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DEPARTMENT OF ENERGY

Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos, New Mexico 87544

NOV 1 4 2019

EMLA-2020-1097-02-001

Mr. John E. Kieling
Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: Submittal of the Field Completion Letter Report for Aggregate Areas Known Cleanup Sites Campaign: SWMU 39-002(a), SWMU 46-004(q), SWMU 15-008(b), and SWMU 15-007(c)

Dear Mr. Kieling:

Enclosed please find two hard copies with electronic files of the "Field Completion Letter Report for Aggregate Areas Known Cleanup Sites Campaign: SWMU 39-002(a), SWMU 46-004(q), SWMU 15-008(b), and SWMU 15-007(c)." On September 20, 2019, the U.S. Department of Energy Environmental Management Los Alamos Field Office (EM-LA) submitted an extension request to the New Mexico Environment Department (NMED) for fiscal year 2019 Milestone #19 of the 2016 Compliance Order on Consent. The purpose of Milestone #19 was to document field completion of cleanups at four sites under the Known Cleanup Sites Campaign. NMED approved the extension request on October 4, 2019. The extension approval removed Milestone #19 and established a new deliverable date of November 15, 2019, in fiscal year 2020. This letter report fulfills the requirements of the original milestone.

If you have any questions, please contact Jack Grow at (505) 695-3308 (jack.grow@em-la.doe.gov) or Cheryl Rodriguez at (505) 257-7941 (cheryl.rodriguez@em.doe.gov).

Sincerely,

Arturo Q. Duran
Compliance and Permitting Manager
Environmental Management
Los Alamos Field Office

Enclosures:

1. Two hard copies with electronic files – Field Completion Letter Report for Aggregate Area Known Cleanup Sites Campaign: SWMU 39-002(a), SWMU 46-004(q), SWMU 15-008(b), and SWMU 15-007(c) (EM2019-0360)

cc (letter and enclosure[s] emailed):
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November 2019
EM2019-0360

Field Completion Letter Report for Aggregate Area Known Cleanup Sites Campaign: SWMU 39-002(a), SWMU 46-004(q), SWMU 15-008(b), and SWMU 15-007(c)

N3B Los Alamos

EM2019-0360

Field Completion Letter Report for Aggregate Area Known Cleanup Sites Campaign: SWMU 39-002(a), SWMU 46-004(q), SWMU 15-008(b), and SWMU 15-007(c)

November 2019

Responsible program director:

Printed Name	Signature	Title	Organization	Date
Michael O. Erickson		Program Director	RCRA Remediation Program	11/12/19

Responsible N3B representative:

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Erich Evered		Program Manager	N3B Environmental Remediation Program	11/12/2019

Responsible DOE EM-LA representative:

Printed Name	Signature	Title	Organization	Date
Arturo Q. Duran		Compliance and Permitting Manager	Office of Quality and Regulatory Compliance	11/14/19

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1.0 PURPOSE OF REPORT

On September 20, 2019, the U.S. Department of Energy Environmental Management Los Alamos Field Office (EM-LA) submitted an extension request to the New Mexico Environment Department (NMED) for fiscal year 2019 Milestone #19 of the 2016 Compliance Order on Consent (Consent Order). The purpose of Milestone #19 was to document field completion of cleanups at four sites under the Known Cleanup Sites Campaign. NMED approved the extension request on October 4, 2019. The extension approval removed Milestone #19 and established a new deliverable date of November 15, 2019, in fiscal year 2020. This letter report fulfills the requirements of the original milestone. The sites addressed in this letter report include Solid Waste Management Unit (SWMU) 39-002(a), SWMU 46-004(q), SWMU 15-008(b), and SWMU 15-007(c).

2.0 OVERVIEW

EM-LA and Newport News Nuclear BWXT-Los Alamos, LLC (N3B) have completed fieldwork at sites previously identified as requiring cleanup. This includes soil removal from sites where previous investigations have identified hazardous contaminants at concentrations that exceed the target risk level of 10^{-5} for lifetime excess cancer risk for carcinogenic contaminants and a hazard index (HI) of 1 for noncarcinogenic contaminants.

3.0 SUMMARY OF FIELDWORK COMPLETED IN FISCAL YEAR 2019

The following sections summarize the status of fieldwork completed at SWMUs 39-002(a), 46-004(q), 15-008(b), and 15-007(c). The approximate site locations are depicted in Figure 3.0-1.

3.1 SWMU 39-002(a), Storage Area

3.1.1 Site Description and Operational History

SWMU 39-002(a) consists of three former satellite accumulation areas (SAAs) (Figure 3.1-1). Area 1 was located on an unpaved, outdoor area next to the northwest corner of building 39-2. The former storage area measured approximately 25 × 30 ft and was used for storage for approximately 10 yr before being registered as an SAA. Area 2 was located inside room 18-A of building 39-2, and was used for approximately 10 yr for storing waste chemicals from photographic processing in 5-gal. containers. According to the Los Alamos National Laboratory (LANL or the Laboratory) Resource Conservation and Recovery Act storage area database dated July 2017, this SAA was removed in March 1993. No known or documented releases are associated with this SAA. Because the site was located inside a building, there was no potential for environmental releases. Area 3 was located on an asphalt driveway at the north end of the loading dock on the southeast side of building 39-2. Building 39-2 was demolished in 2016.

3.1.2 Site Status

In 2010, a total of 52 samples were collected from 24 locations at SWMU 39-002(a), Area 1. The sampling results are presented in the “Investigation Report for North Ancho Canyon Aggregate Area, Revision 1” (LANL 2010, 108500.11). The approved investigation report proposed additional sampling to define vertical extent at three sample locations and the removal of the upper 1 ft of soil from a 2-ft radius around six sampling locations where benzo(a)pyrene exceeded industrial soil screening levels (SSLs). Because the site posed unacceptable risk under the industrial scenario, it was not suitable for corrective action complete with controls and was identified for cleanup under the 2016 Consent Order Known

Cleanup Sites Campaign. Sampling was also conducted in 2010 at Area 3, and nature and extent of contamination were defined. Sampling could not be conducted at Area 2 in 2010 because it was located inside building 39-2.

The investigation results for Area 1 were reevaluated in 2018 in accordance with an updated process for determining extent of contamination. The evaluation determined that additional remediation at SWMU 39-002(a), Area 1, was not warranted. Because building 39-2 was demolished, sampling was proposed at Area 2 to complete the investigation at the three areas of SWMU 39-002(a).

3.1.3 Investigation Objectives

The overall objective of the investigation is to define the nature and extent of contamination associated with SWMU 39-002(a), Area 2, and ensure no unacceptable human health or ecological risk exists at this site.

3.1.4 Scope of Activities

A total of 15 samples were collected from 3 depths (0–1, 2–3, and 4–5 ft below ground surface [bgs]) at 5 locations at SWMU 39-002(a), Area 2. Samples were analyzed for target analyte list (TAL) metals, nitrate, perchlorate, cyanide, semivolatile organic compounds, volatile organic compounds, pH, high explosives, polychlorinated biphenyls (PCBs), and isotopic uranium. Sampling results were compared to SSLs/ screening action levels (SALs) for the industrial scenario.

3.1.5 Fieldwork Completed

Fieldwork at SWMU 39-002(a), Area 2, (LANL 2010, 108500.11) took place August 20–21, 2019. Fieldwork consisted of sample collection and analysis as described in section 3.1.4. Figure 3.1-1 shows the sample locations at SWMU 39-002(a), Area 2.

3.1.6 Current Site Status

Sampling for lateral and vertical extent of contaminants at SWMU 39-002(a), Area 2 is complete, and no values exceeded SSLs/SALs for the industrial scenario. Results from this investigation, and Areas 1 and 3, will be presented in the Phase II Investigation Report for North Ancho Canyon Aggregate Area.

3.2 SWMU 46-004(q) – Outfall

3.2.1 Site Description and Operational History

SWMU 46-004(q) is an inactive outfall located approximately 40 ft north of building 46-58 at Technical Area 46 (TA-46) (Figure 3.2-1). The outfall consists of a 6-in.-diameter cast-iron pipe that discharged into Cañada del Buey. The source of the discharge to the outfall is not known.

