>NECR</u>	SDG/ARCO/Work Order: <u>184742</u> <u>184794</u>
Date Received: <u>4/23/07</u>	PM(A) Review (ensure non-conforming items are resolved prior to signing): <i>gr</i>
Received By: <u>JR</u>	

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	X			Circle Applicable: seals broken damaged container leaking container other (describe)
2 Samples requiring cold preservation within (4 +/- 2 C)? Record preservation method.		X		Circle Coolant # ice bags blue ice dry ice <u>none</u> other describe <u>17°</u>
3 Chain of custody documents included with shipment?	X			
4 Sample containers intact and sealed?	X			Circle Applicable: seals broken damaged container leaking container other (describe)
5 Samples requiring chemical preservation at proper pH?		X		Sample ID's, containers affected and observed pH:
6 VOA vials free of headspace (defined as < 6mm bubble)?		X		Sample ID's and containers affected:
7 Are Encore containers present? (If yes, immediately deliver to VOA laboratory)			X	
8 Samples received within holding time?	X			Id's and tests affected:
9 Sample ID's on COC match ID's on bottles?	X			Sample ID's and containers affected:
10 Date & time on COC match date & time on bottles?	X			Sample ID's affected:
11 Number of containers received match number indicated on COC?	X			Sample ID's affected:
12 COC form is properly signed in relinquished/received sections?	X			
14 Air Bill, Tracking #'s, & Additional Comments				<u>FedEx 855948823412</u>

Suspected Hazard Information	Non-Regulated	Regulated	High Level	RSO RAD Receipt # _____ *If > x2 area background is observed on samples identified as "non-regulated/non-radioactive", contact the Radiation Safety group for further investigation.
A Radiological Classification?	X			Maximum Counts Observed*: <u>20 cpm</u>
B PCB Regulated?	X			
C Shipped as DOT Hazardous Material? If yes, contact Waste Manager or ESH Manager.	X			Hazard Class Shipped: UN#:
D Regulated as a Foreign Soil?	X			
PM (or PMA) review of Hazard classification: <i>gr</i> Initials <u>4/23</u> Date:				

ce

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Certificate of Analysis

Company: Environmental Quality Management
Address: 6825 216th Street SW
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Lynnwood, Washington 98036
Contact: Ms. Cheryl Cox
Project: NECR Homesites Analytical

Report Date: May 14, 2007

Client Sample ID: NECR-GH-01
Sample ID: 184794001
Matrix: Soil
Collect Date: 19-APR-07 11:00
Receive Date: 23-APR-07
Collector: Client
Project: EOMA00107
Client ID: EOMA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
<i>Gamma, Ra226, Solid</i>											
Cesium-137	UI	0.00	+/-0.0668	0.110	0.100	pCi/g		MJH1 05/09/07	0902	629911	1
Radium-226		14.4	+/-1.36	0.189	0.500	pCi/g					
Radium-228		0.965	+/-0.364	0.350	0.500	pCi/g					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	

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 Contact: Ms. Cheryl Cox
 Project: NECR Homesites Analytical

Report Date: May 14, 2007

Client Sample ID:	NECR-GH-02	Project:	EOMA00107
Sample ID:	184794002	Client ID:	EOMA001
Matrix:	Soil		
Collect Date:	19-APR-07 11:15		
Receive Date:	23-APR-07		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
<i>Gamma, Ra226, Solid</i>											
Cesium-137		0.382	+/-0.0934	0.0912	0.100	pCi/g		MJH1 05/09/07	1107	629911	1
Radium-226		13.0	+/-1.25	0.187	0.500	pCi/g					
Radium-228		1.00	+/-0.427	0.329	0.500	pCi/g					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	

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 Project: **NECR Homesites Analytical**

Report Date: May 14, 2007

Client Sample ID:	NECR-GH-03	Project:	EOMA00107
Sample ID:	184794003	Client ID:	EOMA001
Matrix:	Soil		
Collect Date:	19-APR-07 11:25		
Receive Date:	23-APR-07		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
<i>Gamma, Ra226, Solid</i>											
Cesium-137		0.359	+/-0.0895	0.0886	0.100	pCi/g		MJH1 05/09/07	1312	629911	1
Radium-226		13.2	+/-1.26	0.190	0.500	pCi/g					
Radium-228		0.978	+/-0.415	0.387	0.500	pCi/g					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst Comments
I	EML HASL 300, 4.5.2.3	

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 Project: **NECR Homesites Analytical**

