June 4, 2018

Mr. James Pate
Environmental Scientist DCLA
Emergency and Radiological Services Division- Radiation Section
Louisiana Department of Environmental Quality
602 North Fifth Street
Baton Rouge, LA 70802

RE: AAR Response to Louisiana DEQ Inquiry Regarding Rough Order of Magnitude (ROM) Cost Estimate – Ra226 Source Removal and Disposal, New Orleans, LA per DOE Triage Incident Report (TIR) for TE-13-0927

Dear Mr. Pate:

ARS Aleut Remediation, LLC (AAR) hereby provides the requested ROM cost estimate range and associated technical approach for the removal, packaging, transport, and disposal of a Ra226 source believed to be located approximately 12"-16" beneath the surface of Lowerline Street in New Orleans, LA. Due to the uncertainties described in the referenced DOE TIR for TE-13-0927 (attached) and our telephone discussions with you on this matter, AAR provides this ROM cost estimate in a range in an attempt to quantify estimated ROM costs for conditions yet unknown. We have included our assumptions to produce the ROM cost estimate range, which align with the range of assumptions identified in the referenced DOE TIR. This ROM cost estimate range is intended to assist the Louisiana DEQ and the City of New Orleans, LA with planning and does not represent a bid to perform services at this time.

Basis for ROM Cost Estimate Range
The AAR ROM Cost Estimate Range is based on the ASSESSMENT section of the DOE TIR for TE-13-0927, which states: *"The presence of neutrons was not evident in the collected spectra. No SNM signatures were identified in the spectra. No threat was determined, consistent with the 2013 assessment. Our confidence level for Ra226 identification is high, based on excellent quality of the collected spectra. The activity is 1-10 mCi with high confidence. However, we cannot differentiate between a point source and a highly-localized but distributed source."* The AAR ROM Cost Estimate Range, therefore, is based on the range of possible subsurface conditions to be encountered between the following two scenarios:

1. A single Ra226 point source, with an activity of approximately 1 mCi, and
2. A highly-localized but distributed Ra226 source, with an activity of approximately 10 mCi.

There are several costs items that would be the same for either scenario, such as: Planning, Submittals, and Coordination of Task; Mobilization; Crew Size; Street Signage for Closure/Detour; Primary Heavy Equipment and Tools; and Radiological Instruments. AAR would propose to mobilize with the manpower, equipment, and materials to perform the removal of the Ra226 contamination, prepared to perform either scenario or some currently unknowable scope of work between the two assumed extremes. The field work at Lowerline Street in any case would be conducted in accordance with ARS's radioactive material license, LA-7153-L02, as issued by the Louisiana DEQ and would include the following primary elements:

1. Mobilization to the Site
2. Deployment of Road Blocks and Established Detours
3. Locate, Saw Cut, and Removal of Approximately 25 square feet (SF) of Street Surface

4. Survey of the Open Street Area
5. Careful, Guided Excavation of the Intended Area

The primary difference in costs between Scenario 1 and Scenario 2 will be in the: Excavation; Removal; Packaging; Transport; Disposal; Decontamination; Site Restoration; and Overall Duration of Task (depending on all other circumstances.)

Scenario 1
In this scenario, a single, non-leaking, Ra226 point source, with an activity of approximately 1 mCi, is located approximately 12"-16" below grade in the center of Lowerline Street at the exact coordinates provided in the referenced TIR. AAR believes the Lowerline Street field work for this removal could be performed in one to two days (excluding extensive street repair) including all packaging and transport of the single Ra226 point source. As the guided excavation proceeds, subsequent tasks would include the following primary elements:

1. Verification of Source Location and Activity
2. Removal and Immediate Packaging of Point Source for Disposal
3. Verification of less than "Twice Background" in Open Excavation and Staged Material
4. Collection of Confirmatory Soil Sample After Excavation and Final Survey
5. Backfill with Non-Impacted Fill
6. Limited Repair of Street Surface
7. Removal of Road Barricades and Demobilization
8. Temporary packaging for transport from the Lowerline Street site to QSA Global.

Final packaging of the 1 mCi Ra226 non-leaking source and its subsequent disposal would be performed by QSA Global of Baton Rouge, LA.

