

Rio Algom Mining LLC

July 25, 2022

ATTN: Mr. Thomas Lancaster
United States Nuclear Regulatory Commission
Mail Stop T5-A10
Washington, DC 20555-0001

Re: **Rio Algom Mining LLC – Ambrosia Lake West Mill**
License SUA-1473, Docket No. 40-8905
2021 ALARA Report

Dear Mr. Lancaster,

Rio Algom Mining LLC (RAML) respectfully submits the *Calendar Year 2021 ALARA Report* (Attachment 1) for your records. The submittal of this report is not required by license condition but was verbally committed to by RAML during the NRC inspection conducted on September 12-14, 2018.

Also attached is a letter dated November 22, 2021 (Attachment 2) describing the July 2021 extreme precipitation event and RAML's response. This letter is referenced in the *Calendar Year 2021 ALARA Report*.

If you have any questions or need additional information, please do not hesitate to call me at (916) 947-7637.

Sincerely,



Sandra L. Ross, P.G., Site Manager
Rio Algom Mining, LLC

cc:	Document Control
Attachment 1	Calendar Year 2021 ALARA Report
Attachment 2	November 22, 2021 letter – July 2021 Extreme Precipitation Event

CALENDAR YEAR 2021 ALARA REPORT
RIO ALGOM MINING LLC – AMBROSIA LAKE WEST MILL
McKinley County, New Mexico

Prepared for:

Rio Algom Mining LLC
P.O. Box 218
Grants, New Mexico 87020

Prepared by:

H3 Environmental, LLC
3810 Osuna Road NE, Suite 2
Albuquerque, New Mexico 87109

July 2022

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Acronyms and Definitions

Term	Definition
ALARA	as low as is reasonably achievable
byproduct material	tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by such solution extraction operations do not constitute "byproduct material" within this definition.
CDE	committed dose equivalent
CEDE	committed effective dose equivalent
CFR	Code of Federal Regulations
Ci	curies
contractor	an individual or business who has signed a contract, field services agreement, or purchase order and is completing work for BHP at the facility
DAC	derived air concentration
DDE	deep dose equivalent
employee	An employee of RAML who is completing work for RAML at the facility
EPA	United States Environmental Protection Agency
g	gram
H3	H3 Environmental, LLC
IDW	Investigation-derived waste
INTERA	INTERA, Inc.
L	liter
LDE	lens dose equivalent (eye dose equivalent to the lens of the eye)
license	NRC License SUA-1473 for RAML's Ambrosia Lake West mill
licensed material	radioactive and non-radioactive material that is regulated pursuant to the facility license
mill	former Ambrosia Lake West uranium mill
mrem	millirem
mrem y ⁻¹	millirem per year
N	north
NRC	United States Nuclear Regulatory Commission
OSL	optically stimulated luminescent dosimeter
pCi L ⁻¹	picocuries per liter
POE	point of exposure
RAML	Rio Algom Mining LLC
RPEM	radiation protection and environmental monitoring
RWP	radiation work permit
SDE	shallow dose equivalent
SDP	Soil Decommissioning Plan
SOP	standard operating procedure
SUA-1473	NRC license SUA-1473 for RAML's Ambrosia Lake West mill
TEDE	total effective dose equivalent
Th-230	thorium-230
uranium (U)	total uranium
visitor	any individual who is onsite at the facility who is not classified as a worker
VWP	vibrating wire piezometer
worker	an employee or contractor who is completing work for BHP onsite at the facility for 5 or more days per year

1 Site Activities

This report summarizes calendar year 2021 activities, occupational radiation dose monitoring results, and public dose evaluations at Rio Algom Mining LLC's (RAML's) Ambrosia Lake West (ALW) uranium mill, which is currently being decommissioned. The ALW mill is regulated by the United States Nuclear Regulatory Commission (NRC) via radioactive materials license SUA-1473 ([NRC 2022](#)), which requires that RAML implement a radiation protection and environmental monitoring (RPEM) program as described in RAML's *Radiation Protection and Environmental Monitoring Program Manual* ([RAML 2022a](#)). Among other items, the RPEM program manual requires that RAML maintain exposure to licensed material at levels that are as low as is reasonably achievable (ALARA) and requires RAML to prepare this annual report summarizing the RPEM program activities and data for the previous calendar year.

Much of the licensed material at the ALW mill has been consolidated in engineered repositories that were closed following NRC-approved plans. Activities involving licensed material at the facility in 2021 are summarized for each quarter in the following subsections and consisted of 1) routine environmental monitoring, 2) soil investigations pursuant to the NRC-approved *Soil Decommissioning Plan* (SDP) ([Komex 2006](#)), and 3) miscellaneous non-routine operations.

1.1 First Quarter

Activities involving licensed material in the first quarter consisted of:

- Routine environmental monitoring including: 1) groundwater sampling in and around the licensed area; and 2) passive track etch monitoring for radon-222 in ambient air at the seven locations shown on [Figure 1](#); and
- Soil characterization work ([RAML 2021d](#)) performed in accordance with the NRC-approved SDP ([Komex 2006](#)) and RAML standard operating procedures (SOPs) (see section [4.2](#)).