Report Date: May 14, 2007

Client Sample ID:	NECR-GH-04 (MS.MSD)	Project:	EOMA00107
Sample ID:	184794004	Client ID:	EOMA001
Matrix:	Soil		
Collect Date:	19-APR-07 13:15		
Receive Date:	23-APR-07		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
<i>Gamma, Ra226, Solid</i>												
Cesium-137		0.193	+/-0.0662	0.0688	0.100	pCi/g		MJH1	05/09/07	1517	629911	1
Radium-226		6.37	+/-0.650	0.151	0.500	pCi/g						
Radium-228		0.908	+/-0.286	0.269	0.500	pCi/g						

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	

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Suite J
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Contact: Ms. Cheryl Cox
Project: NECR Homesites Analytical

Report Date: May 14, 2007

Client Sample ID: NECR-GH-05
Sample ID: 184794005
Matrix: Soil
Collect Date: 19-APR-07 13:00
Receive Date: 23-APR-07
Collector: Client
Project: EOMA00107
Client ID: EOMA001

Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Gamma Spec Analysis											
<i>Gamma, Ra226, Solid</i>											
Cesium-137	U	-0.0176	+/-0.0385	0.0615	0.100	pCi/g		MJH1 05/09/07	1722	629911	1
Radium-226		1.04	+/-0.162	0.112	0.500	pCi/g					
Radium-228		1.20	+/-0.296	0.197	0.500	pCi/g					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst Comments
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 Project: **NECR Homesites Analytical**

Report Date: May 14, 2007

Client Sample ID:	NECR-GH-06	Project:	EOMA00107
Sample ID:	184794006	Client ID:	EOMA001
Matrix:	Soil		
Collect Date:	19-APR-07 11:30		
Receive Date:	23-APR-07		
Collector:	Client		

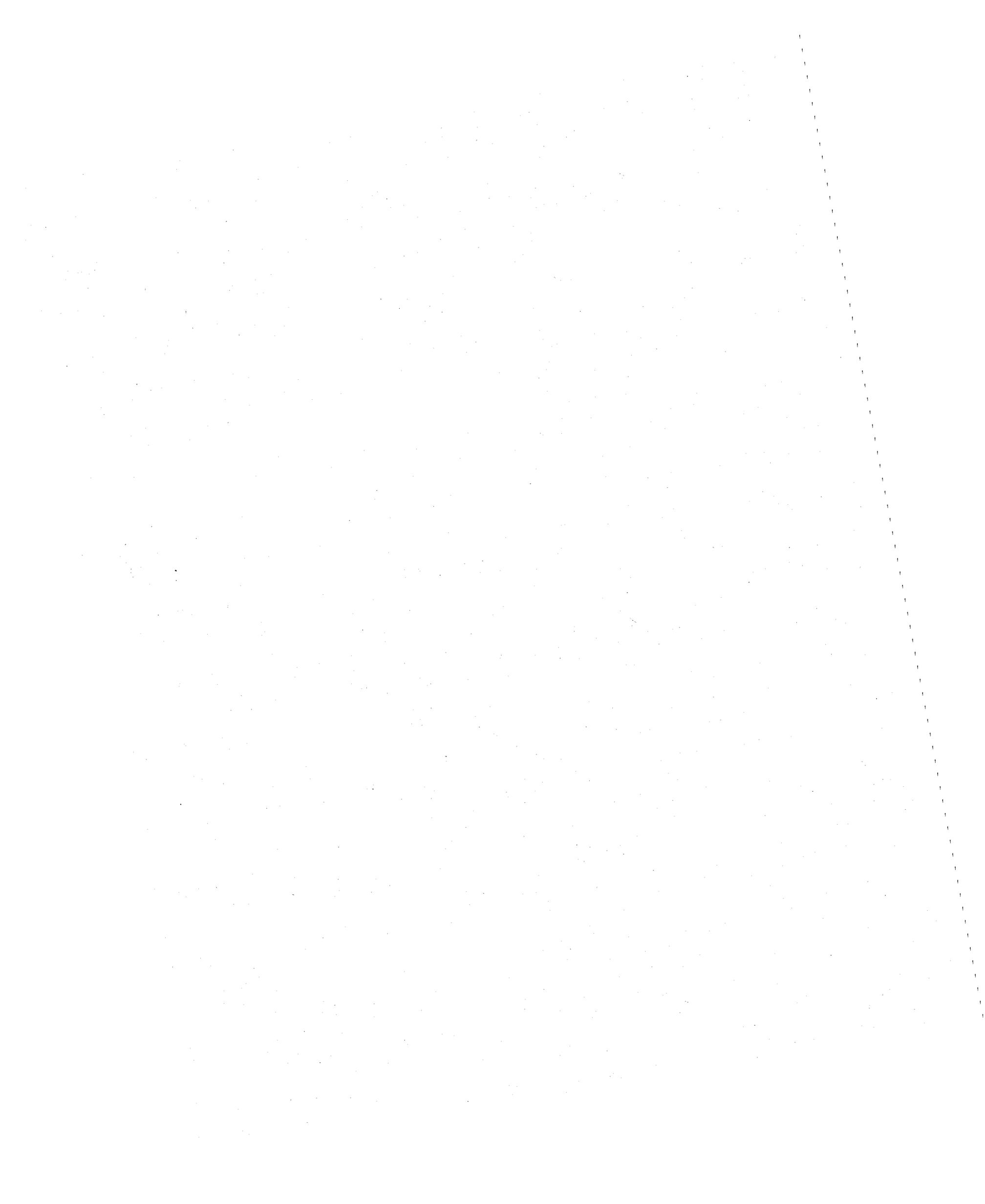
Parameter	Qualifier	Result	Uncertainty	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis												
<i>Gamma, Ra226, Solid</i>												
Cesium-137		0.278	+/-0.0886	0.0956	0.100	pCi/g		MJHI	05/09/07	1926	629911	1
Radium-226		11.5	+/-1.11	0.181	0.500	pCi/g						
Radium-228		1.09	+/-0.356	0.374	0.500	pCi/g						