Scenario 2
In this scenario, highly-localized but distributed Ra226 source, with activity of 10 mCi, is located approximately 12"-16" below grade in the center of Lowerline Street at the exact coordinates provided in the referenced TIR. AAR believes the Lowerline Street field work for this removal could be performed in two to three days (excluding extensive street repair), including all temporary packaging of the Ra226 contaminated materials onsite and transport offsite for subsequent final packaging and disposal. As the guided excavation proceeds, subsequent tasks would include the following primary elements:

1. Verification of Ra226 Distributed Contamination Location and Activity
2. Expansion of Street Surface Cut, as Needed
3. Removal and Packaging of the Leaking Source and up to Five (5) Drums of Contaminated Soils
4. Survey and Decontamination of All Impacted Equipment
5. Verification of less than "Twice Background" in Open Excavation and Staged Material
6. Collection of Confirmatory Soil Sample After Excavation and Final Survey
7. Backfill with Non-Impacted Fill and Imported Fill
8. Limited Repair of Street Surface
9. Removal of Road Barricades and Demobilization

Disposal of a 10 mCi leaking Ra226 source disposal would utilize a "2R" type overpack. The Source would be encapsulated in a capped iron pipe and stabilized in a type 7A drum with concrete. A full 28 day concrete cure is required prior to shipment. Once the leaking source has been removed from the excavation, surveys will be conducted to determine the magnitude

and extent of soil contamination. A sufficient amount of soil will be removed in order to remediate any residual contamination while also ensuring that the concentration of Ra-226 in the waste does not exceed 1500 pCi/g. For estimating purposes, if 25% leakage and an initial activity of 10 mCi are assumed; up to 5 drums of soil may need to be excavated. A smaller volume of soil may suffice based on field measurements of contamination and initial source activity. All contaminated materials would be packaged and transported to ARS's Port Allen facility for final stabilization and packaging prior to shipment to U.S. Ecology for disposal.

ROM Cost Estimate Range

The AAR ROM cost estimate range is established by pricing Scenario 1 and Scenario 2 through final disposal of the Ra226 wastes, as follows:

Scenario 1 – Non-Leaking Ra226 Source at 1 mCi

-Scenario 1 ROM Cost Estimate by Task:

Pre-Mobilization Planning and Review	$ 6,775
Mobilization and Site Set-up	$ 7,412
Source Removal, Backfill and Demobe	$ 19,650
Project Reporting and Closeout	$ 4,335
Total ROM Cost Estimate:	$ 38,172

-Scenario 1 ROM Cost Estimate by Category:

Labor	$ 15,200
Materials/ODCs/License Fees	$ 16,678
Equipment and Instruments	$ 3,299
Transportation and Disposal w/ Analytical	$ 2,995
Total ROM Cost Estimate:	$ 38,172

Scenario 2 – Leaking Ra226 Source at 10 mCi

-Scenario 2 ROM Cost Estimate by Task:

Pre-Mobilization Planning and Review	$ 6,775
Mobilization and Site Set-up	$ 7,412
Source Removal, Backfill and Demobe	$ 44,235
Project Reporting and Closeout	$ 8,670
Total ROM Cost Estimate:	$ 67,092

-Scenario 2 ROM Cost Estimate by Category:

Labor	$ 22,050
Materials/ODCs/License Fees	$ 24,262
Equipment and Instruments	$ 3,916
Transportation and Disposal w/ Analytical	$ 16,864
Total ROM Cost Estimate:	$ 67,092

Summary

With the information provided and the basic assumption of "twice background" as the no further action level for the removal of the Ra226 contamination in Lowerline Street, AAR believes a usable ROM cost estimate range to be used for funding purposes is $38,172 to $67,092.

Should you have any questions in regard to this ROM Cost Estimate prior to your response, please contact me at 314-422-2296 or cstone@aar-llc.com. Also, Kelly Ausbrooks may be reached at 270-564-1800 or kausbrooks@aar-llc.com for technical clarifications. Thank you.

