

September 11, 2009

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and Environmental Protection
U.S. Nuclear Regulatory Commission
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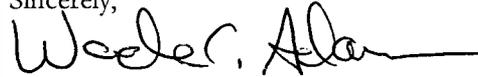
**SUBJECT: CONFIRMATORY SURVEY PLAN FOR THE SECTION 4 AREA AT THE
RIO ALGOM AMBROSIA LAKE FACILITY, AMBROSIA LAKE,
NEW MEXICO DCN 1797-PL-01-0
(DOCKET NO. 040-8905; NRC F1000; RFTA NO. 09-011)**

Dear Mr. McLaughlin:

Enclosed is the confirmatory survey plan for Section 4 of the Rio Algom Ambrosia Lake Facility in Ambrosia, New Mexico. Confirmatory survey activities are scheduled to be performed on September 21 through 24, 2008. The Oak Ridge Institute for Science and Education (ORISE) requests approval of this survey plan prior to the initiation of survey activities.

If you have any questions, please direct them to me at 865.576.0065, Erika Bailey at 865.576.6659 or Tim Vitkus at 865.576.5073.

Sincerely,



Wade C. Adams
Project Leader/Health Physicist
ORISE/Survey Projects

WCA:km

Enclosure

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**CONFIRMATORY SURVEY PLAN FOR THE SECTION 4 AREA
AT THE RIO ALGOM AMBROSIA LAKE FACILITY,
AMBROSIA LAKE, NEW MEXICO
(DOCKET NO. 040-8905; NRC F1000; RFTA NO. 09-011)**

INTRODUCTION AND SITE HISTORY

The Rio Algom Mining Limited Liability Corporation (RAM) Ambrosia Lake site began processing uranium-bearing ore in 1958. Operating under NRC Source Material License SUA-1473, the site processed approximately 33 million tons of ore through 1985 and continued to be an active uranium production facility through December 2002. Reclamation of the tailings began in 1989 and included the excavation and disposal of unlined evaporation pond residues, contaminated soil cleanup, construction of surface water erosion protection features and the demolition of the mill buildings (NRC 2006).

Construction of the Section 4 evaporation ponds commenced in 1976 and was completed in 1979. The ponds were used to evaporate liquid wastes generated from RAM's processing mill. The ponds remained in active service until April 2004; reclamation activities included the pond sediments being relocated to the main tailings disposal area (KOMEX 2006). Other reclamation activities included the excavation and disposal of unlined evaporation pond residues, contaminated soil clean-up, completion of the majority of the required reclamations for Impoundments 1 and 2, construction of a rock apron on Impoundment 2 and demolition of the conventional milling structures and most support facilities. Additional activities at the site included the construction of erosion protection features adjacent to the tailings disposal facility.

On January 19, 2005, the RAM submitted a *Soil Decommissioning Plan* (DP) for its Ambrosia Lake uranium mill tailings facility, specifically the evaporation ponds, to the U.S. Nuclear Regulatory Commission (NRC). The NRC requested, in several comment letters, that RAM provide additional information and a revised plan (NRC 2006). RAM issued a revised DP that addresses the methods and procedures implemented to ensure soil remediation meets the requirements of the *Uranium Mill Tailings Radiation Control Act* (UMTRCA) and NRC regulations contained within the *Code of Federal Regulations* (CFR) Title 10, Part 40, Appendix A. The DP presents the geographical site, pertinent background information and the design for surface reclamation of the Section 4 and Pond 9 evaporation pond sediment material which is considered byproduct material as defined by the

Atomic Energy Act of 1954. As per the CFR requirements, the DP addresses the disposal of the uranium mill tailings in a manner as to protect human health and the environment (NRC 2006).

The NRC's Headquarters and Region IV Offices have requested that the Oak Ridge Institute for Science and Education (ORISE) perform confirmatory radiological surveys of the Section 4 Area evaporation ponds at the Rio Algom Mining Ambrosia Lake facility in Ambrosia Lake, New Mexico.

SITE DESCRIPTION

RAM's Ambrosia Lake site is located in the Ambrosia Lake mining district in the southeastern part of McKinley County, New Mexico, approximately 25 miles north of Grant, New Mexico (Figure 1). The Grants Uranium Belt, specifically the Ambrosia Lake mining district, contained numerous mining companies which operated two uranium ore processing mills and over 20 underground uranium mines within the Ambrosia Lake valley. Forty years of mining and milling activities throughout the valley has led to extensive surface disturbance within the area. The Section 4 evaporation ponds, consisting of Ponds 11 through 21, are located entirely within Section 4 along the southeastern portion of the site (Figure 2). Overall, the Section 4 Ponds occupy 256 acres.