1.2 Second Quarter

Activities involving licensed material in the second quarter consisted of:

- Routine environmental monitoring as described in first quarter; and
- Soil characterization work performed in accordance with a RAML workplan and RAML SOPs (see section [4.2](#)).
- Tailing samples were retrieved from a waste storage conex. This activity was described in a radiation work permit (RWP), see section [2.4.1](#).

1.3 Third Quarter

Activities involving licensed material in the third quarter consisted of:

- Routine environmental monitoring as described in first quarter; and
- Localized scraping and grading earthwork to repair damage to stormwater control features that occurred during a significant precipitation event in third quarter 2021 ([RAML 2021a](#)) (Attachment 2). This activity was described in an RWP, see section [2.4.2](#).

1.4 Fourth Quarter

Activities involving licensed material in the fourth quarter consisted of:

- Routine environmental monitoring as described in first quarter; and
- Soil characterization work performed in accordance with a RAML workplan and RAML SOPs (see section [4.2](#)),

- Removal of vibrating wire piezometers during a sulfur and oxygen isotope sampling event described in an RWP, see section 2.4.3, and
- Non-routine work by contractors involving power pole evaluation and replacement, fence repair, and land surveying which were evaluated for potential exposure to licensed material; in each case it was determined that no RWP was needed due to very limited potential for exposure to licensed material.

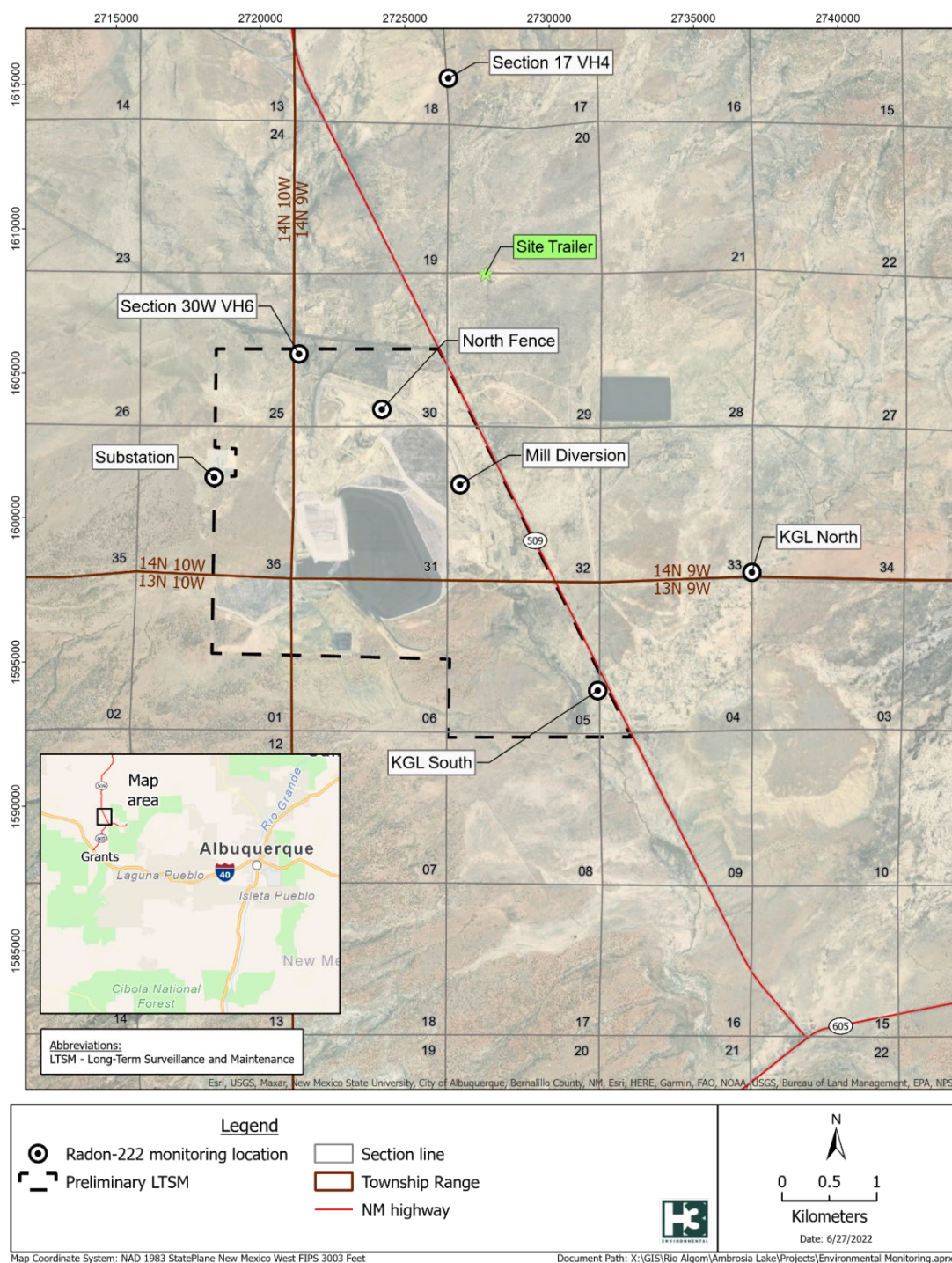


Figure 1. Radon-222 monitoring locations and site trailer at the Ambrosia Lake West mill