Sincerely,

Christopher L. Stone
VP Operations
ARS Aleut Remediation, LLC

CC: Joseph Hampel
Kelly Ausbrooks
Darrin Lawrence
Steve Shirley

ATTACHMENT 1

DOE Triage Incident Report (TIR) for TE-13-0927
Event Date: 25 April 2018

U.S. Department of Energy
NNSA/NA-84
Office of Nuclear Incident Response
OUO: (202) 586-8100

Event Date: 25 April 2018
Event Type: EAL 1
Urgency: within 24 hours
Location: New Orleans, LA

Callout
Bridge Open: 1120 EDT
Bridge Close: 1140 EDT
Report Date: 2 May 2018
Revision #: 5

Edited by: M. Johnson

Federal Leads
DOE ERO: J. Crapo
DOE FTL: S. Bradshaw

Triage Analysts
Gamma Spec: M. Johnson
Gamma Spec II: M. Lombardi
P1E Diag: L. Nakae
Trainees: R. Winkler (L1)

Other Participants

Request submitted by
Organization(s):
RAP Support of Super Bowl

Field Responder Contact
Name: Michael Murray
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gregorydc@ornl.gov

OFFICIAL USE ONLY
May be exempt from public release under the Freedom of Information Act (5 U.S.C. 552), exemption and category: Exemption 7, Law Enforcement.

Department of Energy review required before public release

Name/Org: Micah Johnson DOE
Date: 26 Apr 2018
Guidance: CG-RER-1, 07/08/2002

Format Version 5 (09.29.2016)

TRIAGE INCIDENT REPORT

Brief Description: EAL1 from New Orleans

SUMMARY

A location in New Orleans was revisited where a buried radioactive source was discovered on Jan 31st, 2013. In 2013, a low resolution NaI detector was used. Recently the site was revisited to collect additional spectroscopic data. A high-resolution HPGe detector was used and Triage was activated to provide identification analysis and quantify the source activity and burial depth.

ASSESSMENT:

The presence of neutrons was not evident in the collected spectra. No SNM signatures were identified in the spectra. No threat was determined, consistent with the 2013 assessment. Our confidence level for Ra226 identification is high, based on excellent quality of the collected spectra. The activity is 1-10 mCi with high confidence. However, we cannot differentiate between a point source and a highly-localized but distributed source.

TABLE 1: RADIONUCLIDE(S) IDENTIFIED

Radionuclide(s)	Quantity	Remarks
Ra226	1-10 mCi	Assuming point source

SITUATION

Taken from Triage web site:
This source was first found during mobile operations 1/31/2013 during Super Bowl. Since it was adjucated as non threat, it was not addressed further. While in New Orleans supporting the WWE security, the location was revisited with more time and better equipment. Please confirm the Ra226, the estimated depth of ~12 inches and the source strength (~ 1 millicurie). Please excuse the neutron error on opening PeakEasy; this problem is being dealt with in the near future. No known source spectrum was saved, but the Ra226 should be sufficient for energy cal. The gps location is 29.961481 -90.110023 in the center of Lowerline Street.

DATA

DATA FILES

Triage used the following files in its analysis:

Known.n42 Known Source	31 Jan 13
Ra226 background.n42 Background	31 Jan 13
Ra226Spot.n42 Item of Primary Concern	31 Jan 13
Ra226Spot.png	31 Jan 13
TE-13-0927 Report.docx	02 Feb 13
Asphalt surface contact HIGH DT 2018_04_06_14_37_140.n42 Item of Primary Concern	25 Apr 18
Surface plus 14 inches 2018_04_06_14_44_040.n42 Item of Primary Concern	25 Apr 18
BACKGROUND 2018_04_06_14_49_370.n42 Background	25 Apr 18
Location looking west in Center ofLowerline St 2D8A5812.JPG	25 Apr 18
NOLA HOT Spot map.JPG	25 Apr 18
Surface Plus 14 inches.JPG	25 Apr 18
Surface measurement on spot High DT 2D8A5814.JPG	25 Apr 18
Surface plus 14 inches closeup.JPG	25 Apr 18

ADDITIONAL INFORMATION
None

TECHNICAL ASSESSMENT

Triage spectroscopists and diagnosticians analyzed the collected spectra from the ORTEC Detective EX-100 (e.g. Fig. 1). Detailed analysis and search algorithms were used to exclude SNM and threat materials. GammaDesigner v3.17.1 and PeakEasy v. 4.97 analysis software were used to identify the presence of Ra226 based on the comparison of peak energies and relative intensities in the collected spectra to peaks associated with Ra226. GammaDesigner v3.17.1, SimpleMass v6.2, and GADRAS v18.7.9 analysis software packages were used to quantity the source activity and depth below the roadway surface (see Fig. 2 and 3). A point source was assumed in the modelling; however this does not exclude the possibility of a highly localized but distributed source. We assess that the source strength is in the range of 1-10 mCi and the depth under the asphalt surface is 12-16 in. The data collected was consistent with a localized source.

