SEC Petition Evaluation Report

Petition SEC-00250 ER Addendum (1987–1994)

Report Rev Number:	Addendum (1987-1994)
Report Submittal Date:	06/23/2021
Subject Expert(s):	Tim Adler, Joe Guido
Site Expert(s):	N/A

Petition Administrative Summary

Petition Under Evaluation

Petition Number:	SEC-00250 Addendum (1987–1994)
Petition Type:	83.13
Petition Receipt Date:	November 1, 2018
Qualification Date:	March 6, 2019
DOE/AWE Facility Name:	Y-12

Petition Class

Petitioner-Requested Class Definition:	All workers who worked in any area of Y-12 where uranium was fabricated or processed from January 1, 1980, to December 31, 2000.
Class Evaluated by NIOSH:	All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Y-12 Plant in Oak Ridge, Tennessee that may have incurred thorium exposures, during the period from January 1, 1977 through December 31, 1994 for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days within the parameters established for one or more other classes of employees in the Special Exposure Cohort.
NIOSH-Proposed Class(es) to be Added to the SEC:	None for the period evaluated in the addendum (1987-1994)

Related Petition Summary Information

SEC Petition Tracking Number(s):	SEC-00018 SEC-00028 SEC-00098 SEC-00186 SEC-00250 SEC-00251
Petition Type:	83.13 83.13 83.14 83.14 83.13 83.14
DOE/AWE Facility Name:	Y-12 Plant Y-12 Plant Y-12 Plant Y-12 Plant Y-12 Plant Y-12 Plant

Petition Status:	Class added to the SEC for March 1943 through December 31, 1947 Class added to the SEC for January 1948 through December 31, 1957 Class added to the SEC for March 1, 1943 through December 31, 1947 Class added to the SEC for January 1, 1948 through December 31, 1957 Class added to the SEC for January 1, 1977 through July 31, 1979 Class added to the SEC for January 1, 1958 through December 31, 1976

Related Evaluation Report Information

Report Title:	SEC Petition Evaluation Report for Petition SEC-00018 SEC Petition Evaluation Report for Petition SEC-00028 SEC Petition Evaluation Report for Petition SEC-00098 SEC Petition Evaluation Report for Petition SEC-00186 SEC Petition Evaluation Report for Petition SEC-00250 SEC Petition Evaluation Report for Petition SEC-00251
DOE/AWE Facility Name:	Y-12 Plant

ORAU Preparation and Review

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DCAS Review and Approval

Peer Review Completed By:	[Signature on File] *Lara Hughes* June 22, 2021
SEC Petition Evaluation Reviewed By:	[Signature on File] *Timothy Taulbee* June 22, 2021
SEC Petition Evaluation Approved By:	[Signature on File] *Grady Calhoun* June 22, 2021

Addendum to the SEC-00250 Y-12 Evaluation Report

Purpose and Scope of this Addendum (1987–1994)

This Addendum evaluates the feasibility of reconstructing internal radiation doses from thorium at the Y-12 Plant in Oak Ridge, Tennessee, during a period left unevaluated in the SEC-00250 Y-12 Evaluation Report (ER) [NIOSH 2019]. The SEC-00250 designated evaluation period is from January 1, 1977 through December 31, 1994; during ER development, the period 1987–1994 was reserved for later evaluation.

In the SEC-00250 ER, NIOSH defined a single class of employees for which NIOSH cannot estimate radiation doses with sufficient accuracy. This class included all employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Y-12 Plant from January 1, 1977 through July 31, 1979. NIOSH proposed this class because there was a lack of sufficient thorium-related lung count data for this period. Sufficient thorium data were available for the period from August 1, 1979 through December 31, 1986, thus making it feasible to estimate thorium dose for that period. In addition, the ER established that estimating dose from all potential uranium intakes, external radiation exposures, and medical X-rays was feasible for the entire period under evaluation (January 1, 1977 through December 31, 1994).