2 Occupational Radiation Protection Program

External doses from ionizing radiation were monitored for personnel working with and around licensed materials. The monitoring methods are identified in the RPEM program manual and associated SOPs (see section [4.2](#)). RAML's dose calculations are performed in a manner consistent with NRC guidance in NRC Regulatory Guide 8.34 *Monitoring Criteria and Methods to Calculate Occupational Radiation Doses* ([NRC 1992](#)). All applicable regulatory limits for occupational radiation doses are contained in Title 10 *Code of Federal Regulations* (CFR) Part 20 ([10 CFR 20.1201](#)).

2.1 External Dosimetry Program

Optically stimulated luminescent dosimeters (OSLs) are used to monitor occupational dose from external ionizing radiation sources at the ALW mill. In 2021, 31 facility workers were assigned dosimeters to be worn while onsite ([Table 1](#)). OSLs allow determination of deep dose equivalent (DDE), eye lens dose equivalent (LDE), and shallow dose equivalent (SDE). Landauer's Luxel® OSLs were used to monitor external dose parameters for 2021. OSLs (including control dosimeters) are stored in a background location (the site trailer, see [Figure 1](#)) when personnel are not onsite, and Landauer reports background-corrected external dose quarterly to a sensitivity of 1 mrem. RAML conservatively assumes that all reported dose is the result of exposure to licensed material. Since 2000, worker external doses at the ALW mill have been low (typically less than ten percent of regulatory limits), and therefore monitoring is not required per [10 CFR 20.1502](#); a determination of prior occupational dose in [10 CFR 20.2104](#) is also not applicable. However, RAML has opted to continue monitoring worker external doses as an ALARA practice. 2021 external dosimetry results are tabulated in [Table 1](#).

2.1.1 Deep Dose Equivalent

In 2021, six individuals had DDEs exceeding the 1 mrem sensitivity of the Luxel® OSL. The highest DDE was 6 mrem y^{-1} . The 2021 DDE results are below RAML's administrative action level and are well below the regulatory occupational standard of 5,000 mrem y^{-1} .

2.1.2 Lens Dose Equivalent

In 2021, seven individuals had LDEs exceeding the 1 mrem sensitivity of the Luxel® OSL, with a maximum LDE of 6 mrem y^{-1} . In six of these cases, the LDE was equal to the DDE for the same individuals. However, one individual had a recorded LDE of 1 mrem in the third quarter without an associated DDE.

2.1.3 Shallow Dose Equivalent

In 2021, five individuals had SDEs exceeding the 1 mrem sensitivity of the Luxel® OSL, with a maximum SDE of 6 mrem y^{-1} . In four of these cases, the SDE was equal to the DDE for the same individuals, however two individuals had no SDE associated with their LDE/DDE. One individual had a recorded SDE of 1 mrem in the third quarter without an associated DDE.

Table 1. Summary of Ambrosia Lake West mill external dosimetry (2021)

Entity	Individuals Monitored	Individuals with Dose ^a ≥ 1 mrem			Max Annual Dose ^a (mrem)		
		DDE	LDE	SDE	DDE	LDE	SDE
RAML	5	2	2	2	6	6	6
H3	9	2	3	2	2	2	1
INTERA	11	1	1	0	1	1	0
Arcadis	5	1	1	1	1	1	1
Earthworx	1	0	0	0	0	0	0
TOTAL	31	6	7	5	6	6	6

^a External dosimetry results are corrected for background doses measured by control dosimeters located at the site trailer.

DDE – deep dose equivalent

LDE – lens dose equivalent

SDE – shallow dose equivalent

H3 - H3 Environmental, LLC

INTERA – INTERA, Inc.

RAML - Rio Algom Mining LLC

2.2 Internal Dosimetry Program

RAML did not monitor or assess internal doses from ionizing radiation in 2021 because previous monitoring has demonstrated that internal doses as a result of the types of operations at the ALW mill in 2021 are much lower than the monitoring thresholds in [10 CFR 20.1502](#) (i.e., ten percent of the applicable regulatory limit of a committed effective dose equivalent (CEDE) of 5,000 mrem y⁻¹).

2.2.1 Committed Dose Equivalent

No monitoring or assessment of committed dose equivalent (CDE) to the highest exposed organ was made in 2021. As such, no internal dose was calculated or assigned to workers.

2.2.2 Committed Effective Dose Equivalent

No monitoring or assessment of CEDE was made in 2021. As such, no internal dose was calculated or assigned to workers.

2.2.3 Bioassay Program

Routine bioassay was discontinued in 2017. Future bioassay monitoring will be driven by the requirements of RWPs issued for a specific task. In 2021, there were no RWPs that required bioassay sampling and as such, no internal dose was calculated or assigned to workers.