REMARKS
Good spectra and data were collected. The photographs provided were helpful to verify the detector used by the field team and measurement configurations. The provided pictures and spectrum data verify that a Detective EX-100 was used.

SITUATIONAL ASSESSMENT

NA

TRIAGE RECOMMENDATIONS

NEXT STEPS
NA

RADIOLOGICAL HEALTH/SAFETY
The dose of the source on contact with the surface of the road was reported to be 1.1 mrem/h which is high for background but is low hazard. The source is currently contained by the road surface but the condition of the source is unknown and Triage recommends that the area should be treated as non-sealed potentially dispersable source if the surface of the road is breached for repair, reconfiguration, or in case of attempted recovery. Below-surface containment is not known, but the local character of the radiation field from the source does not indicate wide dispersal. The approximate dose rate for a bare 5 mCi Ra-226 source is 45 mR/h at 12 in.

PROCESS IMPROVEMENTS
NA

OFFICIAL USE ONLY

FIGURES AND TABLES

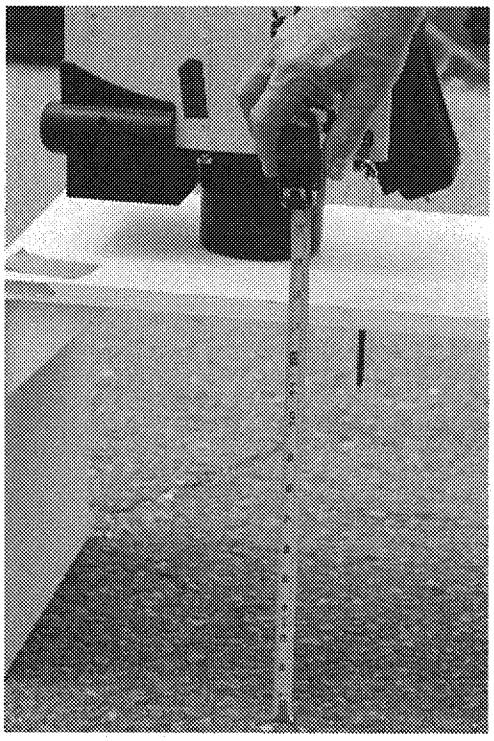

Figure 1: Picture of field team with Detective EX-100 and scaling fiducial. Assessment is that the Ra226 source is approximately 15 inches below the asphalt surface (see Fig. 2).