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MXP2	04/25/07	1142	628449

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EML HASL 300, 4.5.2.3	





ecology and environment, inc.

International Specialists in the Environment

130 Battery Street, Suite 400
San Francisco, California 94111
Tel: (415) 981-2811, Fax: (415) 981-0801

Tuesday, May 29, 2007

Attn: Harry Allen, USEPA On-Scene Coordinator
Andy Bain, USEPA Remedial Project Manager

Subject: Review of G. [REDACTED] Soil Samples

Wednesday, April 18, 2007, GSA Contractor, Robin Clemens with Ecology and Environment, Inc. and subcontractor Carl Palladino with the Palladino Company, attended a Northeast Church Rock (NECR) home site meeting at the [REDACTED] residence off Red Pond Water Road in Church Rock, New Mexico. In attendance were Harry Allen and Andy Bain, USEPA, members from Navajo EPA and local residence. During the meeting EPA, agreed to perform a soil survey of the [REDACTED] residence across Red Water Pond Road.

Thursday, April 19, 2007, GSA contractors per EPA's request performed a preliminary radiation soil survey of the [REDACTED] property. During the survey, the contractors identified a few areas of elevated levels of radiation along the inside 2-3 feet, of the fence line paralleling Red Pond Water Road. These samples are labeled NECR-GH-01, NECR-GH-02, NECR-GH-03 and NECR-GH-05. Sample ID number NECR-GH-05 was collected in the parking area/driveway/front entrance to the [REDACTED] residence. And NECR-GH-04 was collected along the fence line across the property from the Red Pond Water Road fence line.

When surveying the soil, areas where the soil demonstrated higher than twice background radiation survey readings, soil samples were collected. Although the radiation survey readings were not elevated in front of the [REDACTED] residence, sample number NECR-GH-05, was collected as a health and safety precaution. Listed below in Table 1, are the un-validated analytical results, reported by the General Engineering Laboratory of Charleston, South Carolina. All of the soil samples were collected at the surface (0.5-1.5 inches below ground surface (bgs)) of the soil within a square foot area, where radiation readings read over 30 counts per minute.

NECR Homesite
Soil Sampling
Un-Validated Analytical Results
Table 1

Sample ID	Results (picocuries/gram)	Comments
NECR-GH-01	14.4	Soil sample collected along the Red Water Pond Road fence line on the NE corner and over the fence from the ██████ property. Rad readings-approx. 40K cpm
NECR-GH-02	13.0	Soil sample collected along the Red Water Pond Road fence line. Rad readings-approx. 30K cpm
NECR-GH-03	13.2	Soil sample collected along the Red Water Pond Road fence line. Rad readings-approx. 30K cpm
NECR-GH-04	6.37	Soil sample collected along the fence line across the ██████ Property. Rad readings-approx. 20K cpm
NECR-GH-05	1.04	Soil sample collected by the steps in front of the ██████ residence. Rad readings-approx. 13K cpm
NECR-GH-06	11.5	Duplicate sample of NECR-GH-03. Soil sample collected along the Red Water Pond Road fence line. Approx. 30K cpm

Bolded results are above the site action level of 2.24 pCu/g
cpm-counts per minute

Based on these preliminary results, a more thorough survey and possibly a removal action may be required.

Sincerely,



Robin Clemens
GSA Contractor
Ecology and Environment, Inc.
Project Manager