2.3 Total Effective Dose Equivalent

The total effective dose equivalent (TEDE) is the sum of the internal dose component (CEDE) and the external dose component (DDE). Since RAML did not have an internal dosimetry program in 2021, TEDE estimates for 2021 are equivalent to the DDEs reported in [Table 1](#). Worker TEDEs in 2021 were much less than ten percent of any applicable limit.

2.4 Radiation Work Permit Program

Consistent with RAML's RPEM program manual, RAML uses RWPs to control non-routine work activities. RAML describes most non-routine work in work plans, which are reviewed by the radiation safety officer or the radiation safety officer's designee to evaluate the radiation hazard for each proposed job task and therefore whether an RWP is required to control the proposed work. In 2021, RWPs were issued for the activities described below.

2.4.1 Tailing Sample Retrieval from Storage Conex (RWP# RA-2021-05-01)

On May 18, 2021, tailing samples were retrieved from a storage conex so that the United States Environmental Protection Agency (EPA) could collect a sample. Oversized investigation derived waste (IDW) and 55 gallon drums containing IDW were removed from the conex; EPA collected a sample from a drum containing tailing material.

2.4.2 Storm Event Recovery (RWP# RA-2021-08-01 DRAFT)

As part of recovery from the rain event between July 25 and August 2, 2021 ([RAML 2021a](#)) (Attachment 2), RAML conducted earthwork activities included scraping and grading roads, excavation and shoring of berms, channels, and diversion structures. Earthwork was conducted in areas with elevated soil concentrations of radionuclides and in areas where stormwater carrying radioactive material had collected (see [Figure 2](#)). An RWP was drafted on August 3, 2021 to cover earthwork activities. The draft RWP required breathing zone sampling to confirm that no worker exposure had occurred; no additional personal protective equipment or precautions beyond routine work practices and equipment were required.

In the fourth quarter of 2021, H3 Environmental identified that the draft earthwork RWP had not been finalized, site workers did not train to the RWP, and appropriate monitoring (consistent with the RWP) was not performed. The lack of RWP for flood recovery earthwork was a significant procedural failure for the ALW mill radiation protection program. To confirm that no unacceptable worker exposure had occurred, the RSO performed a dose estimate for the exposed worker using available unshielded gamma survey and soil sampling data collected within/near the areas where earthwork occurred and conservative assumptions. The exposed worker could not have received more than 100 mrem executing earthwork activities¹.

The root cause of the failure to issue or control work with an RWP was a training failure, which caused workers to be unaware of the requirement that the RSO (or designee) evaluate all non-routine work to identify whether an RWP is required, and to implement an RWP, when required. New controls were established as a result of this event to improve and reinforce worker training and increase awareness of the need to evaluate non-routine work for an RWP. New controls consist of:

- A memorandum was prepared describing the types of activities that require an RWP. This memorandum was reviewed and shared with RAML staff and RAML consultant representatives on May 5, 2022,
- Training was conducted on February 17 and May 5, 2022, with all RAML workers to discuss when RWPs are required and the procedure for initiating the RSO's review of non-routine work, and
- A "Disturbance Approval Form" and process was prepared and implemented. This process leads workers through all relevant approvals prior to performing earth-disturbing work, including the need to evaluate work to identify whether an RWP is required.

2.4.3 Sulfur and Oxygen Isotope Sampling Event (RWP# RA-2021-08-01)

On October 19, 2021, vibrating wire piezometers (VWPs) were removed from four locations prior to sampling. INTERA, Inc. staff responsible for handling the VWP and bailer wore a Tyvek suit and nitrile gloves in addition to other standard personal protective equipment required by SOPs and Job Risk Assessments. Only workers wearing Tyvek were permitted to handle the VWPs, bailer, bailer twine, and other equipment that came into direct contact with water from the piezometers. A plastic groundsheet was placed near the well prior to beginning work to capture

¹ Estimated external dose was less than 12 mrem assuming work was completed over a three-week (120 hour) period with no shielding at exposure rates of 100 $\mu\text{R hr}^{-1}$. Estimated internal dose was less than 45 mrem based on the maximum available measured Ra-226 and Th-230 concentrations for each of the three work zones (23, 10, and 2 pCi g⁻¹ for Ra-226 and 5, 139, and 119 pCi g⁻¹ for Th-230), assuming 40 hours of work in each zone with a continuous air concentration of 5 mg m⁻³ of respirable dust, which is the Occupational Safety and Health Administration Permissible Exposure Limit. Internal doses were estimated using the most conservative [10 CFR 20 Appendix B](#) derived air concentration (DAC) for Ra-226 (3E-10 $\mu\text{Ci mL}^{-1}$) and Th-230 (3E-12 $\mu\text{Ci mL}^{-1}$) assuming a dose conversion of 2.5 mrem DAC-hr⁻¹.

any drips resulting from removal of the VWPs. The VWP cable was detached from the well casing and spooled up over the plastic groundsheet, then placed on the groundsheet during sampling. After sampling was complete, the VWP was reinstalled in the piezometer casing, and IDW was placed in the IDW storage area behind the site trailer.

2.5 Contamination Control Program

Control of potential contamination from licensed material at the facility includes personnel and equipment scan surveys in accordance with the RPEM program manual and SOPs (see section [4.2](#)).