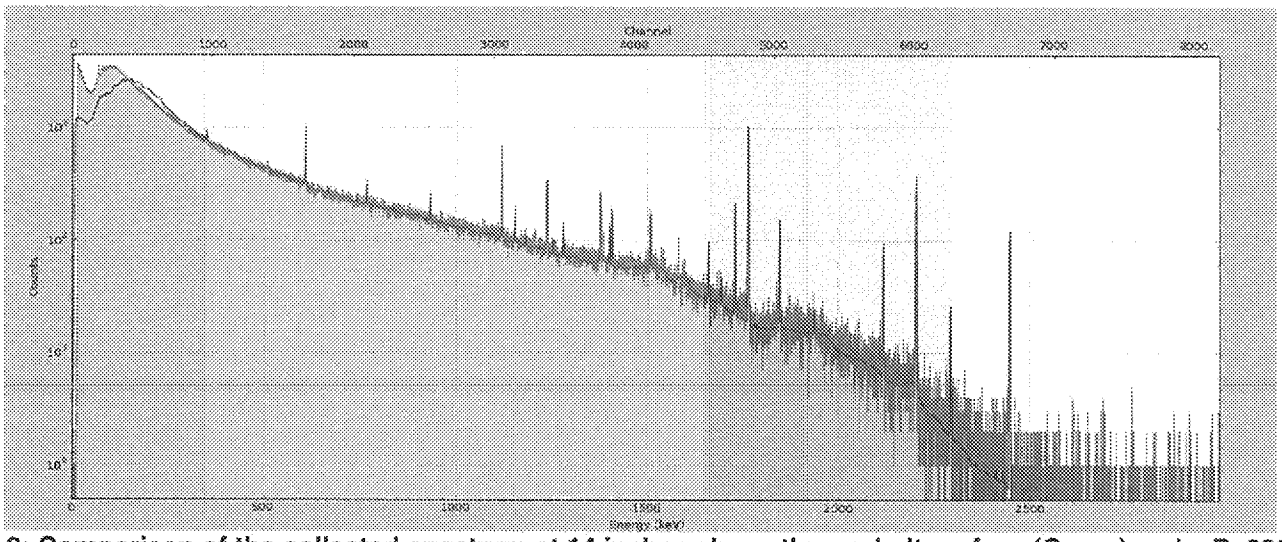

Figure 2: Comparison of the collected spectrum at 14 inches above the asphalt surface (Green) and a Ra226 model spectrum (Red). The model spectrum generated with Gamma Designer v3.17.1 was attenuated with a layer of soil with a thickness of approximately 15 inches and a 0.5 in. layer of Iron to achieve a differential attenuation consistent with that observed in the data. The full energy photopeak areas generated by a 5 mCi Ra226 source are consistent with the measurement data.

OFFICIAL USE ONLY

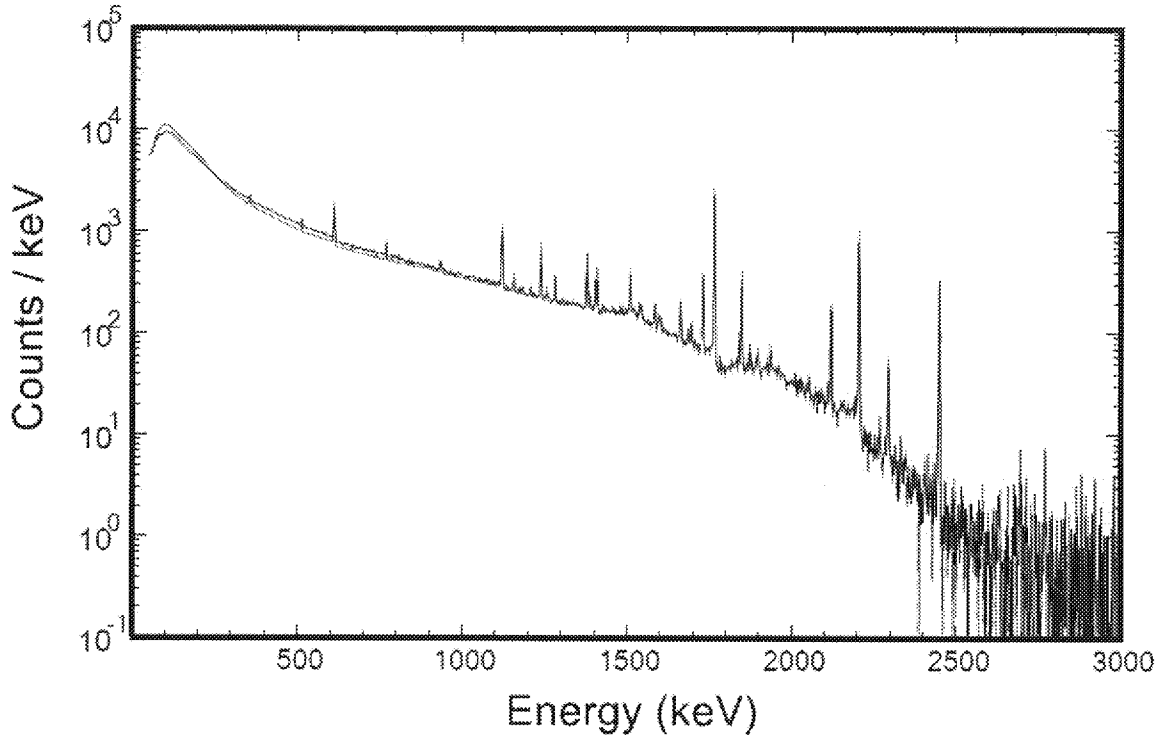

Figure 3: GADRAS v18.7.9 generated model spectrum (red) of Detective Ex-100 spectrum (black) obtained 14 in. above the asphalt surface. A 7 +/- 1.5 mCi Ra226 source at a soil depth of 15.7 +/- 1 in. and an additional 0.5 in. of Iron shielding provided a model spectrum consistent with the full energy photopeak areas and continuum observed in the measurement data.