Memorandum

To: Santa Susana Field Laboratory Work Group
From: SC&A, Inc.
Date: July 25, 2019
Subject: Evaluation of Petitioner-Specific Concerns Regarding SEC-00235

Introduction

On March 25, 2019, CORE Advocacy for Nuclear & Aerospace Workers—the petitioner, hereafter "CORE Advocacy," for Special Exposure Cohort (SEC) petition SEC-00235 at the Santa Susana Field Laboratory (SSFL)–submitted two documents for consideration by the SSFL work group (WG) related to potential exposures to thorium and americium during the post-1988 period.

The two items submitted by CORE Advocacy were described as follows in the transmitting email (CORE Advocacy, 2019):

> 1. SSFL Area IV Building Numbers where EPA identified Americium and Thorium as "Radionuclides of Concern," during the 2012 Area IV Radiological Characterization Study. Dates of building demolition are included. There are approximately 50 building locations where EPA identified Am / Th.
>
> 2. EPA's description of processes at SSFL Area IV Building 4023, which specifically involved TRUMP-S research.

The first item was a 2017 report by CORE Advocacy (CORE Advocacy, 2017) summarizing specific information from the 2012 U.S. Environmental Protection Agency (EPA) study (referenced as EPA 2012a–2012h in this memorandum). The second item was an excerpt from a specific section of the 2012 EPA study. These items were briefly discussed during the March 2019 SSFL WG teleconference (SSFL WG, 2019, pp. 23–26) and again during the meeting of the Advisory Board on Radiation Worker Health (Board) held April 17, 2019, in Pittsburgh, PA (ABRWH, 2019, pp. 59–60, 73–96). During the latter discussion, the Board tasked SC&A with providing a formal review of the submitted documents in the context of SEC-00235. This memorandum presents the results of SC&A's review of the two petitioner-supplied documents and any relevant underlying documentation as necessary.

Radionuclides of Concern Identified in 2012 Area IV Radiological Characterization Study

The first item submitted by CORE Advocacy summarizes a series of historical site assessments (HSAs) that were performed for EPA and finalized in 2012. The purpose of the HSAs was to review historical site processes in order to identify the areas and potential contaminants that could theoretically be present to aid in future sampling and remediation activities. Specifically, the "Introduction" volume to the HSA study states:

> The objective of the HSA component of the radiological study was to provide a comprehensive investigation that identifies, collects, organizes, and evaluates historical information relevant to nuclear research operations as it pertains to radiological contamination in the Area IV Study Area. Once these areas were identified, potential areas where radiological contamination may exist at the site were identified for sampling. [EPA, 2012a, p. 1]

The HSAs are useful because they provide a retrospective look at the different radiological operations at the site and thus indicate the different types of residual contamination that have the potential to be present in the various SSFL facilities under consideration. For example, one such HSA concerning building 4023 identified the potential for Transuranic Management by Pyropartitioning – Separation (TRUMP-S) operations after the currently established SEC period (post-1988) (EPA, 2012b). This specific building is the subject of item 2 presented by CORE Advocacy in March 2019 and is discussed in detail in the next section.

As CORE Advocacy points out in their report detailing information in the HSAs and correspondence submitted to the SSFL WG, there are approximately 50 buildings/locations where americium and thorium were likely to be present for the purposes of remediation sampling activities (CORE Advocacy, 2017). The potential for *residual contamination* (including americium and thorium) to have been present at various locations at SSFL is to be expected based on the historical radiological operations at the site, in particular, operational research related to irradiated fuel elements and use of thorium fuels in reactors such as the Advanced Epithermal Thorium Reactor (AETR).

However, the key question is whether *operational activities* involving these radionuclides occurred after 1988 that may present an exposure scenario that cannot be bounded with sufficient accuracy by potential dose reconstruction methods. It should be noted that, based on SC&A's preliminary review of SEC-00235 (SC&A, 2019), it was recommended that the National Institute for Occupational Safety and Health (NIOSH) develop dose reconstruction methods for decontamination and decommissioning (D&D) workers who may have come in contact with residual contamination from americium and thorium. NIOSH agreed with this recommendation and methods to reconstruct such doses are currently being evaluated (SSFL WG, 2019, pp. 16–21).

The question of continued operational exposures that are independent from D&D activities is certainly a potential concern in the context of SEC-00235. Therefore, SC&A reviewed the EPA HSAs to ascertain whether such operations may have existed after 1988. Specific comments related to the buildings identified by CORE Advocacy are contained in Attachment A.