In the SEC-00250 ER, NIOSH left unevaluated the feasibility of estimating thorium internal exposure from January 1, 1987 through December 31, 1994 due to lack of post-1986 activity-based thorium progeny data. Since issuing the SEC-00250 ER, NIOSH has received post-1986 activity-based thorium progeny data from Y-12 (i.e., Ac-228 and Pb-212). This Addendum presents NIOSH's analysis of these data and their applicability for estimating maximum potential internal thorium doses from January 1, 1987 through December 31, 1994.

Evaluation Report Addendum Summary: SEC-00250, Y-12 Plant

Class Evaluated by NIOSH (in this Addendum)

All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked in any area at the Y-12 Plant in Oak Ridge, Tennessee that may have incurred internal thorium exposures during the period from January 1, 1987 through December 31, 1994.

NIOSH Determination about the Proposed Class to be Added to the SEC (in this Addendum)

Since the SEC-00250 ER was issued, NIOSH has obtained sufficient post-1986 occupational internal monitoring data. Based on its analysis of these data, NIOSH found no part of the class under evaluation in this Addendum for which it cannot estimate maximum radiation doses with sufficient accuracy.

Feasibility of Dose Reconstruction

As previously identified in the SEC-00250 ER, NIOSH found it is not feasible to estimate internal thorium exposures with sufficient accuracy for all employees at the site from January 1, 1977 through July 31, 1979 [NIOSH 2019].

For the period from August 1, 1979 through December 31, 1994, per EEOICPA and 42 CFR 83.13(c)(1), NIOSH has established that it has access to sufficient information to: (1) estimate the maximum radiation dose, for every type of cancer for which radiation doses are reconstructed, that could have been incurred in plausible circumstances by any member of the class; or (2) estimate radiation doses of members of the class more precisely than an estimate of the maximum dose [42 CFR Part 83, 2018, PDF p. 10]. Information available from the site profile and additional resources is sufficient to estimate the maximum internal and external potential exposure to members of the evaluated class under plausible circumstances during the specified period.

The NIOSH dose reconstruction feasibility findings described in the SEC-00250 ER and this Addendum are based on the following:

- As previously identified in the SEC-00250 ER, NIOSH has determined that there are insufficient *in-vivo* monitoring data for thorium (i.e., lung counts) during the period from January 1, 1977 through July 31, 1979. Available thorium lung count data during this period are mass-based results. As such, NIOSH does not have the ability to use these data to determine the associated intakes of thorium-232, thorium-228, and radium-228 with sufficient accuracy. Thus, NIOSH cannot determine with sufficient accuracy the internal exposures from thorium lung measurements during the period from January 1, 1977 through July 31, 1979.

- As previously identified in the SEC-00250 ER, NIOSH has determined that there are sufficient *in-vivo* and *in-vitro* monitoring data for uranium (i.e., lung counts and urinalysis) during the period from January 1, 1977 through December 31, 1994 to allow NIOSH to determine the potential intakes of uranium with sufficient accuracy.

- NIOSH has assessed the available calutron-cyclotron-related radioisotope data produced at Y-12 by the ORNL Isotopes Division, to determine if a dose reconstruction infeasibility exists [ORAUT 2018a]. NIOSH has concluded that no dose reconstruction infeasibilities existed with the exception of Pu-241, which was addressed in the SEC-00251 ER.

- As previously identified in the SEC-00250 ER, beta, photon, and neutron monitoring data are available for Y-12 in the form of individual dosimetry during the evaluation period from January 1, 1977 through December 31, 1994. Consistent with its findings in prior NIOSH evaluations of the Y-12 Plant, NIOSH finds that there is sufficient monitoring and source term information available to reconstruct external and medical X-ray doses for all workers at the Y-12 Plant during the period from January 1, 1977 through December 31, 1994.

Pursuant to 42 C.F.R. § 83.13(c)(1), for the period from January 1, 1987 through December 31, 1994, NIOSH has determined that there are sufficient activity-based Pb-212 and Ac-228 *in-vivo* monitoring data to allow NIOSH to determine with sufficient accuracy the associated intakes of Th-232, Th-228, and Ra-228. Thorium-related doses from January 1987 through December 1994 (excluding January–May 1992) can be bounded by using either: (1) the Ac-228 and Pb-212 lung count data retrieved from the Y-12 Electronic Record Keeping System (1987–1991); or (2) the Ac-228 lung count data retrieved from the Y-12 Electronic Record Keeping System in conjunction with the associated chest wall thickness (1992–1994).