RADIONUCLIDES OF CONCERN

The radionuclides of concern (ROCs) are those associated with the uranium decay series and are natural uranium (NatU), thorium-230 (Th-230), and radium-226 (Ra-226). These radionuclides, in addition to being present as natural background constituents, may also be present in the surrounding area as a result of extensive uranium mining activities that occurred adjacent to the RAM mill facility.

OBJECTIVES

The objectives of the confirmatory survey are to verify that remedial actions have been effective in meeting established release criteria and that documentation accurately and adequately describes the final radiological conditions of the RAM Ambrosia Lake, Section 4 Areas.

RESPONSIBILITY

Work described in this survey plan will be performed under the direction of Tim Vitkus, Survey Projects Manager and Wade Adams, Project Leader of the ORISE. The ORISE cognizant site

representative has the authority to make appropriate changes to this survey plan or the survey procedures as deemed necessary, after consultation with the NRC site representative and appropriate ORISE project personnel. Deviations to the survey plan or procedures will be documented in the site logbook.

DOCUMENT REVIEW

ORISE personnel will review the decommissioning plan (DP), closure plan (CP), the final status survey plan (FSSP) and the technical evaluation report (TER) for the soil decommissioning in preparation for confirmatory survey activities for the Section 4 Areas (KOMEX 2006, BHP 2004, NRC 2006). Information will be evaluated to assure that final status survey (FSS) procedures were appropriate for the radionuclides of concern and that residual activity levels satisfy the established radiological release criteria.

HEALTH AND SAFETY

ORISE will adhere to all applicable regulatory requirements and participate in required site-specific training. Activities performed by ORISE will be conducted under the RAM overall health and safety plan. Personnel working on the project will be informed of known or potential hazards to effectively apply required safety precautions. ORISE and designated site personnel will walk-down the project areas prior to initiating surveys to evaluate any additional potential health and safety issues. The walk-down will provide information to determine if the hazards present are currently addressed by ORISE's Job Hazard Analysis (JHAs) contained in the Survey Procedures Manual (ORISE 2008a). Additionally, the proposed survey and sampling procedures will be evaluated to ensure that any hazards inherent to the procedures themselves are addressed in current JHAs. Confirmatory survey activities are expected to be conducted in areas that do not require work in radiological areas or special dosimetric considerations.

PROCEDURES

ORISE personnel will visit the RAM site to perform visual inspections and independent measurements and sampling. The confirmatory survey activities will be conducted in accordance with the ORISE Survey Procedures and Quality Program Manuals (ORISE 2008 and ORAU 2009).

RAM has delineated the areas into affected, unaffected areas, and mining-affected areas. Areas not expected to contain radioactive contamination attributable to licensed activities and that have not been impacted by mining activities were classified as unaffected areas (natural background). Unaffected areas are generally located upwind and possess natural background concentrations of ROCs and gamma radiation levels. Mining-affected areas are those areas near the site unaffected by *milling-related* activities but where soils have been affected by *mining-related* activities (non-11e.(2) material). The impacted site area where ORISE will be performing confirmatory surveys is within Section 4 and includes eleven evaporation ponds.

For the confirmatory surveys, ORISE will divide Section 4 into three survey areas. In each of the areas, ORISE will perform a ranked set sampling (RSS) approach for determining one hundred square meter (100 m²) areas—the fundamental compliance unit—and for determining soil sample locations (EPA 2002). ORISE will perform gamma surface scans and soil sampling in the immediate (100 m² area) vicinity of each randomly selected 100 m² area. Deviations to the survey plan will be documented in the site logbook

REFERENCE SYSTEM

Global positioning system (GPS) coordinates will be used for referencing measurement and sampling locations. The specific reference system used will be the New Mexico State Plane Coordinate System (NAD 27 horizontal). ORISE will also use the RAM site grid system (if applicable), in which RAM divided the area into 10 m (meter) x 10 m grid blocks (100 m² areas).

SURFACE SCANS

Randomly-Selected 100 m² Areas

High density gamma radiation surface scans will be conducted over the soil surface within each of the randomly selected 100 m² areas—90 such areas will be selected (30 each from the three survey areas). Surface scans will be performed using NaI scintillation detectors coupled to a ratemeters or ratemeter-scalers with audible indicators. Detectors will also be coupled to GPS systems that enable real-time gamma count rate and position data capture. Locations of elevated radiation, suggesting the presence of residual contamination, will be marked and identified for further investigation.