3.2.2 Site Status

In 2010, a total of 26 samples were collected from 13 locations at SWMU 46-004(q). The sampling results are presented in the “Investigation Report for Upper Cañada del Buey Aggregate Area, Revision 1” (LANL 2011, 203410). Based on the analytical data, mercury was detected above the soil background value (0.1 mg/kg) in 10 samples at 5 locations. The maximum concentration of 824 mg/kg was detected at

location 46-611501 from 1.0–2.0 ft bgs. Mercury concentrations increased with depth at this location and the concentrations exceeded construction worker, industrial, and residential SSLs.

The investigation results were reevaluated in 2015 in accordance with an updated process for determining extent of contamination and the results were documented in the "Supplemental Investigation Report for Upper Cañada del Buey Aggregate Area" (LANL 2016, 601745) The supplemental investigation report had the following conclusions for SWMU 46-004(q):

- Vertical extent of mercury was not defined at sample location 46-611501 and further sampling to define vertical extent was warranted.
- Extent of contamination was defined or further sampling was not warranted for all other chemicals of potential concern.
- The site posed potential unacceptable noncarcinogenic human health risk under the construction worker and residential scenarios because of mercury.
- The site posed potential unacceptable risk to ecological receptors primarily because of mercury.
- The site did not pose unacceptable carcinogenic risk or dose under the industrial scenario.

Because the site posed unacceptable risk under the construction worker scenario and potential unacceptable ecological risk, it was not suitable for corrective action complete with controls and was identified for cleanup under the 2016 Consent Order Known Cleanup Sites Campaign.

3.2.3 Investigation Objectives

The overall objectives of the investigation and cleanup activities are (1) complete characterization of the site so that no further sampling is warranted, (2) reduce risk to acceptable levels under the construction worker scenario, and (3) reduce risk to ecological receptors to acceptable levels. Specific objectives are discussed below.

3.2.4 Scope of Activities

Additional samples were collected to determine the extent of the excavation (Figure 3.2-1). One sample from one depth (2–3 ft) was collected from the center of the excavation (location 46-611501). Samples were also collected 3 ft up-gradient and 3 ft down-gradient from location 46-611501. Samples were collected 3 ft to either side of location 46-611501 parallel to the slope. Samples from these locations were collected from 0–1, 1–2, and 2–3 ft bgs.

Additional sample locations were collected from two depths (0–1 ft and 1–2 ft) 6 ft and 10 ft down-gradient of location 46-611501 in the drainage to ensure lateral extent of elevated mercury concentrations were defined. All samples were analyzed for mercury and the sample at location 46-611501 was also analyzed for PCBs.

If the initial sampling results showed mercury concentrations greater than the construction worker soil screening level (77.1 mg/kg), additional step-out samples were collected to determine the area of excavation. Initially, an area 4 ft × 4 ft parallel to the slope and centered on location 46-611501 was excavated to a depth of 2 ft to remove the soil with elevated mercury contamination. However, further sampling expanded the initial excavation.

3.2.5 Fieldwork Completed

Fieldwork at SWMU 46-004(q) took place September 14–December 13, 2018. Fieldwork consisted of sample collection of 60 samples in soil and tuff at 25 locations, in and around the outfall. The analytical data were used to define the specific excavation areas and depths to which mercury-contaminated soil was removed to reduce the risk under the construction worker scenario and to ecological receptors. Results from planned and additional sampling in and around the outfall and drainage indicated the base-scope excavation area needed to be extended. Figure 3.2-1 shows sample locations and excavation areas at SWMU 46-004(q).

A total of 2.75 yd^3 of excavated material was packaged in B-12 waste containers and shipped to an approved, licensed waste disposal facility. Excavated areas were backfilled to grade with clean fill.

3.2.6 Current Site Status

The lateral and vertical extent of all chemicals of potential concern at SWMU 46-004(q) are defined and remediation and restoration is complete. Results from this remediation will be presented in the Phase II Investigation Report for Upper Cañada del Buey Aggregate Area.

3.3 SWMU 15-008(b) – Surface Disposal Area

3.3.1 Site Description and Operational History

SWMU 15-008(b) is a former surface disposal area located at TA-15, north of Firing Site R-44 [SWMU 15-006(c)] and extending along the northern edge of the mesa and downslope into Threemile Canyon (Figure 3.3-1). The surface disposal area covers approximately 8.5 acres. Soil and debris generated from activities at the R-44 firing site were disposed of at SWMU 15-008(b). Activities at the firing site began in 1951. The firing site was used extensively until 1978 and sporadically until 1992 when firing site activities ceased. An expedited cleanup was performed in July 2000, following the Cerro Grande fire. The expedited cleanup activities included removing 20 yd^3 of firing site debris from SWMU 15-008(b) and the surrounding area and emplacing erosion-control features, such as straw wattles, rock check dams, and silt fencing.

3.3.2 Site Status

SWMU 15-008(b) was investigated during 2009–2010 as part of the Threemile Canyon Aggregate Area investigation. A total of 163 samples were collected in 2009–2010 from 82 locations within and around the disposal area and on the canyon slope to the north. At all but one location, samples were collected at the surface (0.0–0.3 ft bgs to 0.0–1.0 ft bgs) and from the subsurface (1.0–1.5 ft bgs to 3.0–4.2 ft bgs). At the remaining location, only a surface sample (0.0–0.4 ft bgs) was collected. All samples were analyzed for TAL metals, cyanide, total uranium, perchlorate, explosive compounds, americium-241, gamma-emitting radionuclides, isotopic plutonium, and isotopic uranium. Forty samples were also analyzed for PCBs. The 2010 ”Investigation Report for Threemile Canyon Aggregate Area, Revision 1” (LANL 2010, 111324.14) concluded that nature and extent of contamination were not defined at SWMU 15-008(b) and additional sampling was proposed in the 2011 “Phase II Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 1” (LANL 2011, 207405).

The investigation results were reevaluated in 2015 in accordance with an updated process for determining extent of contamination and the results were documented in the “Supplemental Investigation Report for Threemile Canyon Aggregate Area, Revision 1” (N3B 2018, 700033). The supplemental investigation report had the following conclusions for SWMU 15-008(b):

- Vertical extent of total uranium and uranium-238 contamination was not defined at sample location 15-610723 and further sampling to define vertical extent was warranted.
- Extent of contamination was defined or further sampling was not warranted for all other chemicals of potential concern.
- The site posed potential unacceptable noncarcinogenic human health risk under the industrial and residential scenarios because of lead.
- The site posed potential unacceptable risk to ecological receptors because of copper and lead.
- The site did not pose unacceptable carcinogenic risk or dose under the industrial and residential scenarios.

Because the site posed unacceptable risk under the industrial scenario and potential unacceptable ecological risk, it was not suitable for corrective action complete with controls and was identified for cleanup under the 2016 Consent Order Known Cleanup Sites Campaign.

3.3.3 Investigation Objectives

The overall objectives of the investigation and cleanup activities are (1) complete characterization of the site so that no further sampling is warranted, (2) reduce risk to acceptable levels under the industrial scenario, and (3) reduce risk to ecological receptors to acceptable levels. Specific objectives are discussed below.

Debris from firing site activities (e.g., pieces of wire and cable, metallic debris, plastic) are present on the surface of the site. This debris may serve as a continuing source of soil contamination. One objective of the investigation/cleanup activities, therefore, is to remove surface debris present from past firing site operations.

The 2009–2010 sample locations were located throughout the mesa-top portion of the site at a spacing of approximately 50 ft, and down the canyon slope at a spacing of approximately 75 to 100 ft to the bottom of the canyon. The investigation results did not indicate unacceptable dose because of radionuclides, although uranium, depleted uranium (DU), and tritium are known to have been used at the firing site [SWMU 15-006(c)]. The 2009–2010 sampling may have been biased low with respect to radionuclide contamination because worker radiation protection requirements in effect at the time precluded collection of samples from areas where field screening indicated elevated levels of radioactivity. A second objective of the investigation/cleanup activities is to better characterize surface radiological contamination at the site.