SC&A did not find evidence that operations involving thorium and americium existed during the time period in question. However, SC&A acknowledges that residual amounts of radioactivity from americium and thorium were likely (and expected) to exist during this time and must be appropriately accounted for during dose reconstruction for former energy employees at SSFL.

TRUMP-S Activities After 1988

The second item submitted by CORE Advocacy in March 2019 included a specific excerpt from the EPA HSA related to potential for TRUMP-S activities in building 4023. The pertinent section of the excerpt is as follows:

> In 1989, reports appear to indicate that Building 4023 served as a support facility for the Transuranic (TRU) Management by Pyropartitioning – Separation (TRUMP-S) operations in Building 4020, located in Subarea HSA-5D. Atomics International requested DOE's approval to utilize the facilities for a 2-year period beginning July 1988 for the Kawasaki Heavy Industries (KHI) and the Central Research Institute of the Electric Power Industry (CRIEPI) of Japan-sponsored "pyrochemical partitioning of actinides from PUREX waste" program. . . . The material used in this experiment was listed as including uranium, neptunium (Np-237), plutonium (Pu-239), and americium (Am-241). [EPA, 2012b, p. 15]

The underlying documentation for this statement in EPA (2012b) was a safety analysis conducted for building T020 (also known as building 4020 and the "hot lab"), revised usage applications regarding TRUMP-S materials, and a management plan for the TRUMP-S test program. All the documents were dated 1989.

SC&A identified additional documentation from 1988–1990 related to the proposed TRUMP-S project at SSFL, summarized as follows:

- **October 20, 1988:** An internal letter describes revisions to the proposed usage application for TRUMP-S materials (Rockwell International, 1988). The letter describes several internally identified deficiencies in the proposed application and requests appropriate revisions.

- **July 25, 1989:** An internal letter indicates that a planning meeting was held to obtain the proper documentation to operate the TRUMP-S glove box in B/020 (the hot lab). The document states:

  > The portion of the license for renewal and to do the work was submitted to NRC. [Redacted] is following the license renewal process. At the present time we can work with depleted uranium, neptunium and americium. [Rockwell International, 1989a, p. 1]

  Although the document does appear to indicate work with americium could have been done under the existing license at that time, subsequent documentation (discussed below) suggests that the radioactive portion of the TRUMP-S project did not occur at SSFL.

- **Undated, probably mid-1989:** An undated report that appears to be a regular status update on SSFL site operations discusses what to do with the waste that will be generated from the TRUMP-S experiment. While undated, the report has a handwritten notation of "8/16" and discusses activities to be carried out in late 1989 and early 1990. Therefore, SC&A believes it is reasonable to assume the report was from August of 1989. The report states:

  > A meeting was held with [redacted] to discuss the disposition of the waste **to be generated** from the TRU partitioning tests. Since the waste will contain transuranics (Pu, Am, Np) and cadmium, the waste generated in late 1989/early 1990 will be TRU/mixed waste. [Redacted] will be in contact with [Redacted] to determine what steps are needed to get a head start on the planning/disposal process. [Emphasis added.] [Rockwell International, n.d., p. 1]

- **October 13, 1989:** An internal letter states that a "Test Readiness Review" (Rockwell International, 1989b, p. 1) of the TRUMP-S glove box tests was to be held on October 13, 1989. Per the Rockwell International test procedures, the object of a "Test Readiness Review" is to:

  > verify technical and operational readiness to conduct the planned tests or operations, to identify risks associated with the tests, and to document review comments and their resolution. [Rockwell International, 1989b, p. 3]

- **October 21, 1989:** An internal letter dated October 21, 1989, describes the meeting minutes and action items directly related to the TRUMP-S program. The letter states:

  > The following action items resulted at the meeting. These action items must be completed **prior to beginning the radioactive portion of TRUMP-S** [emphasis added]. [Rockwell International, 1989c, p. 1]

- **February 1, 1990:** A letter from Rockwell International to the U.S. Nuclear Regulatory Commission (NRC) on February 1, 1990, concerning the license amendment to allow the TRUMP-S project to proceed, states:

  > This is in reply to your letter . . . regarding our recent transmittal to [redacted], wherein we provided additional information regarding the TRUMP-S program **to be conducted** in the RIHL. We understand that a license amendment is necessary to reflect this change. [Emphasis added.] [Rockwell International, 1990a, p. 1]