Health Endangerment Determination (for this Addendum Period).

Per EEOICPA and 42 C.F.R. § 83.13(c)(3), a health endangerment determination is not required because NIOSH has determined that it has sufficient information to estimate dose for the members of the evaluated class [42 CFR Part 83, 2018, PDF p. 11].

Revised Excerpts from the SEC-00250 Y-12 Evaluation Report

NOTE: From this point forward, this SEC-00250 Y-12 ER Addendum only addresses those sections that require discussion regarding the 1987–1994 period; therefore, the section numbering is not contiguous. When deemed helpful to the reader, additional ER text is sometimes included for context.

3.2 Class Evaluated by NIOSH

This Addendum presents conclusions from NIOSH's evaluation of Y-12 thorium dose reconstruction feasibility for the period reserved for later evaluation in the SEC-00250 Y-12 ER (i.e., January 1, 1987 through December 31, 1994) [NIOSH 2019].

3.3 NIOSH Determination about the Proposed Class to be Added to the SEC

Since issuing the SEC-00250 ER, NIOSH has obtained sufficient post-1986 occupational internal monitoring data to bound internal doses from thorium exposures. Based on its analysis, NIOSH found no part of the class under evaluation in this Addendum for which it cannot estimate maximum radiation doses with sufficient accuracy.

4.0 Data Sources Reviewed by NIOSH to Evaluate the Class

As is standard practice, NIOSH completed an extensive database and Internet search for information regarding the Y-12 Plant. The database search included the Department of Energy (DOE) Legacy Management Considered Sites database, the DOE Office of Scientific and Technical Information (OSTI) SciTech Connect database, and the Hanford Declassified Document Retrieval System. In addition to general Internet searches, the NIOSH Internet search included OSTI OpenNet searches, the Nuclear Regulatory Commission (NRC) Agency-wide Documents Access and Management (ADAMS) web searches, and the DOE-National Nuclear Security Administration-Nevada Site Office-search. Attachment One includes a summary of the Y-12 Plant documents. The summary specifically includes data capture details and general descriptions of the documents retrieved.

In addition to the database and Internet searches listed above, NIOSH identified and reviewed numerous data sources for information relevant to determining the feasibility of dose reconstruction for the class of employees under evaluation. This included determining the availability of information on personal monitoring, area monitoring, industrial processes, and radiation source materials. The following subsections summarize the data sources identified and reviewed by NIOSH.

4.3 Facility Employees and Experts

NIOSH reviewed a total of twenty-three documented communications (interviews) for this Addendum. Six of the interviews had been previously reviewed for the 2018 evaluation of petition SEC-00251 (one conducted in 2012 for SEC-00046; five conducted in 2018 for SEC-00251). These six interviews were re-reviewed for this SEC-00250 ER Addendum effort. Seventeen additional interviews were performed during 2019–2020. Four of these were initiated by NIOSH to target specific SEC-00250 ER Addendum evaluation goals (described briefly below). The remaining thirteen interviews were initiated by the petitioner and petitioner's representative inviting former workers to share their respective site knowledge and employment experiences.

The four interviews initiated by NIOSH included former Y-12 and K-25 personnel. They focused on thorium chest counting process details to better understand the following three topics:

1. The internal dosimetry program and lung counting system for thorium monitoring of Y-12 workers at K-25 during the Y-12 lung counter shutdown in January 1992 through May 1992 and beyond.

2. The internal dosimetry program and lung counting system for thorium monitoring of Y-12 workers with the new HPGe Y-12 system starting in June 1992 and beyond.

3. Potential radionuclide intakes for Y-12 workers as evidenced by workplace controls, monitoring policies and procedures, and bioassay data.