The results of the 2009–2010 investigation identified locations of elevated lead concentrations that drive unacceptable human health risk. The human health risk screening evaluations in the supplemental investigation report showed a HI of 11 for the industrial scenario and 12 for the residential scenario, primarily from lead. The exposure point concentration (EPC) for lead was 8610 mg/kg for the industrial scenario and 4400 mg/kg for the residential scenario, due primarily to a concentration of 138,000 mg/kg at location 15-610746. In addition to this result, there were two lead results (977 mg/kg and 1250 mg/kg) above the industrial SSL (800 mg/kg) and six lead results (406 mg/kg to 777 mg/kg) above the residential SSL (400 mg/kg) and below the industrial SSL. These results indicate that it should be feasible to obtain acceptable risk under the industrial scenario by removing soil contaminated at concentrations above the lead SSL. A third objective of the investigation/cleanup activities is to remove soil with lead concentrations greater than the industrial SSL.

The results of the 2009–2010 investigation showed potential unacceptable risk to several ecological receptors (e.g., American robin, montane shrew, deer mouse, earthworm, and plant) because of copper

and lead. The ecological risk evaluation showed adjusted HIs greater than 1 using lowest observed adverse effect level ecological screening levels. Hazard quotients ranged from 2 to 14 for copper, based on an EPC of 1410 mg/kg and 7 to 29 for lead, based on an EPC of 4400 mg/kg. A fourth objective of the investigation/cleanup activities is to remove soil containing elevated concentrations of copper and lead posing an unacceptable ecological risk.

During the 2009–2010 investigation, soil samples were collected at depths of 0.0–0.5 ft and 2.9–3.5 ft bgs at location 15-610723. At this location, uranium concentrations increased from 118 mg/kg to 403 mg/kg and uranium-238 activities increased from 108 pCi/g to 188 pCi/g. Because concentrations/activities increased with depth at this location and the maximum concentration and maximum activity were greater than the residential SSL (234 mg/kg) and the residential SAL (188 pCi/g), respectively, further sampling for vertical extent of total uranium and uranium-238 was warranted. A fifth objective of the investigation/cleanup activities is to characterize the vertical distribution of total uranium and uranium-238 at location 15-610723 to demonstrate decreasing concentrations/activities with depth.

3.3.4 Scope of Activities

3.3.4.1 Radiation Survey

A walkover radiation survey was performed to identify areas of elevated radioactivity. The survey covered a portion of the mesa-top in and around the site (Figure 3.3-1). Locations of elevated radioactivity were inspected for the presence of DU or radioactive debris. If DU or debris was present, it was removed and staged at a location determined by the facility operations director (FOD).

During the walkover radiation survey, locations of elevated radioactivity (greater than 2 times background) were flagged. Samples at flagged locations outside the planned grid locations (Figure 3.3-1) were collected at depths of 0.0–1.0 ft bgs and 1.0–2.0 ft bgs and analyzed for isotopic uranium and toxicity characteristic leaching procedure (TCLP) lead and TCLP chromium for waste determination. For any flagged locations that were within the planned grid locations, isotopic uranium was added to the analytical suite for the 0.0–1.0 ft bgs grid sampling.

3.3.4.2 Characterization and Confirmation Sampling and Soil/Tuff Removal

Based on the results of the human health and ecological risk screening evaluations, soil samples were collected from 14-ft × 14-ft grid locations shown in Figure 3.3-2. All grid locations were sampled from 0.0–1.0 ft bgs and analyzed for lead and copper for characterization, beryllium for health and safety, and TCLP lead and TCLP chromium for waste profiling.

From the 2009–2010 sampling data, concentrations exceeding the lead SSL (800 mg/kg) were excavated to 1.0 ft bgs at grid locations 16, 20, 27, 31, 34, 42, 88, 102, 106, 109, 113, 116, 117, 121, 183, 197, 201, 233, 237, 259, and 266 (Figure 3.3-2).

Based on the 2009–2010 sampling data, concentrations exceeding 100 mg/kg copper were to be excavated to 4.5 ft bgs or to 1.0 ft below the soil/tuff contact, whichever was first, at grid locations 23, 84, 119, and 127 (Figure 3.3-2). The cleanup value was revised to the EcoPRG (490 mg/kg) to be consistent with regulatory requirements.

The results from the 0.0–1.0 ft bgs grid location sampling were used to determine if additional grid cells needed to be excavated. If lead concentrations exceed the lead SSL (800 mg/kg) (LANL 2017, 602647) at any grid location, the grid cell was excavated to 1.0 ft bgs. If copper concentrations exceeded the copper EcoPRG (490 mg/kg) at any grid location, the grid cell was excavated to 4.5 ft bgs or to 1 ft below

the soil/tuff contact, whichever was first. Following soil removal, confirmation samples were collected from the bottom of the excavation to 0.5 ft below the bottom of the excavation.

3.3.5 Fieldwork Completed

Remediation took place June 28–November 6, 2019. Existing location 15-610723 was sampled to define the vertical extent of isotopic and total uranium. Nine additional confirmation samples were collected from the bottom of the excavation in tuff (Qbt3) to supplement the tuff data obtained in the 2009–2010 sampling campaign. In addition, a walkover radiological survey was conducted in and around the planned excavation area to identify areas where radiation values were greater than 2 times the background. Those areas identified were also sampled for isotopic uranium (119 locations). In all, a total of 407 samples at 278 locations were collected. Figure 3.3-3 shows the sampling locations, radiological survey, and excavation areas at SWMU 15-008(b).

Copper and lead soil with concentrations exceeding the Eco-PRG values (LANL 2017, 602647) and industrial SSLs (NMED 2019, 700550), respectively, were removed to the top of tuff up to approximately 0.25 ft below the top of the soil/tuff interface. At location 15-61568, soil and tuff were excavated to ~5 ft bgs to remove contamination of copper above Eco-PRG. No soils sampled for total and isotopic uranium were identified as having concentrations above SALs. A total of 1760 yd^3 of copper- and lead-contaminated soil was removed. The excavated material was packaged in waste containers and staged for shipment to an approved, licensed waste disposal facility for final disposition.

3.3.6 Current Site Status

The nature and extent of contamination have been defined at SWMU 15-008(b), and lead- and copper-contaminated soil has been removed to reduce the risk under the industrial scenario and to ecological receptors. Results from this remediation will be presented in the Phase II Investigation Report for Threemile Canyon Aggregate Area.

3.4 SWMU 15-007(c) – Shaft

3.4.1 Site Description and Operational History

SWMU 15-007(c) is an underground shaft (structure 15-264) located at TA-15 approximately 300 ft east of building 15-263 and 100 ft north of underground shaft 15-265 [SWMU 15-007(d)] (Figure 3.4-1). The shaft, 6 ft in diameter × 120 ft deep, is situated within a 20-ft × 20-ft concrete pad and covered with a wooden lid. In 1972, the shaft was used to conduct a single underground test involving approximately 2 tons of high explosives, the only material used in the test. This test was designed to determine the ability of tuff to absorb the explosion. To confine the explosion to the bottom of the shaft, the shaft was filled with layers of magnetite, cement, sand grout, bentonite, sand, and gravel. Before 2010, a 0.25-in.-diameter lead shot was scattered on the surface of the concrete pad and on the soil on three sides of the pad. The source of the lead shot was probably bags of lead shot used for instrument shielding during the experiment.

3.4.2 Site Status

SWMU 15-007(c) was investigated during 2009–2010 as part of the Threemile Canyon Aggregate Area investigation. Lead shot was removed from the concrete pad and from the surface of the surrounding soil during the 2009–2010 investigation.

A total of 44 samples were collected in 2009–2010 from 22 locations around the shaft. At each location, a sample was collected at the surface (0.0–0.5 ft bgs) and from the subsurface (1.0–1.5 ft bgs to 1.0–2.1 ft bgs). All samples were analyzed for TAL metals, cyanide, perchlorate, and explosive compounds. In addition, 6 samples were analyzed for PCBs. The 2010 "Investigation Report for Threemile Canyon Aggregate Area, Revision 1" (LANL 2010, 111324.14) concluded that nature and extent of contamination were not defined at SWMU 15-007(c) and additional sampling was proposed in the 2011 "Phase II Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 1" (LANL 2011, 207405).