- **February 1990:** A technical progress report provided by Rockwell International to the U.S. Department of Energy (DOE) for the year 1989 describes the progress made in electrochemical instrumentation designed for the TRUMP-S experiment. The progress report states that the glove box testing for the project had met satisfactory criteria. However, the progress report notes:

> While Rockwell was awaiting DOE permission to **start up the test** pending DOE review of the NEPA Action Description Memorandum, Rockwell Management concluded it would be impractical to continue the TRUMP-S project beyond Stage 1 activities at the Santa Susana Field Laboratories. As a result, an effort was undertaken to locate a facility where the TRUMP-S actinide tests could be conducted for both Stage 1 and Stage 2. [Emphasis added.] [Rockwell International, 1990b, p. 7]

- **February 21, 1990:** A newspaper article from February 21, 1990, indicates that seven opponents to Rocketdyne's application to continue operations in the hot lab had filed "legal cases with the Nuclear Regulatory Commission judge reviewing the case" (Chasen, 1990a). The article goes on to state:

> The cases challenge Rocketdyne's record of credibility in monitoring itself, the company's described "worst-case scenario" for its **planned "TRUMP-S" project**, its emergency contingency plan, and several other aspects of the company's application. . . .
>
> [Rocketdyne] is seeking permission to keep the lab open through Oct. 30 to complete one last experiment called TRUMP-S, for transuranic management by pyro-partitioning separation, and has announced plans to shut it down afterward.
>
> Originally, Rocketdyne was seeking a 10-year license extension, but cut its request to one year last October. [Emphasis added.] [Chasen, 1990a]

- **May 19, 1990:** A follow-on newspaper article from The Simi Valley Enterprise, dated May 19, 1990, describes the dismantling of the hot lab at SSFL and specifically discusses the intended TRUMP-S research as follows:

> Rocketdyne announced in April that the "hot lab's" days were over. One last experiment called TRUMP-S, **originally scheduled to take place** in the "hot lab," was relocated to University of Missouri, at Columbia in the heat of public challenges to the company's request to get the project licensed by the U.S. Nuclear Regulatory Commission.
>
> The experiment would have been in a 4-by-3.5-by-7-foot shielded glove box.
>
> Now the TRUMP-S project — sponsored jointly by Japan and the DOE – is facing challenges in Missouri as well. But Rocketdyne officials are confident that the project will go forward there. [Emphasis added.] [Chasen, 1990b]

- **September 21, 1993:** D&D operations for building 4023 were completed by Rockwell International; however, specific isotopic analysis is not included in the final report (Rockwell International, 1993).

- **October 1994:** A confirmatory survey of building 4023 was performed for DOE by the Oak Ridge Institute for Science and Education (DOE, 1994) and found one small spot of beta surface contamination that was above the DOE guidelines. This spot was subsequently cleaned up, and DOE (1994) agreed with the assessment by Rockwell International that building 4023 met the guidelines for unrestricted release. Soil samples appear only to have been taken for uranium isotopes and cesium.

- **February 19, 1998:** The State of California Health and Welfare Agency, Department of Health Services concurred that building 4023 could be released for use without radiological restriction (California DHS, 1998).

Based on the evidence described in the documentation above, it is SC&A's belief that despite significant planning, procedural development, and equipment testing, the TRUMP-S experiments planned by Rockwell International to occur after 1988 never actually took place at SSFL. It appears the TRUMP-S material and equipment designed for the experiment were transferred to the University of Missouri. Therefore, the exposure potential at SSFL to TRUMP-S materials appears limited to storage during the time period of interest.

Summary Conclusion

SC&A does not believe that there is evidence currently available that demonstrates that operational exposures involving thorium and americium continued to occur at SSFL after 1988. Specific to the TRUMP-S research, SC&A believes that there was clear intent to conduct such operations using the hot lab (building 4020) with support from building 4023 (and likely other laboratory buildings associated with the hot lab). However, the documentation reviewed indicates that the project never reached fruition at SSFL as far as the actual handling and processing of the TRUMP-S material.