Remaining Area

For the remaining area, as time restraints and site conditions permit, ORISE may perform very low density gamma radiation surface scans of the Section 4 surface soils (Table 1). Surface scans will be performed as described above. Locations of elevated radiation, suggesting the presence of residual contamination, will be marked and identified for further investigation.

RSS Selected Affected Areas	High Density	75 to 100 %
Other Affected Areas	Very Low Density	Up to 5 %

GAMMA DIRECT MEASUREMENTS

Gamma direct measurements will be performed at four points equidistant from the grid block corners and the center of each of the 90 randomly selected 100 m² areas. A 30-second gamma count, at 0.5 m height, will be performed at each direct measurement location. The four gamma count measurements from within the respective 100 m² area will be summed for a total count for that area.

SOIL SAMPLING

Randomly-Selected 100 m² Areas

Based on the RSS gamma direct measurement results, ten locations (100 m² areas) will be sampled for radionuclide concentrations in soil. From these ten locations, four surface soil samples (0 to 15 cm) will be collected from four points midway between the center and 100 m² grid block corners. These four samples will be field composited into one soil sample from that 100 m² area. Additional samples may be collected from any locations of elevated direct gamma radiation detected during gamma scans.

Judgmentally-Selected Locations

Judgmental surface (0 to 15 cm) and subsurface (> 15 cm) soil samples may be collected based on FSS and/or gamma scan results. Additional judgmental surface and/or subsurface soil samples may

be collected based on visual observation and/or site history or at the discretion of the NRC site representative.

Background Soil Samples

ORISE will use the background soil sample data results collected by RAM (KOMEX 2006). For consistency with the licensee, background concentrations will not be subtracted from soil samples collected in the impacted areas.

Interlaboratory Comparison Samples

ORISE may also request up to ten RAM FSS and/or characterization soil samples for interlaboratory comparison analyses.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and data will be returned to the ORISE laboratory in Oak Ridge, Tennessee for analysis and interpretation. Sample analyses will be performed in accordance with the ORISE Laboratory Procedures Manual (ORISE 2009). Soil samples will be analyzed by gamma spectroscopy for U-235, U-238, Th-230, and Ra-226. The spectra will also be reviewed for other identifiable photopeaks. Based on gamma spectroscopy results, alpha spectroscopy may be performed on several soil samples to determine Th-230 concentrations. Soil sample results will be reported in units of picocuries per gram (pCi/g). The soil data generated will be compared with the NRC-approved soil release criteria established for the RAM Ambrosia Lake facility and with the FSS data provided for the specific FSS grid blocks within the vicinity of the areas that receive confirmatory surveys. ORISE will also compare the mean activity concentration levels for these 100 m² areas with the applicable RAM FSS results.

Results will be presented in a draft report and provided to the NRC for review and comment.

RELEASE CRITERIA

The primary ROCs are natural uranium (U-234, U-235 and U-238), Th-230 and Ra-226. The applicable site-specific cleanup levels for the ROCs are provided in Table 2. To demonstrate compliance with the Table 2 criteria, each radionuclide concentration should be less than its

respective cleanup level—with consideration for small areas of elevated activity—as well as application of the unity rule. The unity rule requires that the sum of the concentration of each contaminant divided by the respective guideline be less than one.

TABLE 2: RIO ALGOM MINING SURFACE SOIL CLEANUP LEVELS	
Radionuclide	Soil Guidelines (pCi/g)^a
Natural Uranium	38
Th-230	17 ^b
Ra-226	7

^aCleanup levels from Section 8: Final Status Survey Plan within the Soil Decommissioning Plan (KOMEX 2006). These values include background.

^bSection 8.1.1.3 initial Th-230 cleanup level was 14 pCi/g. As this level did not include background, the Th-230 cleanup level was revised to 17 pCi/g (RAM 2008).