The investigation results were reevaluated in 2015 in accordance with an updated process for determining extent of contamination and the results were documented in the "Supplemental Investigation Report for Threemile Canyon Aggregate Area, Revision 1" (N3B 2018, 700033). The supplemental investigation report had the following conclusions for SWMU 15-007(c):

- Vertical extent of lead contamination was not defined at sample locations 15-610802 and 15-610813 and further sampling to define extent was warranted.
- Extent of contamination was defined or further sampling was not warranted for all other chemicals of potential concern.
- The site posed potential unacceptable noncarcinogenic human health risk under the industrial scenario because of lead and under the residential scenario because of antimony and lead.
- The site did not pose unacceptable carcinogenic risk or dose under the industrial and residential scenarios and did not pose unacceptable risk to ecological receptors.

Because the site posed unacceptable risk under the industrial scenario, it was not suitable for corrective action complete with controls and was identified for cleanup under the 2016 Consent Order Known Cleanup Sites Campaign.

3.4.3 Investigation Objectives

The overall objectives of the investigation and cleanup activities are (1) complete extent and characterization of the site so that no further sampling is warranted and (2) reduce risk to acceptable levels under the industrial scenario. Specific objectives are discussed below.

The results of the 2009–2010 investigation identified elevated lead in a surface sample that drives unacceptable risk. The 2009–2010 sample locations extended outward around the SWMU 15-007(c) shaft with spacing between locations approximately 10–20 ft. Because the source of lead contamination appears to be from lead shot, elevated lead concentrations may be very localized and a closer sample spacing may be warranted. One objective of the investigation/cleanup activities is to better characterize surface lead contamination around the SWMU 15-007(c) shaft.

The human-health risk screening evaluations in the supplemental investigation report (LANL 2016, 601216) showed an HI of 20 for the industrial scenario and 26 for the residential scenario, primarily from lead. The exposure point concentration for lead was 15,500 mg/kg for the industrial scenario and 7290 mg/kg for the residential scenario, primarily because of a concentration of 63,700 mg/kg at location 15-610814. This result was the only result above the industrial SSL (800 mg/kg) or residential SSL (400 mg/kg). Thus, removal of this one location would reduce risk to acceptable levels for both the industrial and residential scenarios. As noted above, however, additional sampling is needed to verify that this is the only location requiring removal. A second objective of the investigation/cleanup activities is to remove soil with lead concentrations greater than the industrial SSL.

During the 2009–2010 investigation, soil samples were collected at depths of 0.0–0.5 ft and 1.0–2.0 ft bgs at location 15-610802 and 0.0–0.5 ft and 1.0–1.5 ft bgs at location 15-610813. At location 15-610802, lead concentrations increased from 150 mg/kg to 200 mg/kg and at location 15-610813, lead concentrations increased from 45.9 mg/kg to 180 mg/kg. Because concentrations increased with depth at these locations and the residential SSL was only about 2 times the maximum concentration, further sampling for vertical extent of lead was warranted. A third objective of the investigation/cleanup activities is to characterize the vertical distribution of lead at these locations to demonstrate decreasing lead concentrations with depth.

3.4.4 Scope of Activities

3.4.4.1 X-Ray Fluorescence Survey

Surface soil samples were screened in the field using x-ray fluorescence (XRF) to identify any areas having elevated lead concentrations. The XRF survey was conducted on a 5-ft grid centered at the shaft and extending outward from the concrete pad around the shaft, omitting the initial 1 ft bgs excavation area (Figure 3.4-1). The gridded area was 50 ft × 50 ft and excluded the planned excavation and concrete pad areas. A total of 78 surface soil samples (0.0–0.5 ft bgs) were collected from the center of each grid cell and screened for lead in the field using XRF. If lead concentrations in the outermost grid cells exceeded the industrial SSL (800 mg/kg), the grid was extended in 5-ft spacing increments until concentrations were less than the industrial SSL on the outermost grid cells. Any large material observed during performance of the survey was removed and stockpiled at an area designated by the FOD.

3.4.4.2 Characterization and Confirmation Sampling and Soil/Tuff Removal

The results of the XRF survey and the 2009–2010 investigation were used to define any areas having lead concentrations greater than the industrial SSL. These results were used to define areas of soil to be excavated in addition to the planned excavation area (Figure 3.4-1). Excavation area(s) encompass all XRF survey locations with concentrations greater than the industrial SSL.

Soil within the defined excavation area was removed to a depth of 1 ft bgs. The initial area was estimated to be about 10 ft × 20 ft (i.e., bounded by sample locations 15-610796, 15-610802, and 15-610807 and the cement pad), which yielded an estimated excavation volume of about 9 yd^3. Confirmation samples were collected from 1.0–2.0 ft bgs and analyzed for lead and antimony.

3.4.5 Fieldwork Completed

Remediation took place June 28–September 6, 2019. Soil was excavated around existing sampling location 15-610814 and additional depth samples were collected at existing sampling locations 15-610802 and 15-610813 to define the vertical extent of lead. Additionally, 78 surface grab samples were collected at a predetermined 5-ft × 5-ft gridded locations and scanned using a portable XRF analyzer spectrometer to identify any additional areas of elevated lead. Figure 3.4-2 shows the sampling locations and excavation areas at SWMU 15-007(c).

Soil containing lead with concentrations exceeding the industrial SSLs was removed to 1 ft bgs using existing analytical data and field XRF screening data. A total of ~18.9 yd^3 of lead-contaminated soil was removed. The excavated material was packaged in waste containers and staged for shipment to an approved, licensed waste disposal facility for final disposition.

3.4.6 Current Site Status

The nature and extent of contamination have been defined at SWMU 15-007(c) and lead-contaminated soil has been excavated to reduce the risk under the industrial scenario. Results from this remediation will be presented in the Phase II Investigation Report for Threemile Canyon Aggregate Area.

4.0 References

The following reference list includes documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. This information is also included in text citations. ERIDs were assigned by the Laboratory's Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory's Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by N3B (IDs 700000 and above). IDs are used to locate documents in N3B's Records Management System and in the Master Reference Set. The NMED Hazardous Waste Bureau and N3B maintain copies of the Master Reference Set. The set ensures that NMED has the references to review documents. The set is updated when new references are cited in documents.

LANL (Los Alamos National Laboratory), January 2010. "Investigation Report for North Ancho Canyon Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-10-0125, Los Alamos, New Mexico. (LANL 2010, 108500.11)

LANL (Los Alamos National Laboratory), November 2010. "Investigation Report for Threemile Canyon Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-10-7227, Los Alamos, New Mexico. (LANL 2010, 111324.14)

LANL (Los Alamos National Laboratory), May 2011. "Investigation Report for Upper Cañada del Buey Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-11-2487, Los Alamos, New Mexico. (LANL 2011, 203410)

LANL (Los Alamos National Laboratory), October 2011. "Phase II Investigation Work Plan for Threemile Canyon Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-11-6156, Los Alamos, New Mexico. (LANL 2011, 207405)

LANL (Los Alamos National Laboratory), February 2016. "Supplemental Investigation Report for Threemile Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-16-20567, Los Alamos, New Mexico. (LANL 2016, 601216)

LANL (Los Alamos National Laboratory), August 2016. "Supplemental Investigation Report for Upper Cañada del Buey Aggregate Area," Los Alamos National Laboratory document LA-UR-16-26150, Los Alamos, New Mexico. (LANL 2016, 601745)

LANL (Los Alamos National Laboratory), September 2017. "Ecological Preliminary Remediation Goals for Soils at Los Alamos National Laboratory, Revision 1," Los Alamos National Laboratory document LA-UR-17-28554, Los Alamos, New Mexico. (LANL 2017, 602647)

N3B (Newport News Nuclear BWXT-Los Alamos, LLC), July 2018. "Supplemental Investigation Report for Threemile Canyon Aggregate Area, Revision 1," Newport News Nuclear BWXT-Los Alamos, LLC, document EM2018-0011, Los Alamos, New Mexico. (N3B 2018, 700033)