Given the historical processes involved in previous campaigns covered by already established SECs (SEC-0093, SEC-00156, and SEC-00234), it is logical that residual amounts of thorium and americium were likely present in existing facilities, equipment, and surrounding areas that underwent decontamination and decommissioning during the post-1988 period. NIOSH acknowledges as much regarding americium in their 2018 white paper, "Status of Operations Involving Thorium and Americium at Area IV SSFL During the Remediation Period (1988 - Present)":

> The majority of the transuranic activity would have been from plutonium-238, plutonium-239, plutonium-240, plutonium-241, americium-241, and curium-244. . . . Workers who subsequently performed decommissioning and decontamination (D&D) procedures on the hot cells could potentially be exposed to residual amounts of these radionuclides. [NIOSH, 2018, p. 2]

As noted previously, SC&A's review of remaining internal dose issues for SEC-00235 (SC&A, 2019) recommended that an occupational intake model be developed for D&D workers using available air sampling data, administrative limits, or alternate methods to account for exposures to residual americium and thorium for the period after 1988. NIOSH and the SSFL WG

concurred with this recommendation, and dose reconstruction methods for these important radionuclides are currently being evaluated by NIOSH.

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Attachment A: Discussion of Specific Buildings Identified in CORE Advocacy (2017)

Bldg.	SC&A Summary of Pertinent Information from 2012 EPA Historical Site Assessment	Ref.
0000	The location is noted in CORE Advocacy 2017 as the Radioactive Materials Disposal Facility (later known as the Radioactive Materials Handling Facility) Leach Field. This leach field was not used after 1961, when the sanitary sewer line was constructed.	EPA, 2012g
4003	Atomics International performed D&D of this facility from January 1975 to June 1975, after which time it was used as a storage building for excess equipment.	EPA, 2012f
4005	The radionuclides of concern are listed as Th-234 and Th-231 (both of which are natural decay products of U-238 and U-235, respectively) as a result of a uranium carbide fuel manufacturing operations occurring in building 4005 during a 9-month period in 1966 and 1967. Other operations at building 4005 appear to be non-nuclear.	EPA, 2012b
4006	Americium was only mentioned as a radionuclide of concern due to the proximity of building 4006 to the primary buildings housing the Systems for Nuclear Auxiliary Power (SNAP) operations.	EPA, 2012c
4009	Building 4009 housed the Organic Moderated Reactor and Sodium Graphite Reactor operations occurring up until 1967. Radiological use authorizations after this time indicate the handling of contaminated equipment as part of the in-service inspection project for commercial power reactors (1989–1992), use of x-ray tubes (1992–1993), and depleted uranium for the High-Energy Rate Forging project (date unspecified).	EPA, 2012h
4010	Building 4010 housed the SNAP Experimental Reactor projects up until 1965. After that, the building remained unused for 9 years until it was declared surplus in 1974. D&D work took place in 1977 and 1978.	EPA, 2012c
4011	The north section of the building was used for the calibration and repair of radiation detection equipment utilizing sealed and electroplated calibration sources (1984–1996). The south section was used for nonradiological activities.	EPA, 2012c
4012	This building was part of the SNAP Critical Test Facility and stored clad reactor elements up until approximately 1968. Additional criticality experiments were performed in the early 1970s for the Heavy Metal Reflected Fast Spectrum Reactor that was sponsored by the National Aeronautics and Space Administration (NASA). In 1979, the facility was modified to perform quality assurance radiography work, which occurred until 1992.	EPA, 2012c
4013	EPA 2012c did not find any evidence of radioactive material being stored or handled in building 4013. The building was identified due to its proximity to other SNAP buildings.	EPA, 2012c
4019	Also known as the SNAP Flight Systems Facility, this building had all SNAP-related components removed in 1970, at which time it was redesignated the Energy Technology Engineering Center (ETEC) Construction Staging and Computer Facility.	EPA, 2012c
4020	The Fermi Program was the last fuel decladding operation performed at building 4020 (the hot lab). The operation actually finished ahead of schedule, and in 1986, all the related materials and equipment for decladding operations were removed. The hot cells were also decontaminated at this time in preparation for an alternate future project. However, DOE opted to begin D&D activities in the hot lab rather than continue radiological operations. Twenty radiological incidents were reported after 1988 in the hot lab; only one of them involved transuranic material (puncture wound occurring in a contaminated plutonium glovebox), and none involved thorium.	EPA, 2012e
4021	Building 4021 was named the Radioactive Materials Disposal Facility, which later became the Radioactive Materials Handling Facility (RMHF). It was built to process low-level radioactive waste and after 1988 was used to handle waste associated with D&D activities occurring at ETEC. Seven incidents were reported after 1988; however, none indicated the presence of transuranic material or thorium.	EPA, 2012g