In January 2021, an individual repeatedly recorded count rates (60 counts per minute alpha) exceeding the instrument background during routine personnel scanning over several days of field work. The individual only contacted the radiation safety officer on the last day of the field event. Departing site with detectable activity on an individual's person without first contacting the radiation safety officer is a deviation from RAML's SOP HP-007 *Personnel Contamination Surveys*. Because this was a single event, and not part of a larger pattern of worker non-conformance regarding personnel surveys, the importance of personnel self-scanning and the requirement to meet "indistinguishable from background" prior to departing work for the day was re-emphasized during annual radiation safety awareness training on January 25 and February 22, 2022. No other elevated personnel scanning results occurred in 2021.

All equipment scanned for unrestricted release in 2021 was successfully decontaminated to meet criteria in condition 25 of SUA-1473.

2.6 Training Program

Annual radiation safety awareness training, as outlined in Section 3.1 of the RPEM program manual, was completed for a total of 47 workers including employees and contractors in 2021.

2.7 Audits and Inspections

A review of the RPEM program including content and implementation of applicable requirements and guidance was conducted in 2021 as part of RAML's license amendment request ([RAML 2021b](#)). No deviations from the RPEM program manual or SUA-1473 were identified.

Periodic inspections of the facility were conducted March 29, June 23, September 13, and October 15, 2021 by the radiation safety officer to verify that radiation protection practices were being followed and that the site fences and gates were secure and properly posted.

NRC performed a scheduled inspection including a site visit, interviews, and document review September 14-15, 2021 and identified no violations ([NRC 2021](#)).

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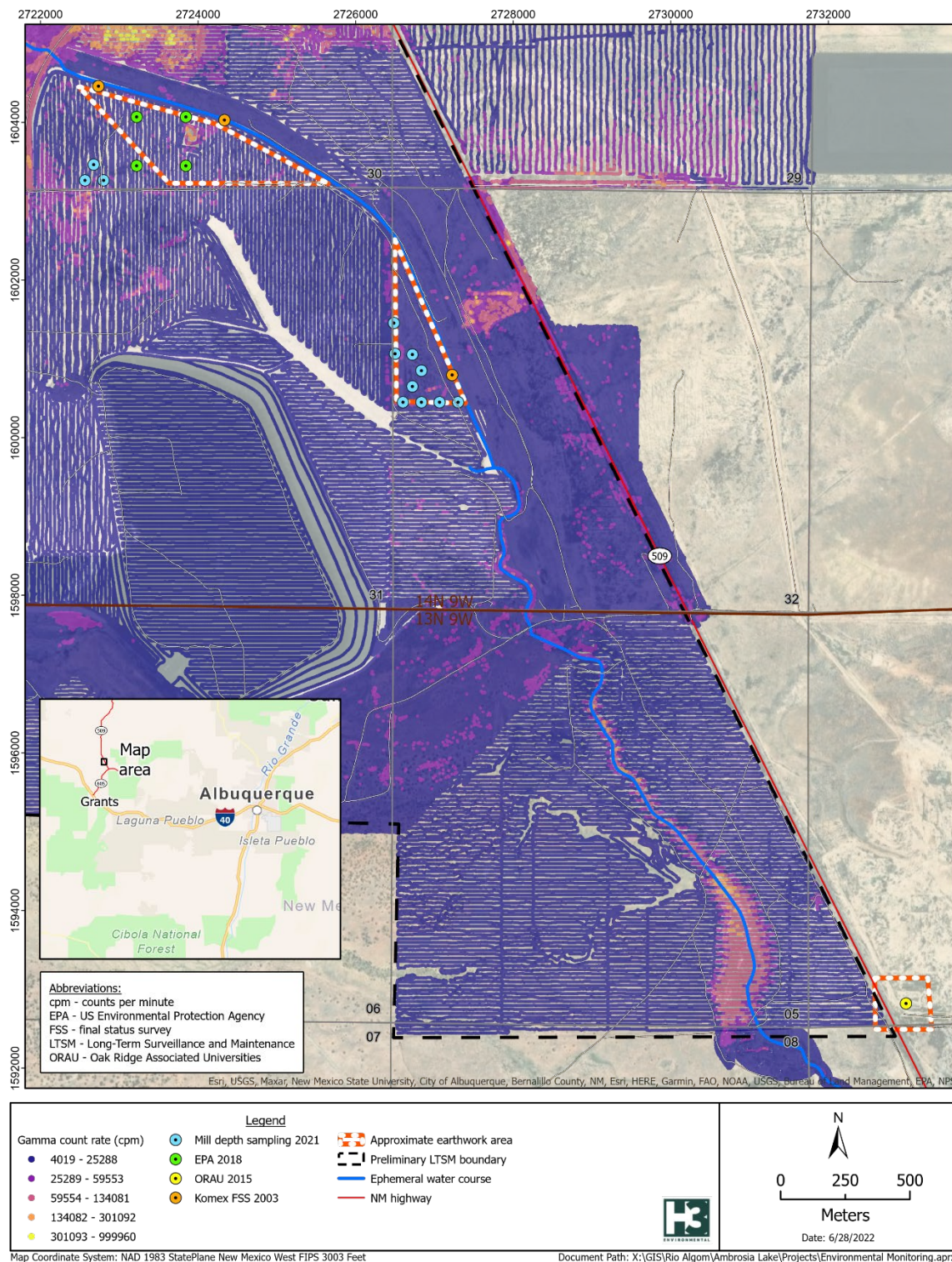