NMED (New Mexico Environment Department), June 19, 2019. "Risk Assessment Guidance for Site Investigations and Remediation, Volume 1, Soil Screening Guidance for Human Health Risk Assessments," February 2019 (Revision 2, 6/19/19), Hazardous Waste Bureau and Ground Water Quality Bureau, Santa Fe, New Mexico. (NMED 2019, 700550)

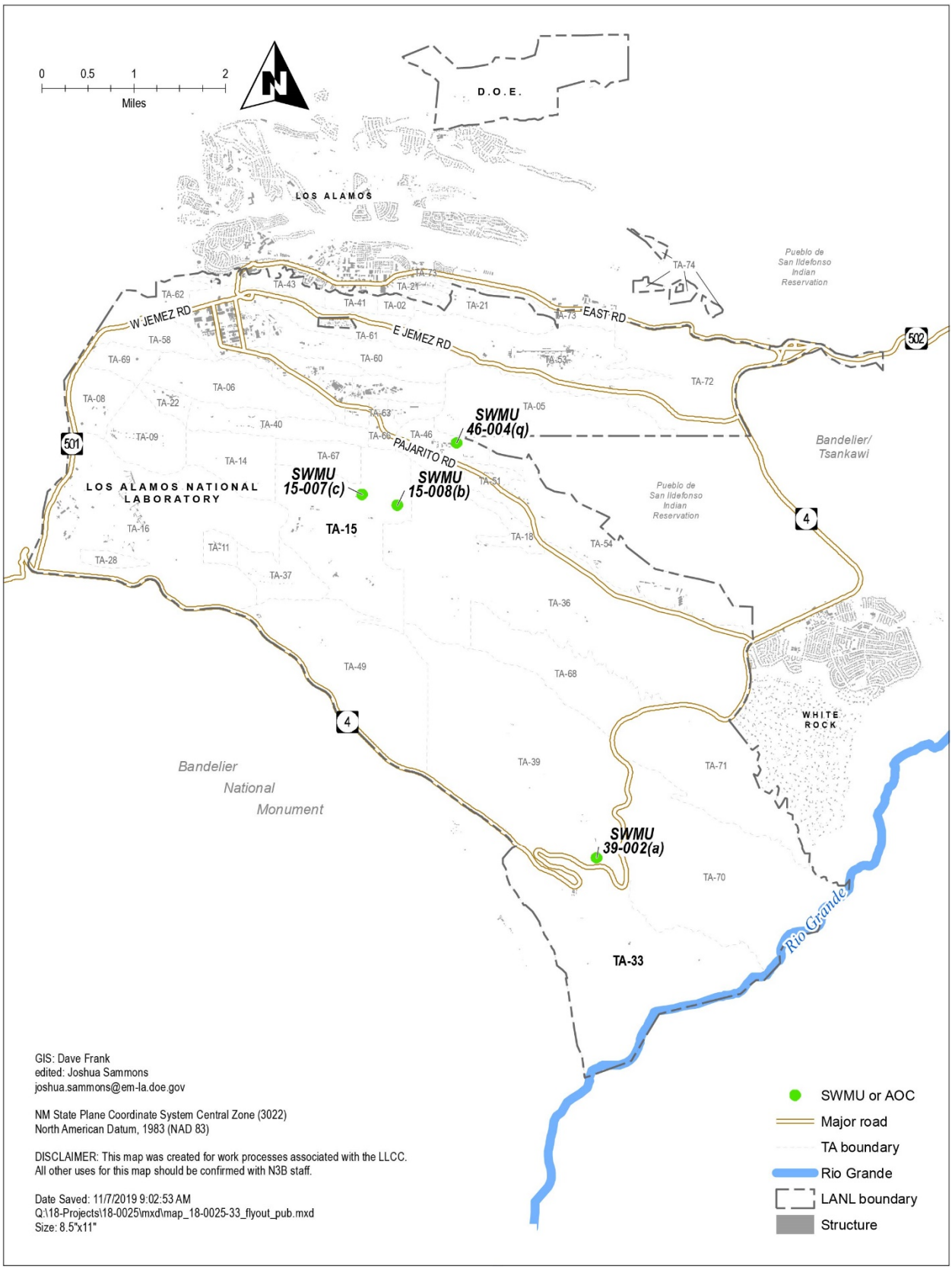

Figure 3.0-1 Location of SWMUs 39-002(a), 46-004(q), 15-008(b), and 15-007(c) with respect to Laboratory TAs