Bldg.	SC&A Summary of Pertinent Information from 2012 EPA Historical Site Assessment	Ref.
4023	See discussion in item 2 on p. 3 of this memorandum concerning potential TRUMP-S activities in building 4023. However, it is also worth noting that building 4023 served as a design, development, and demonstration facility for the Rocky Flats Plutonium Recovery Project that occurred in 1987 (plutonium-241 is the parent isotope of americium-241).	EPA, 2012b
4024	Building 4024 was used to test the SNAP reactors in a simulated operational environment; subsequent dismantling of the reactors prior to shipment to the hot lab resulted in the building 4024 vaults becoming contaminated. Decontamination of the vaults and removal of contaminated equipment was completed in 1978. However, a significant amount of activation products contained in the facility's concrete remained per a disposition of the building in 1989.	EPA, 2012b
4025	After cancellation of the SNAP program, building 4025 was renamed the ETEC Instrumentation and Inventory Building. The building was not known to have handled or stored radioactive materials; however, americium and thorium are listed as contaminants of concern due to the proximity of the building to the RMHF and the potential for migration.	EPA, 2012c
4027	The building was not known to have handled or stored radioactive materials; however, americium and thorium are listed as radionuclides of concern due to the proximity of the building to the RMHF and the potential for migration. A 1988 DOE survey concluded that the area passed the NRC criteria at the time for unrestricted use.	EPA, 2012b
4028	In January 1988, it was reported that building 4028 was in very poor condition due to the facility's inactive status. The above-grade portion of the building was demolished down to its concrete slab in April 1989.	EPA, 2012g
4034	Building 4034 was an office building for the RMHF and was also used for records storage. EPA (2012g) concluded that there was no evidence of radioactive materials known to have been stored or handled in building 4034. However, americium and thorium are listed as radionuclides of concern due to the building's proximity to the RMHF storage vault.	EPA, 2012g
4036	Building 4036 was a non-nuclear office building in support of the SNAP program. Americium and thorium are listed as radionuclides of concern due to the building's proximity to the RMHF.	EPA, 2012b
4041	This building was released by DOE for unrestricted use on July 23, 1985, and was subsequently used for nonradioactive equipment storage.	EPA, 2012f
4044	Building 4044 served as a health physics office, which used calibration sources and performed counting measurements on removable contamination samples. Americium and thorium are listed as radionuclides of concern due to the building's proximity to the RMHF storage vault.	EPA, 2012g
4048	This building was known as the Plant Development Unit Instrumentation Building, which was a non-nuclear operation that occurred from 1978 to 1981. No incidents or radiological surveys were identified for the area. The building was included in the assessment due to its proximity to building 4005.	EPA, 2012b
4055	Also known as the Nuclear Materials Development Facility, this building was designed to house plutonium development work. D&D of the building was completed in October 1986, and final surveys were completed in March 1987.	EPA, 2012e
4057	EPA (2012d) did not find evidence that radioactive material was handled or stored at this location. However, because the building was a research laboratory, it is possible that radioactive materials may have existed. Americium and thorium are listed as radionuclides of concern due to the building's proximity to building 4059.	EPA, 2012d
4059	Building 4059 housed the SNAP 8 prototype reactor, which operated until the end of 1969. The reactor and associated equipment were removed in 1970. In 1973, the building was used by the Liquid Metal Engineering Center, which tested non-nuclear components related to liquid metals.	EPA, 2012d
4064	Building 4064 was built for the repackaging and storing of special nuclear material; however, no special nuclear material was handled in this facility after 1980. A radiological use authorization (No. 139) from 1989 allowed for the storage of radioactive material and decontamination activities at building 4064.	EPA, 2012f