CONFIRMATORY SCHEDULE

Measurement and Sampling	September 21 through 24, 2009
Sample Analysis	October 2009
Draft Report	November 2009
Final Report	Within two weeks of receiving NRC comments on the draft report

FIGURES

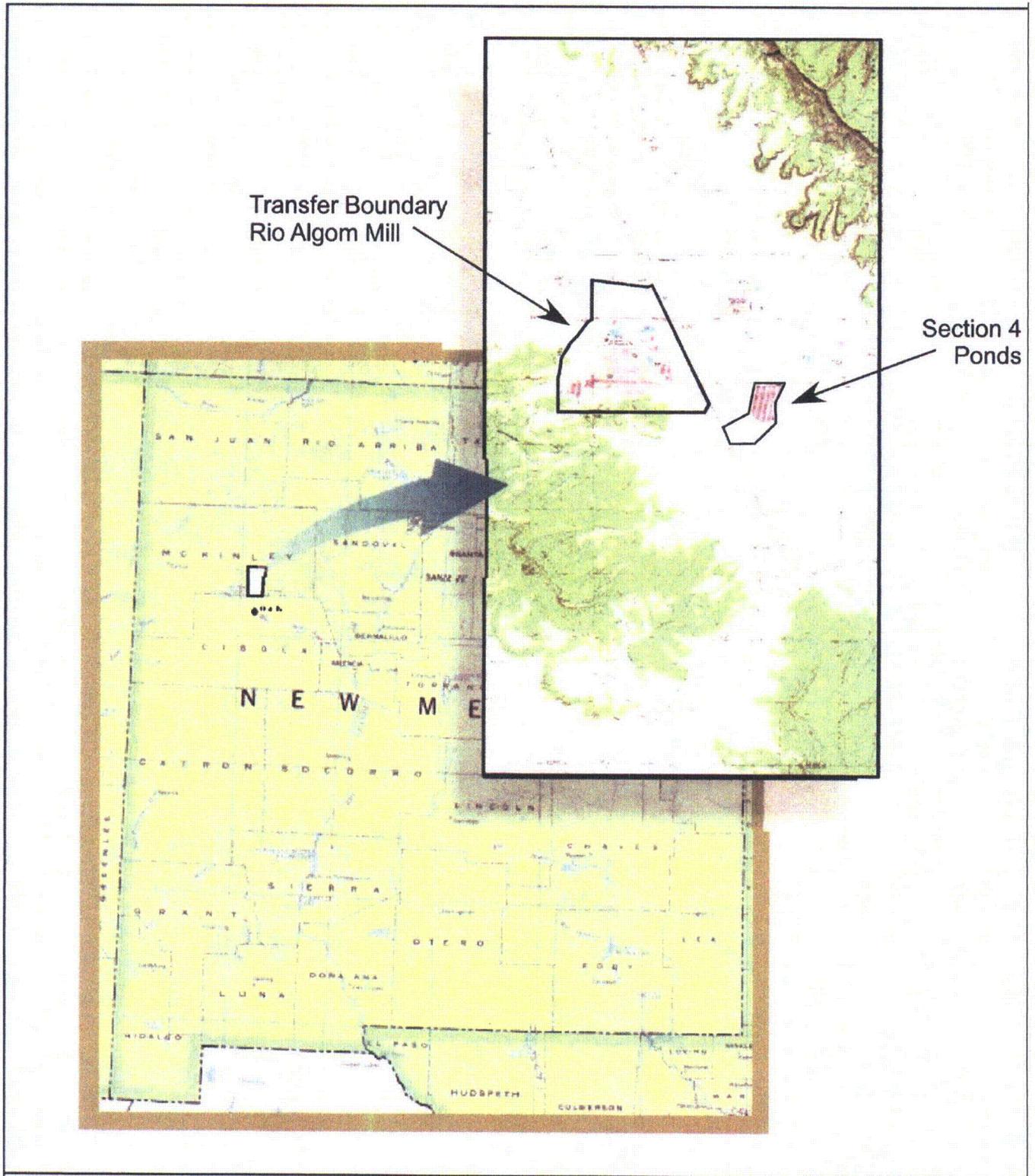


Figure provided by MAXIM.

Figure 1: Site Location Map – Rio Algom Mining, LLC, Ambrosia Lake, New Mexico



Figure provided by MAXIM.

Figure 2: Aerial Photo of Section 4 Pond Area – Ambrosia Lake, New Mexico

REFERENCES

- Komex Environmental and HG Engineering Ltd (KOMEX). *Soil Decommissioning Plan: Rio Algom Mining LLC, Ambrosia Lake Facility, Grants, New Mexico*. Golden, Colorado; May 1, 2006.
- Maxim Technologies, Inc. (MAXIM). *Closure Plan: Lined Evaporation Ponds. Rio Algom Mining LLC, Ambrosia Lake, New Mexico*. Hilliard, Ohio; October 2004.
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