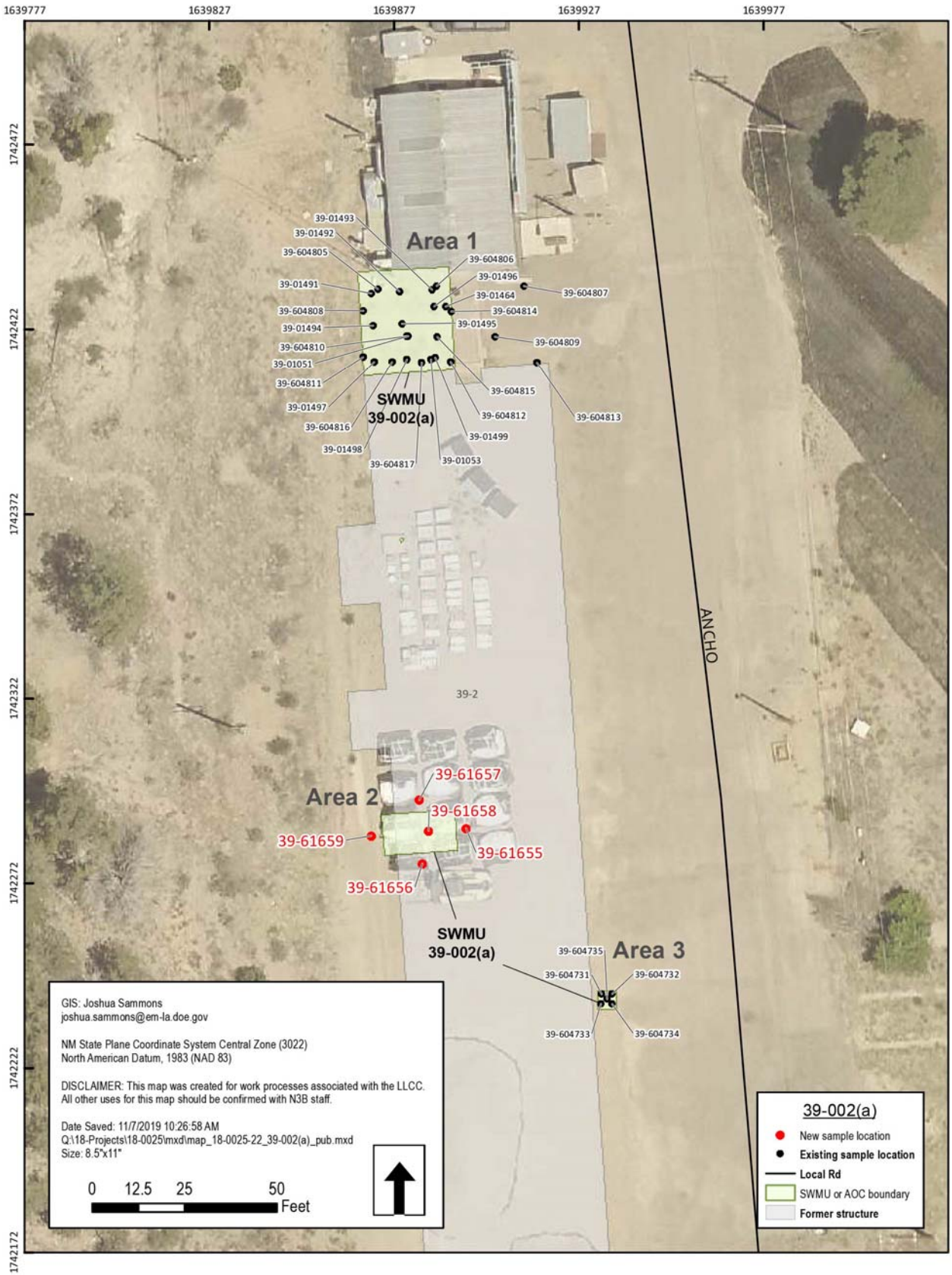

Figure 3.1-1 Sampling locations at SWMU 39-002(a), Area 2

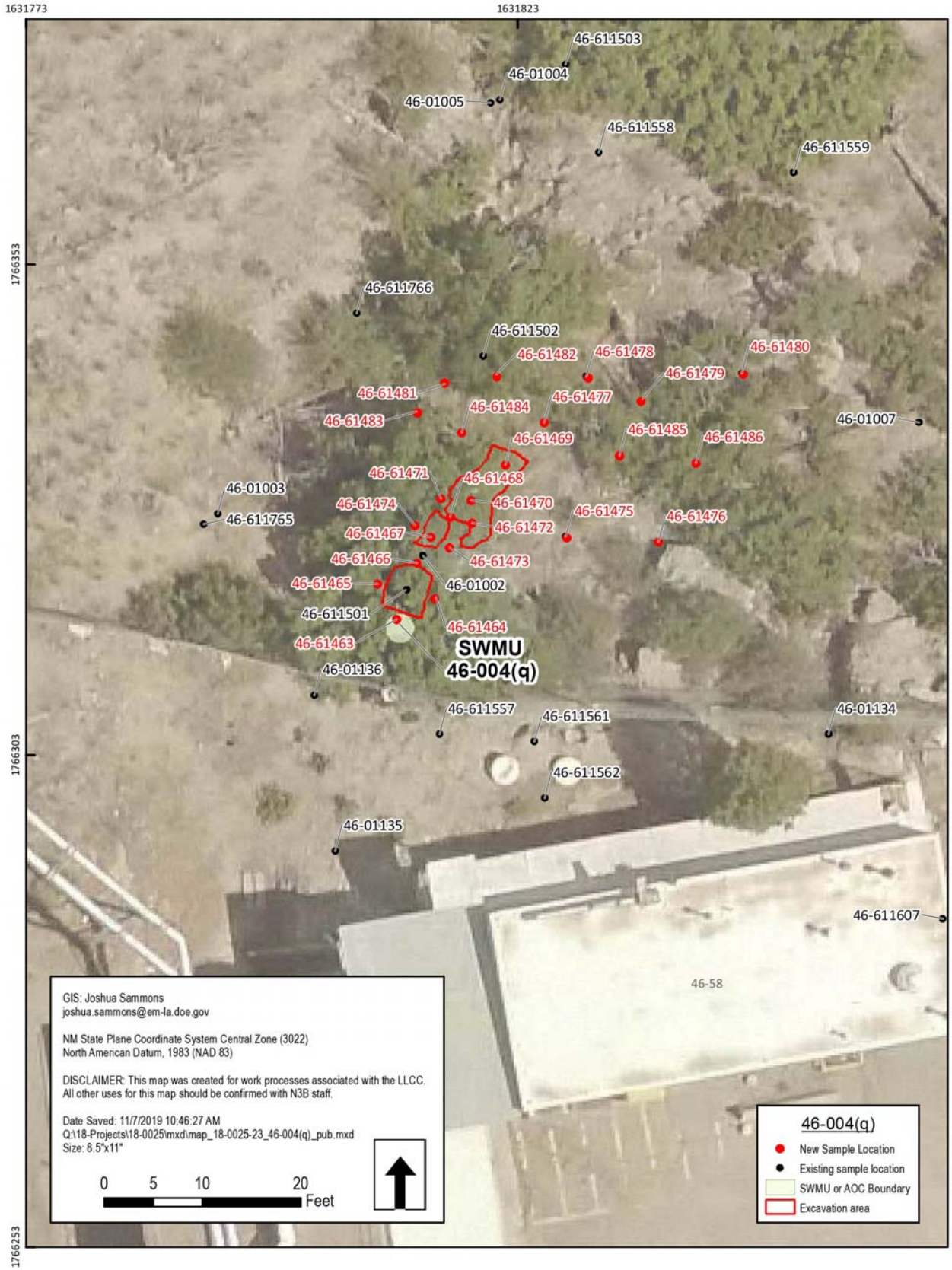

Figure 3.2-1 Sampling locations and excavation areas at SWMU 46-004(q)

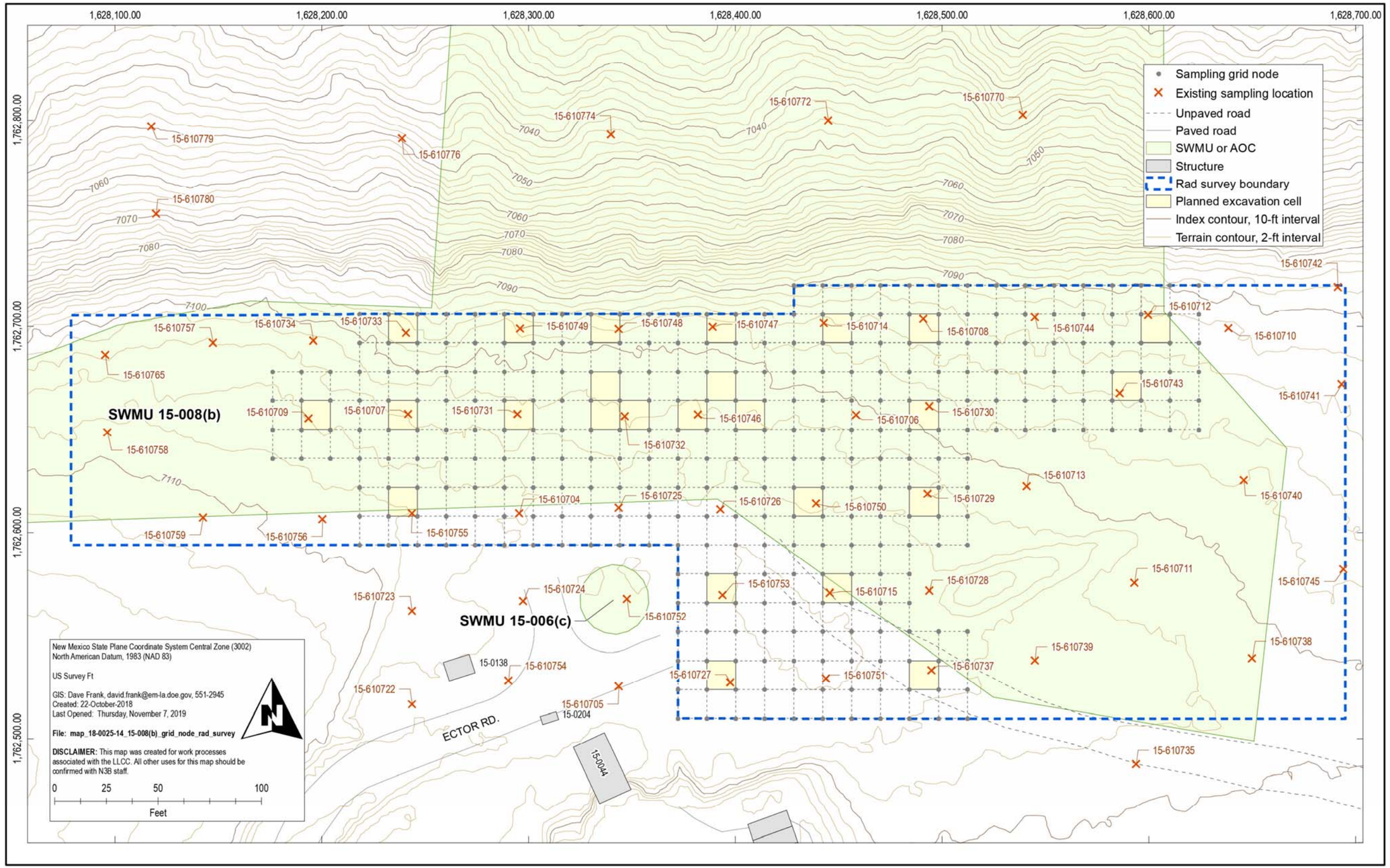

Figure 3.3-1 Radiation survey extent, existing sample locations, and planned excavation grid at SWMU 15-008(b)