Interviews reviewed or conducted in support of the SEC-00250 ER Addendum evaluation:

- Documented Communication, 2012, Documented communication SEC-00046 with [Name redacted] on operation of the MIVRML counter for the monitoring of thorium intakes at Fernald. Telephone interview by ORAU Team and NIOSH; March 15, 2012; SRDB Ref ID: 110639 [ORAUT 2012b]

- Documented Communication, 2018a, Documented communication SEC-00251 with [Name redacted] on thorium activities at Y-12. In-person interview by ORAU Team; August 15, 2018; SRDB Ref ID: 173936 [ORAUT 2018b]

- Documented Communication, 2018b, Documented communication SEC-00251 with [Name redacted] on thorium activities at Y-12. In-person interview by ORAU Team; August 16, 2018; SRDB Ref ID: 173937 [ORAUT 2018c]

- Documented Communication, 2018c, Documented communication SEC-00251 with [Name redacted] on thorium activities at Y-12. In-person interview by ORAU Team; August 16, 2018; SRDB Ref ID: 173938 [ORAUT 2018d]

- Documented Communication, 2018d, Documented communication SEC-00251 with [Name redacted] on thorium activities at Y-12. In-person interview by ORAU Team; August 16, 2018; SRDB Ref ID: 173939 [ORAUT 2018e]

- Documented Communication, 2018e, Documented communication SEC-00251 with [Name redacted] on post-1957 thorium activities at Y-12. In-person interview by ORAU Team; August 16, 2018; SRDB Ref ID: 174343 [ORAUT 2018f]

- Documented Communication, 2019a, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. In-person interview by ORAU Team; December 11, 2019; SRDB Ref ID: 179794 [ORAUT 2019a]

- Documented Communication, 2019b, Documented communication SEC-00250 with [Name redacted] Y-12 / K-25 thorium activities. In-person interview by ORAU Team; December 23, 2019; SRDB Ref ID: 179795 [ORAUT 2019b]

- Documented Communication, 2019c, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. In-person interview by ORAU Team; December 23, 2019; SRDB Ref ID: 179739 [ORAUT 2019c]

- Documented Communication, 2020a, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. In-person interview by ORAU Team; January 9, 2020; SRDB Ref ID: 180370 [ORAUT 2020a]

- Documented Communication, 2020b, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by NIOSH and ORAU Team; August 20, 2020; SRDB Ref ID: 184817 [ORAUT 2020b]

- Documented Communication, 2020c, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by ORAU Team; September 1, 2020; SRDB Ref ID: 184705 [ORAUT 2020c]

- Documented Communication, 2020d, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by NIOSH and ORAU Team; October 30, 2020; SRDB Ref ID: 184816 [ORAUT 2020d]

- Documented Communication, 2020e, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by NIOSH and ORAU Team; October 30, 2020; SRDB Ref ID: 184703 [ORAUT 2020e]

- Documented Communication, 2020f, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by ORAU Team; October 30, 2020; SRDB Ref ID: 184704 [ORAUT 2020f]

- Documented Communication, 2020g, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by NIOSH and ORAU Team; October 21, 2020; SRDB Ref ID: 184708 [ORAUT 2020g]

- Documented Communication, 2020h, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by NIOSH and ORAU Team; October 22, 2020; SRDB Ref ID: 184701 [ORAUT 2020h]

- Documented Communication, 2020i, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by NIOSH and ORAU Team; November 4, 2020; SRDB Ref ID: 184700 [ORAUT 2020i]

- Documented Communication, 2020j, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by NIOSH and ORAU Team; November 4, 2020; SRDB Ref ID: 184706 [ORAUT 2020j]

- Documented Communication, 2020k, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by NIOSH and ORAU Team; November 4, 2020; SRDB Ref ID: 184707 [ORAUT 2020k]

- Documented Communication, 2020l, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by NIOSH and ORAU Team; November 6, 2020; SRDB Ref ID: 184818 [ORAUT 2020l]

- Documented Communication, 2020m, Documented communication SEC-00250 with [Name redacted] on Y-12 / K-25 thorium activities. Telephone interview by ORAU Team; November 11, 2020; SRDB Ref ID: 184702 [ORAUT 2020m]

4.4 Previous Dose Reconstructions

NIOSH reviewed its NIOSH DCAS Claims Tracking System (referred to as NOCTS) to locate EEOICPA-related dose reconstructions that might provide information relevant to the time period under evaluation (January 1, 1987 through December 31, 1994). Table 4-1 summarizes the results of this review (NOCTS data available as of January 21, 2021).