Bldg.	SC&A Summary of Pertinent Information from 2012 EPA Historical Site Assessment	Ref.
4075	This building was utilized for the storage of radioactive waste awaiting shipment for disposal at appropriate offsite locations. These stored wastes include low-level, mixed, and transuranic waste.	EPA, 2012g
4100	Building 4100 was the site of the AETR, which utilized thorium as nuclear fuel. However, from the 1980s until the late 2000s, the facility was used by NASA for high-energy computer-aided tomography. The laboratory portions of the building were also used for instrument calibration and contaminated sample counting. Two incidents are reported after 1988: One involved mixed fission products, and the other involved a radiography issue.	EPA, 2012d
4143	Building 4143 housed the Sodium Reactor Experiment (SRE). Decommissioning began in 1974, and the final D&D report was issued in 1983. After this time, the building was used for component storage.	EPA, 2012f
4153	This building was demolished in 1978 and released for unrestricted use by DOE in July 1985.	EPA, 2012f
4163	DOE released this area for unrestricted use in July 1985.	EPA, 2012f
4228	EPA (2012c) did not find evidence that radioactive material was handled or stored in building 4228. Americium is included as a radionuclide of interest due to the building's proximity to building 4012 (SNAP facility).	EPA, 2012c
4273	This building served as the radioactive laundry facility until 1971. The building was demolished down to its foundation in 1975 and was cleared for unrestricted use by DOE in July 1985.	EPA, 2012f
4373	This building was used as part of the SNAP program. Following a 1988 survey of the building, it was reassigned for non-nuclear use. However, it was also reported at the time that the interior of the building had become dilapidated. EPA (2012e, p. 110) notes: "As of 1994, the building remained abandoned; however, it is unclear whether the condition of the building had been improved or changed since the 1988 survey report." The building was eventually demolished in 1999.	EPA, 2012e
4563	Building 4563 was a storage area for radioactive waste that had already been containerized and was awaiting shipment to an offsite disposal facility.	EPA, 2012g
4621	This building was RCRA-C permitted for storage of radioactive sources, packaged waste, and contaminated equipment. A single incident was documented after 1988 at the facility involving a faulty radiation alarm.	EPA, 2012g
4622	Building 4622 was used by health physics for sample counting of waste present at the RMHF. Therefore, americium and thorium are included as radionuclides of concern, as they were present at the RMHF and could have been included in the waste characterizations being performed in building 4622.	EPA, 2012g
4653	This building was used as an interim radioactive waste vault and was cleared by DOE for unrestricted use in July 1985.	EPA, 2012f
4654	Building 4654 was demolished in 1985.	EPA, 2012g
4658	EPA (2012g) could not find evidence of specific radionuclides at building 4658. The site was used as the entry and exit point for all fuel and waste shipments. Therefore, it is assumed all radionuclides of concern for SSFL could have been present at building 4658.	EPA, 2012g
4664	Building 4664 was demolished in the early 1980s.	EPA, 2012g

Bldg.	SC&A Summary of Pertinent Information from 2012 EPA Historical Site Assessment	Ref.
4665	This building served as an oxidation facility, equipment and sodium storage for the RMHF. A later undated report identified in EPA (2012g, p. 140) noted the building was at one time used to store "paper, plastics, paints, filters, and lighting." The radionuclides of concern for this building were developed based on its proximity to the RMHF and storage of materials previously contained in the RMHF.	EPA, 2012g
4668	Note: SC&A was unable not locate an HSA for "Building 4668" but did locate an HSA for "Building 4688" that appears consistent with the CORE Advocacy (2019) entry and is discussed below: Building 4688 was designated as a nonradioactive chemical storage facility (acetone, alcohols, various solvents, reagent materials, paints, oils, and gasoline). However, it appears at some point in the mid-1970s there was an interim storage yard for the RMHF and SRE operations that was located in close vicinity to building 4688. Therefore, radionuclides of concern were identified based on the operations of the SRE and RMHF.	EPA, 2012g
4686	Building 4686 was demolished prior to 1978. A 1982 verification survey by Argonne National Laboratory (ANL, 1984) confirmed that the site area had been decontaminated below limits specified in the Draft ANSI Standard No. N13.12 and NRC (1982) guidelines.	EPA, 2012f
4689	This building was removed in 1967. A 1982 verification survey by Argonne National Laboratory (ANL, 1984) confirmed that the site area had been decontaminated below limits specified in the Draft ANSI Standard No. N13.12 and NRC (1982) guidelines. Furthermore, DOE released the area for unrestricted use in July 1985.	EPA, 2012f
4695	Building 4695 was completely demolished (including below-grade structures) in 1978. The area was released for unrestricted use in July 1985.	EPA, 2012f
4733	Site 4733 was demolished in the 1970s and was released for unrestricted use by DOE in July 1985.	EPA, 2012f
4773	This area is actually an 800,000-gallon retention pond. DOE released this area for unrestricted use in July 1985, and the pond was demolished sometime in 1988.	EPA, 2012f
4886	This area was primarily known as the Sodium Disposal Facility/Sodium Burn Pit. Particularly during 1960–1970, this area was used to dispose of combustible materials (kerosene, sodium, and sodium-potassium alloys (i.e., NaK)) that were contaminating test components from SRE, SNAP, and other nuclear program operations (valves, pumps, etc.). Cleanup of the disposal pit began as early as 1978 with the primary contamination related to cesium-137. However, the remediation does not appear to have been completed until 1994.	EPA, 2012h