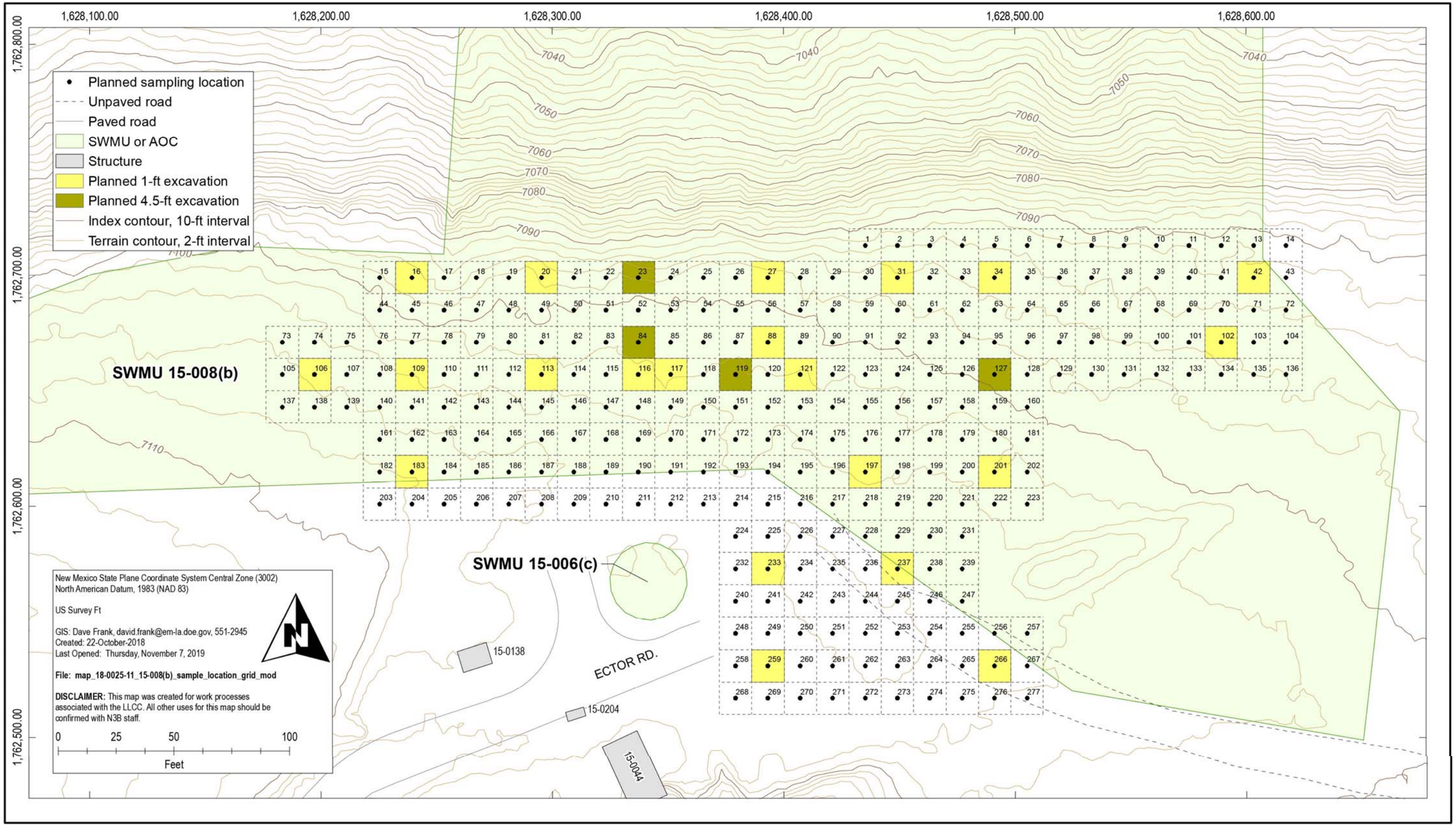

Figure 3.3-2 Planned sampling locations and excavation grids at SWMU 15-008(b)

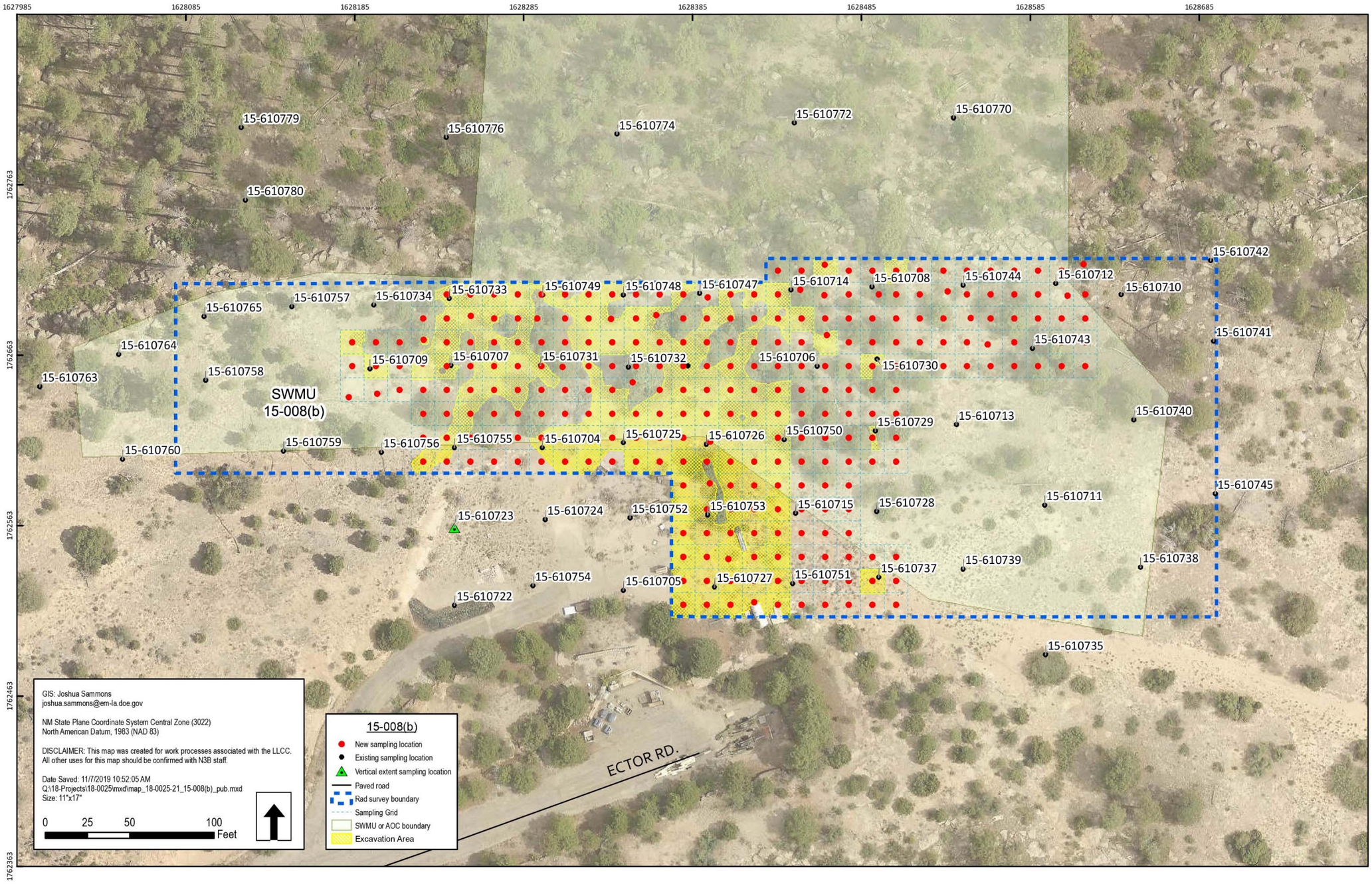

Figure 3.3-3 Sample locations and excavation area at SWMU 15-008(b)