Table 4-1: No. of Y-12 Plant Claims Submitted Under the Dose Reconstruction Rule

Description	Totals
Total number of claims submitted for dose reconstruction	6869
Total number of claims submitted for energy employees who worked during the period under evaluation (January 1, 1987 through December 31, 1994).	2763
Total number of claims submitted for energy employees who started their employment during the period under evaluation (January 1, 1987 through December 31, 1994)	806
Number of dose reconstructions completed for energy employees who worked during the period under evaluation (i.e., the number of such claims completed by NIOSH and submitted to the Department of Labor for final approval).	2616
Number of claims for which internal dosimetry records were obtained for the identified years in the evaluated class definition	1341
Number of claims for which external dosimetry records were obtained for the identified years in the evaluated class definition	2363

There are 2,763 Y-12 claims with some employment between 1987 through 1994. NIOSH reviewed each claim to determine whether internal and external personal monitoring records could be obtained for the employee. As indicated in Table 4-1, for employees who worked during the class period under evaluation, NIOSH has obtained internal and external monitoring data for approximately 49% and 86% of the claims, respectively.

4.5 Additional Data Capture

Since the last Y-12 Data Capture Synopsis in June 2019, additional data capture activities have added 506 documents to the SRDB. The activities included Internet searches for arc-melting reports, formal data capture requests made to Y-12 staff, and a trip to the DOE operations center in Germantown, Maryland to acquire Y-12 thorium inventory and process information. The formal data capture requests were for details on the "Protected Area" portal monitor functional checks, chest-wall-thickness data, as well as requests to resolve discrepancies in Y-12's external dosimetry and bioassay datasets. All formal data request issues were successfully completed.

4.6 Delta View Imaging System

Y-12 staff maintains the Delta View Imaging System, an electronic database that contains scanned images of hard-copy reports and monitoring data associated with Y-12 personnel. Examples of data in Delta View include *in-vivo* lung counts, input forms, multi-channel analyzer output, gamma spectrometry images, and data from Y-12 and X-10 analytical labs. Delta View stores images of documents and is searchable. The images in Delta View are accessible by individual name or ID numbers, analysis, and sample type, among other parameters. Y-12 provided to NIOSH an excerpt from this system in the form of a spreadsheet index and individual image files associated with each spreadsheet row. There were approximately 24,000 images provided, containing *in-vivo* data from 1989 through 1995 [Martin Marietta 1989–1995].

4.7 Y-12 Electronic Records System

Maintained by the Y-12 Internal Dosimetry department, the Electronic Records System (ERS) data contain analytical results by individual, ID, bioassay type, date, and radionuclide. Y-12 initially provided NIOSH with an excerpt from this system in spreadsheet format containing 62,932 individual lung count records from 1958–1986 (also included were two records from 1989 and one from 1990) [Martin Marietta 1984–1995]. These data were later augmented with an additional 13,829 measurements from 1987–1991 [Martin Marietta 1987–1991], 1,275 measurements from 1992–1993 [Martin Marietta 1992–1993], and 3,139 measurements from 1994–1999 [Lockheed Martin 1994–1999]. Y-12 provided an additional file in August 2020 containing 735 lung counts performed on contract employees between 1975 and 1991 [Martin Marietta 1958–1991].

5.0 Radiological Operations Relevant to the Class Evaluated by NIOSH

The following subsections summarize radiological operations at the Y-12 Plant from January 1, 1977 to December 31, 1994 and the information available to NIOSH to characterize particular processes and radioactive source materials.

5.1 Y-12 Plant and Process Description

Descriptions of radiological operations and source terms relevant to this Addendum can be found in Section 5.1 of the original SEC-00250 Y-12 ER [NIOSH 2019]. The 2019 ER provides considerable scope and detail of the Y-12 Plant's potential exposure areas, processes, and source terms.