Figure 2. Approximate locations of 2021 storm event recovery earthwork with available unshielded gamma survey and soil sampling locations

3 Environmental Monitoring Program and Public Dose Evaluation

In addition to the occupational exposures discussed above, RAML annually evaluates radiation doses resulting from its operations to members of the public. These are prepared per the requirements of [10 CFR 20.1301-1302](#), the RPEM program manual, and RAML SOPs (see section [4.2](#)).

RAML submitted semiannual effluent reports to the NRC covering January-June 2021 ([RAML 2021c](#)) and July-December 2021 ([RAML 2022b](#)). Data contained within these reports were used to evaluate doses to members of the public. The calculated radiation doses to members of the public includes only the radon-222 inhalation pathway. Doses from other pathways such as external dose, vegetation, and airborne radioactive particulates was discontinued in 2017 following NRC concurrence to terminate environmental monitoring of these media ([ML17293A342](#)).

Monitoring locations are shown on [Figure 1](#). The Substation location is considered background. Radiation dose was calculated to three hypothetical members of the public, as follows:

- “Nearest resident” using data from location Section 17 VH4 for point of exposure (POE) concentration. The decay product equilibrium fraction of 0.5 represents indoor exposure.
- “Delivery driver” using data from location Section 30W VH6 for POE concentration. The occupancy factor of 0.0072 represents 15 minutes per day, 252 days per year and decay product equilibrium fraction of 0.7 represents outdoor exposure.
- “Occasional visitor” using an average of all site monitoring data except the Substation for POE concentration. The occupancy factor of 0.0128 represents 8 hours per day, 14 days per year and decay product equilibrium fraction of 0.7 represents outdoor exposure.

The 2021 results for dose to member of the public are shown in [Table 2](#). The potential dose calculations for members of the public for 2021 were well below the [10 CFR 20.1301](#) dose limit² of 100 mrem y⁻¹.

Table 2. Public dose estimate for hypothetical public receptors near the Ambrosia Lake West mill (2021)

Receptor Scenario	Average Net Radon-222 Concentration (pCi L ⁻¹)	Occupancy Factor	Equilibrium Fraction	Dose Conversion Factor ^b (mrem per pCi L ⁻¹)	TEDE (mrem)
Nearest resident	0 ^a	1	0.5	500	0
Delivery driver	2.5	0.0072	0.7	500	6.3
Occasional visitor	1.5	0.0128	0.7	500	6.7

^a Net radon concentration for this receptor location was negative and is reported as zero dose.

^b Dose conversion factor for radon-222 is derived using the effluent concentration limit for radon-222 with all decay products from [10 CFR 20, Appendix B](#), Table 2.

mrem – millirem

pCi L⁻¹ – picocuries per liter

TEDE – total effective dose equivalent

² The ALW mill transitioned to “possession only” status in 2003 ([NRC 2003](#)); possession only status does not meet the definition of “uranium fuel cycle” in [40 CFR 190.02](#). Therefore, the public dose limits in [40 CFR 190.10](#) do not apply to the ALW mill.

4 References and Standard Operating Procedures

4.1 References

- Komex. May 1 2006. *Soil Decommissioning Plan for Rio Algom Mining LLC's Ambrosia Lake Facility*. Final Version with all Figures and Attachments submitted by RAML to NRC May 25, 2018. Rio Algom Mining LLC (ADAMS Accession No. ML18166A182).
<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML18166A182>.
- NRC. July 1992. *Monitoring Criteria and Methods to Calculate Occupational Radiation Doses*. Regulatory Guide 8.34. Office of Nuclear Regulatory Research, US Nuclear Regulatory Commission (ADAMS Accession No. ML090770221).
- . August 1 2003. *Amendment 52 to SUA-1473, Ambrosia Lake Change in Status to Possession-Only and Surety Update for License No. SUA-1473*. Letter from Susan M. Frant (NRC) to William Paul Goranson (RAML). US Nuclear Regulatory Commission.
- . October 13 2021. *Rio Algom Mining LLC - NRC Inspection Report 040-08905/2021-001*. Letter from Heather J. Gepford (NRC) to Sandra L. Ross (RAML). US Nuclear Regulatory Commission (ADAMS Accession No. ML21279A351).
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- . February 2 2022. *Amendment 63 to SUA-1473*. Letter from Thomas Lancaster (NRC) to Sandra Ross (RAML). US Nuclear Regulatory Commission (ADAMS Accession Nos. ML22024A444 (letter), ML22024A445 (TER), ML22024A446 (license)).
<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML22024A446>.
- RAML. 2021a. July 2021 Extreme Precipitation Event Rio Algom Mining LLC, Ambrosia Lake Facility. In *Letter from Sandra Ross (RAML) to Kurt Volbrecht (NMED)*.
- . October 1 2021b. *Request for Amendment to SUA-1473 Incorporating Radiation Protection and Environmental Monitoring Program Manual*. Rio Algom Mining LLC - Ambrosia Lake West Mill, License SUA-1473, Docket No. 40-8905. Rio Algom Mining LLC (ADAMS Accession Nos. ML21278A019 (letter), ML21278A020 (Attachment 1 draft RPEM), ML21278A021 (Attachment 2 redline license)).
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- . August 26 2021c. *Semiannual Effluent Report - First Half 2021*. Rio Algom Mining LLC (ADAMS Accession No. ML21244A355).
<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21244A355>.
- . July 14 2021d. *Shielded Gamma Survey Data Summary Report - Supplement*. Submittal from Sandra Ross (RAML) to Thomas Lancaster (NRC). Rio Algom Mining LLC (ADAMS Accession Nos. ML21203A050 and ML21203A051).
<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21203A051>.
- . March 2022a. *Radiation Protection and Environmental Monitoring Program Manual (RPEM)*. Standard Operating Procedure. Rio Algom Mining LLC.
- . March 1 2022b. *Semiannual Effluent Report - Second Half 2021*. Rio Algom Mining LLC (ADAMS Accession No. ML22062B050).
<https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML22062B050>.