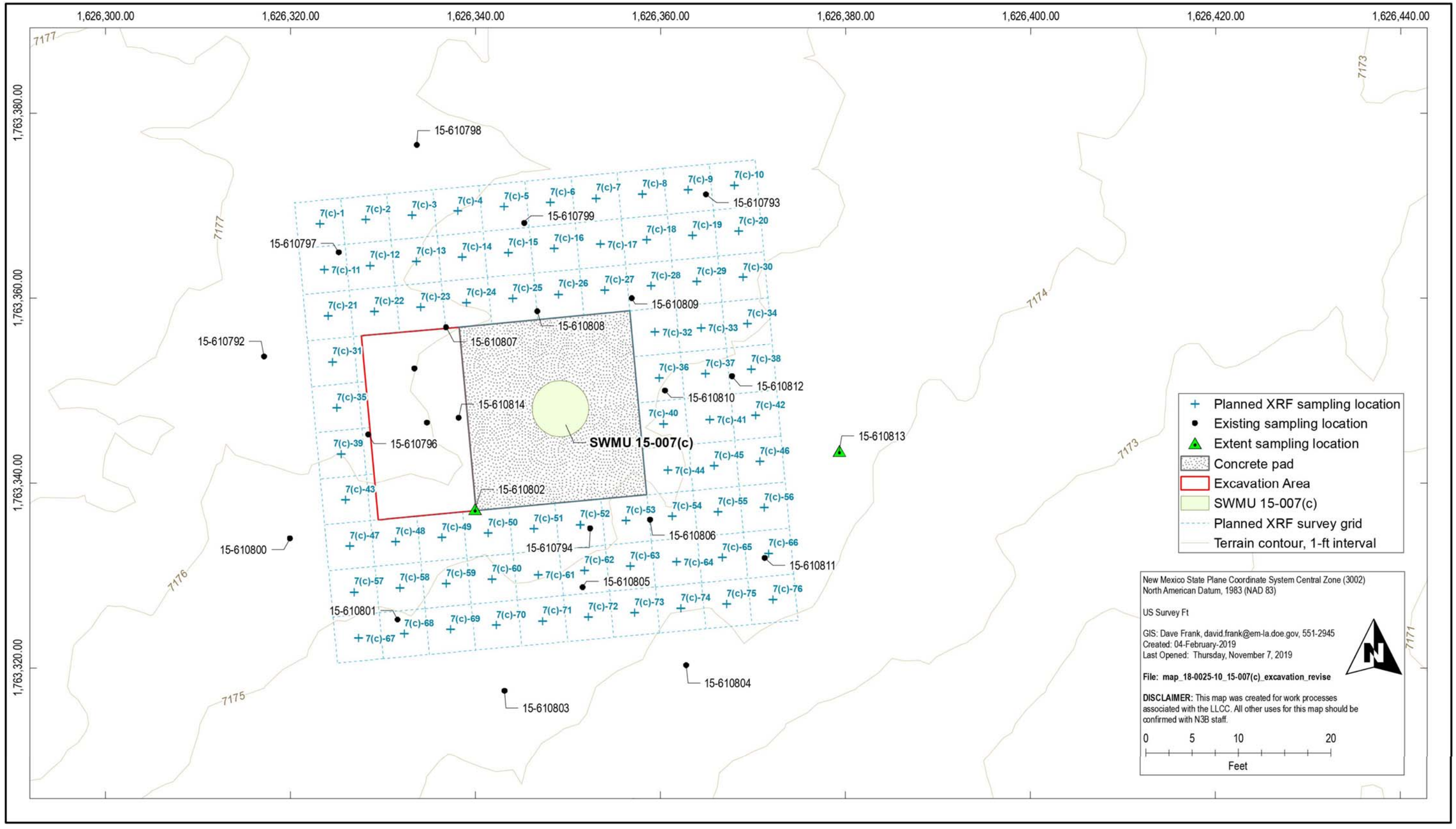

Figure 3.4-1 Planned XRF survey extent, existing sampling locations, and excavation grid at SWMU 15-007(c)

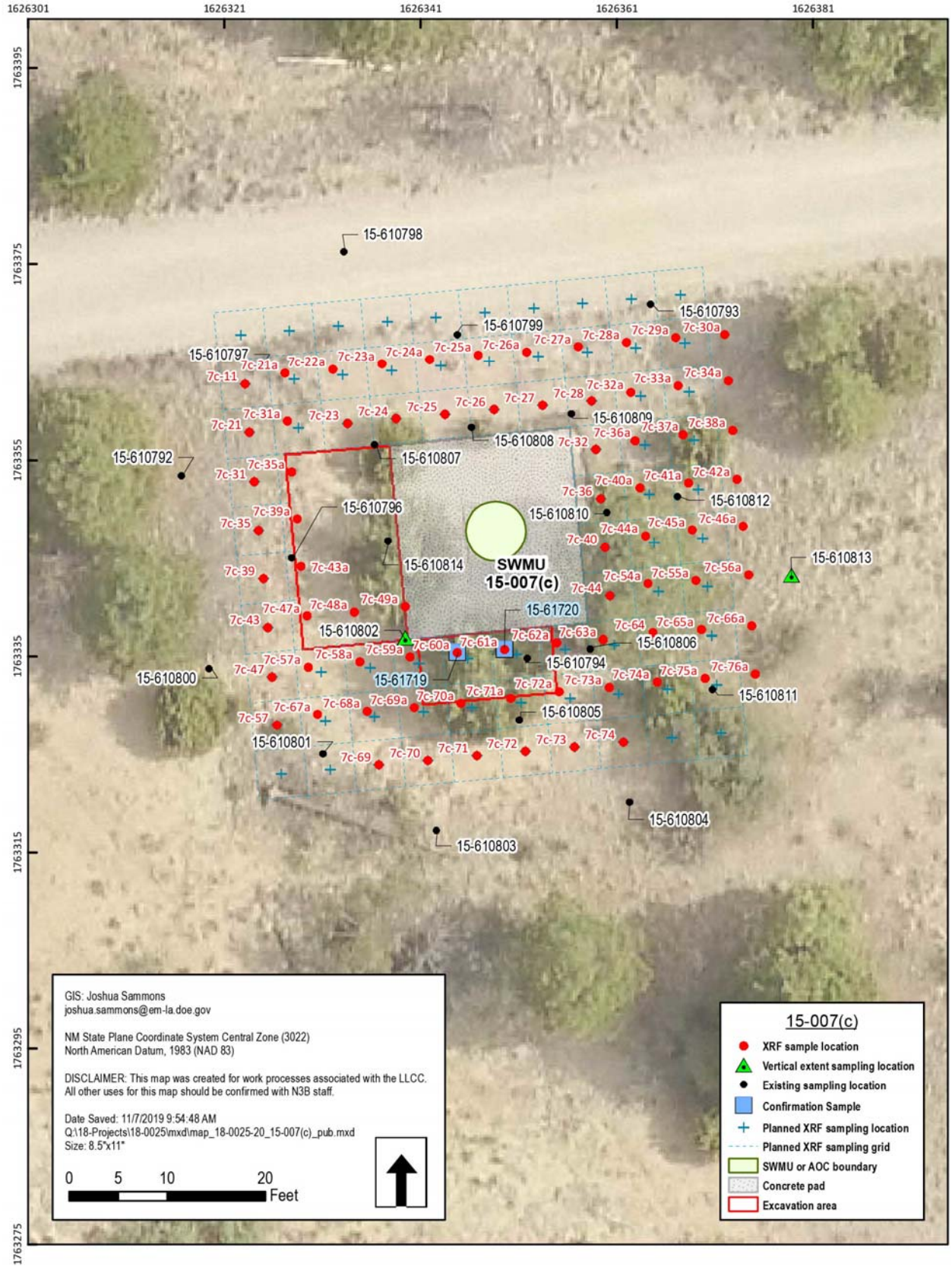

Figure 3.4-2 Sampling locations and excavation areas at SWMU 15-007(c)