5.2 Radiological Exposure Sources from the Y-12 Plant Operations

Radiological exposure source information relevant to the entire SEC-00250 evaluated class can be found in Section 5.2 of the SEC-00250 Y-12 ER [NIOSH 2019]. No additional information related to specific thorium activities during the January 1987 – December 1994 period has been captured since the SEC-00250 ER was issued. None of the interviewees (see Section 4.3) could recall with certainty any specific thorium activities occurring at the Y-12 Plant throughout the 1987–1994 period. However, NIOSH was able to retrieve inventory data specific to thorium for this period, as shown in Table 5-3 below.

Table 5-3: Y-12 Thorium Inventory (1986–1995)

Year	Th Inventory (kg)
1986	5437
1987	4101
1988	4171
1989	4185
1990	4180
1991	4166
1992	4888
1993	4885
1994	5499
1995	18066

Source: [Livengood 2019]

A NIOSH review of thorium inventory records obtained from the DOE Nuclear Materials Management and Safeguards System (NMMSS) for the period 1986 through 1994 revealed that: (1) there were relatively consistent thorium inventories between 1986 and 1994; and (2) the source of a thorium inventory increase in 1995 was related to the receipt of material categorized as "weapons awaiting disassembly feed" [Chaffman 2019]. Additional research into operations with thorium and information from the interviews indicated that there were no thorium activities other than arc melting during the period of evaluation at Y-12 [ORAUT 2018c,d,e]. It was concluded that the increase in thorium inventory is because of an increase of stored material that is unlikely to be a source of internal exposure.

6.0 Summary of Available Monitoring Data for the Class Evaluated by NIOSH

The following subsections provide an overview of the available internal monitoring data for the thorium dose estimation feasibility assessment presented in this Addendum.

6.1 Available Y-12 Plant Internal Monitoring Data

The subsections below address the availability of data related to thorium. Details regarding the various analyses used and the associated minimum detectable activities are presented in ORAUT-TKBS-0014-5, Technical Basis Document for the Y-12 Plant-Occupational Internal Dose [ORAUT 2012a].

6.1.2 Available Thorium Data

NOTE: In the SEC-00250 ER, NIOSH concluded that it had sufficient thorium data to estimate radiation dose for the period from August 1, 1979 through December 31, 1986 [NIOSH 2019]. However, at that time, NIOSH was continuing to work with the Y-12 site to receive post-1986 activity-based thorium progeny data (i.e., data including results for Ac-228 and Pb-212). These data could allow NIOSH to estimate the maximum internal potential exposure from thorium for the period from January 1, 1987 through December 31, 1994. Therefore, NIOSH reserved its evaluation of internal exposure from thorium for the period 1987–1994. This Addendum reflects the subsequent availability of these activity-based thorium progeny data.

Background

Lung counting data for uranium are available to NIOSH for the entire period under evaluation (January 1, 1977 through December 31, 1994). There are 772 thorium lung counts available from 1977 through 1982. These data were received directly from Y-12 in spreadsheet form [BWXT 2005]. All of these data are reported as total thorium in units of mass (mg). In the prior Y-12 evaluation, NIOSH determined that these mass-based data could not be used to reconstruct internal dose from thorium. No additional mass-based data have been identified for the 1987–1994 period.

In the prior evaluation, NIOSH used the 'analysis type' field associated with each measurement record in the lung count spreadsheet to identify Pb-212 and Ac-228 results within thorium-related lung counts (e.g., analysis types 3, 6, and 7) [Martin Marietta 1984–1995]. Table 6-3A below (Table 7-1 from the SEC-00250 ER) summarizes the total number of thorium-related measurements of Ac-228 and Pb-212 by year. One thousand-seven (1007) data points for thorium counts containing Pb-212 and Ac-228 data are available for the time period from August 1979 through December 1986.