4.2 Standard Operating Procedures

CT-009 – QC Counts, Function Check and Total Efficiency of Survey Meter

ESP-010 – Radiation Survey Using GPS Unit

ESP-012 – Soil Sampling for Radionuclides

ESP-013 – Subsurface Soil Sampling for Radionuclides

ESP-015 – Calculating Radiation Dose to a Member of the Public

HP-003 – *Contamination Survey for Unrestricted Release of Materials and Equipment*

HP-005 – *Exposure Rate Survey*

HP-007 – *Personnel Contamination Surveys*

HP-011 – *Measuring Radon Concentration by Track-Etch Cup*

HP-015 – *Periodic Inspection by Radiation Safety Officer*

HP-016 – *DOT Shipping for UN2910 and LSA-1*

PET-HSE27-SF-PRGD-00003 – *Ground Disturbance and Excavation*

Technical Bulletin No. MK3138 – *Geoprobe DT325 Dual Tube Sampling System*

Rio Algom Mining LLC

November 22, 2021

Mr. Kurt Vollbrecht
New Mexico Environment Department
1190 St. Francis Dr.
P.O. Box 5469
Santa Fe, NM 87502

Re: July 2021 Extreme Precipitation Event Rio Algom Mining LLC, Ambrosia Lake Facility

Dear Mr. Vollbrecht:

This letter is to inform you of the details, immediate consequences, and Rio Algom Mining LLC's (RAML) response to a series of extreme precipitation events that affected the former Section 4 Ponds area in the Ambrosia Lake Valley in late July 2021. This maintenance and repair information is provided as a courtesy to the New Mexico Environment Department (NMED) and will be documented in RAML's next semi-annual groundwater monitoring report to NMED, which RAML will submit before February 1, 2022.

Details of the Precipitation Events

The Ambrosia Lake Valley experienced a series of extreme precipitation events from July 21st through 28th, 2021. One on-site station with hourly recording capability identified 2 inches of rain in one hour. The following table presents precipitation data collected by RAML during the July 2021 event; station locations are shown in the attached figure. A meteorology station located in T14N R09W Section 26 within the watershed up stream of the former Section 4 Ponds area recorded nearly 5 inches of precipitation during the event.

Date	T14N R09W Section 17	T14N R09W Section 26	T14N R10W Section 22	T13N R09W Section 2
21-Jul	0.29	0.043	0.007	0.023
22-Jul	0.019	0.1	0.043	0.093
23-Jul	0.001	0.003	0.002	0.023
24-Jul	0.465	1.036	0.272	1.185
25-Jul	0.773	2.433	0.299	1.6
26-Jul	0.533	0.838	0.04	0.439
27-Jul	0.48	0.447	0.184	0.207
28-Jul	0	0	0.005	0.005
TOTAL	2.561	4.9	0.852	3.575
Max 1 Hr.	0.618	2.076	0.235	1.399

Impacts of the Precipitation Events

The severe storms caused run-on to RAML property predominantly from property owned and controlled by others (involving several sections of land). This extreme precipitation resulted in excessive impounding of run-on water in the former Section 4 Ponds area; this impounded water ultimately breached an earthen containment berm that RAML uses to create a "non-discharging" watershed. The location of the berm breach is shown in the attached figure. Stormwater passed through the breached berm and ultimately flowed through non-industrial areas of RAML property and into the Arroyo del Puerto in an area downstream of existing the Ambrosia Lake West Mill outfalls.

RAML Response to the Precipitation Events

RAML maintains and complies with the Rio Algom Mining LLC Ambrosia Lake Mill (MSGP-2021) storm water pollution prevention plan (SWPPP), which covers the former Ambrosia Lake West Mill, including the former Section 4 Ponds. On July 29, 2021, RAML initiated a SWPPP Corrective Action in response to the breach of the earthen containment berm. Repairs were initiated in phases because the ground in some areas was initially too saturated for access by the necessary construction equipment. Repairs were achieved by collecting and stockpiling borrow material suitable for repairing breaches in the berm at southeast corner of the former Section 4 Ponds. Repair of the berm was completed on August 5, 2021.

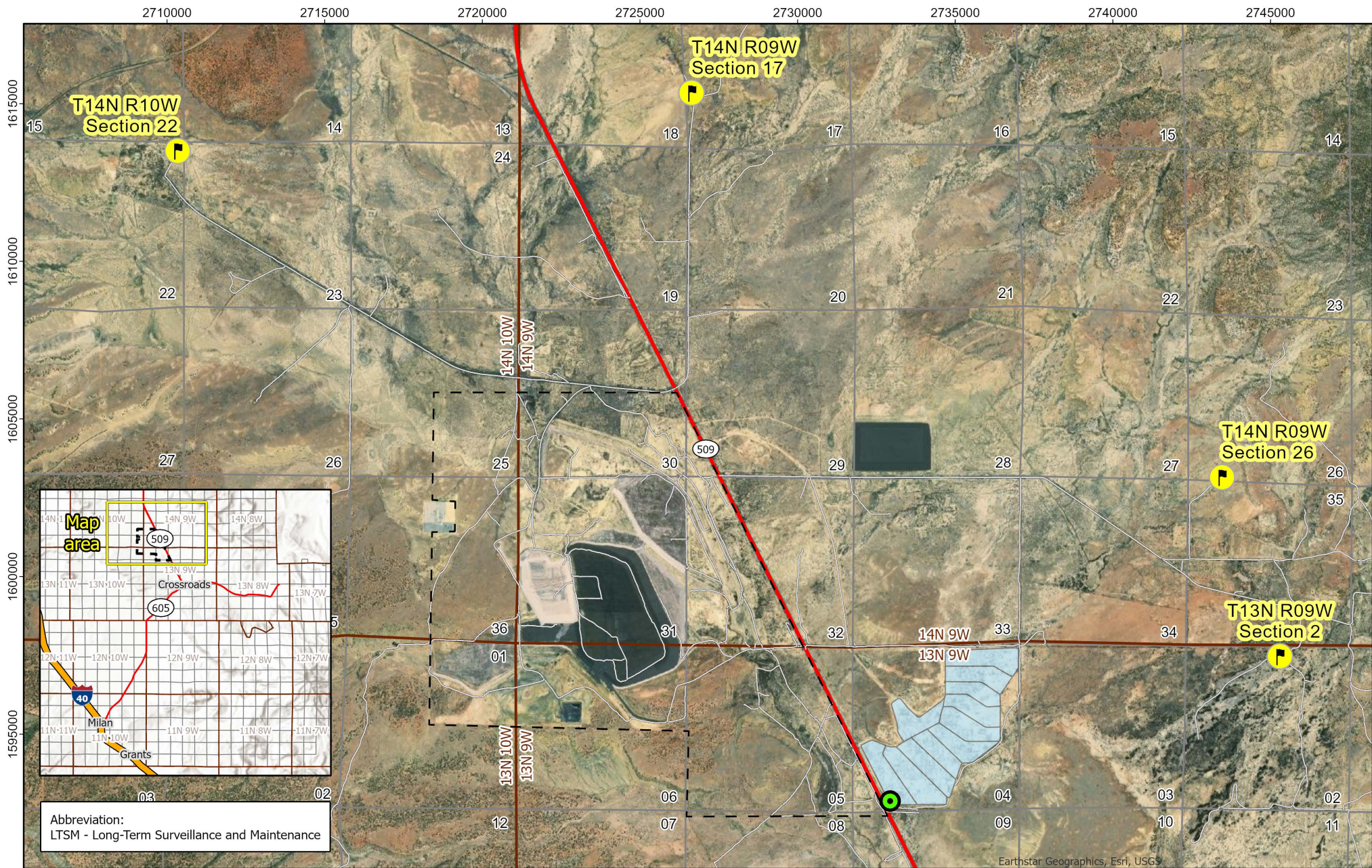
If you have any questions or require additional information regarding the Ambrosia Lake Valley storms in late July 2021, please contact me at (916) 947-7637.

Sincerely,
Rio Algom Mining LLC



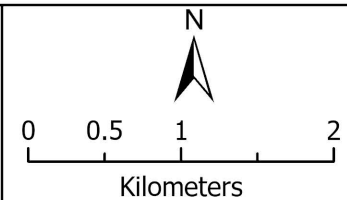
Sandra L. Ross, P.G.
Site Manager

cc: Amber Rheubottom, NMED (email)
Tom Lancaster, NRC (email)
Document Control, NRC (hard copy)
Mike Schierman, H3 (email)
file



Legend

- | | | |
|-------------------------|------------------------|------------|
| Meteorology station | Proposed LTSM boundary | NM highway |
| Containment berm breach | Township Range | Interstate |
| Former Section 4 Ponds | Section line | Site Road |



Date: 11/15/2021