Table 6-3A: Thorium Records 1979-1986

Year	No. of Individuals**	No. of Ac/Pb Measurements Used in Analysis
1979*	43	55
1980	110	128
1981	142	208
1982	83	179
1983	130	166
1984	87	89
1985	83	84
1986	95	98
Total	**512**	**1007**

Source: SEC-00250 Y-12 ER, Table 7-1 [NIOSH 2019].

* Data start in August 1979

** NOTE: The values in Column 2 represent the number of unique individuals monitored during each specific year. The Total value in the last record in Column 2 does not represent the sum of the values in that column. It represents the actual number of unique individuals monitored from 1979–1986.

In the interim, NIOSH obtained an update to the Y-12 lung count data excerpt file [Martin Marietta 1984–1995], which includes results from 1987–1991 [Martin Marietta 1987–1991]. In addition, NIOSH identified additional lung count measurements within the Delta View system that were inadvertently excluded from the Y-12 Dosimetry Records System. A total of 52 measurements were identified for the period 1987 through 1991 [Martin Marietta 1989–1991].

The additional thorium-related data that have become available since the SEC-00250 Y-12 ER was issued are discussed below.

Available Activity-based Thorium Progeny Data

Thorium-related lung count data during the period under evaluation in this Addendum (January 1, 1987 through December 31, 1994) are now available from three measurement systems:

1. The Y-12 *in-vivo* counting facility using a sodium iodine (NaI)-based detector system operating from January 2, 1987 through December 10, 1991;

2. A low-energy germanium (LEGe)-based detector system operating at K-25 for Y-12 from January 13, 1992 through January 6, 1994;

3. A LEGe-based detector system operating at Y-12 from May 14, 1992 through December 29, 1994.

Records for measurements performed using these three systems are available from both the Delta View Imaging System extract file described in Section 4.6 [Martin Marietta 1989–1995] and extracts from the Y-12 Electronic Record Keeping System described in Section 4.7 [Martin Marietta 1958–1991, 1987–1991, 1992–1993; Lockheed Martin 1994–1999]. The number of available thorium-related lung count data provided by these data sources are detailed below.

- Y-12 *In-Vivo* Facility: A total of 14,486 measurements were performed between January 2, 1987 and December 10, 1991. Of these, a total of 3,459 measurements were analyzed for thorium (indicated as type 7, thorium) and each contain an Ac-228 and Pb-212 result in units of nCi. These results are contained in the excerpt file from the Y-12 electronic records system (described in Section 4.7). Table 6-3B shows the yearly and monthly distribution of these data.

Table 6-3B: Yearly and Monthly Distribution of Y-12 *In-Vivo* Facility Lung Count Data for Thorium

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1987	14	23	25	36	28	26	18	3	1	7	20	39	240
1988	38	40	38	40	29	25	40	71	47	62	59	58	547
1989	48	43	31	35	71	77	42	77	52	70	66	53	665
1990	52	115	81	57	90	67	46	71	57	65	57	67	825
1991	113	89	88	79	71	88	82	187	148	139	58	40	1182

Source: [Martin Marietta 1987–1991]

NIOSH can use the 'analysis type' provided in the lung count spreadsheet [Martin Marietta 1984–1995] to identify Pb-212 and Ac-228 results within thorium-related lung counts (e.g., analysis types 3, 6, and 7) [Martin Marietta 1958–1991, 1987–1991]. Table 6-3C summarizes the total number of thorium-related measurements of Ac-228 and Pb-212 by year. Based on this dataset, there are 3,459 thorium counts containing Pb-212 and Ac-228 data for the time period from January 1, 1987 through December 31, 1991.

Table 6-3C: Thorium Records 1987–1991

Year	No. of Unique Individuals*	No. of Ac/Pb Measurements Used in Analysis
1987	220	240
1988	500	547
1989	599	665
1990	712	825
1991	1059	1182
Total	**1799**	**3459**

Source: [Martin Marietta 1958–1991, 1987–1991]

* NOTE: The values in Column 2 represent the number of unique individuals monitored during specified years. In addition, some individuals were monitored in multiple years. Thus, the value in the last record in Column 2 (i.e., 1,799) does not represent the sum of the values in that column; it represents the actual number of unique individuals monitored from 1987–1991. The Total value in the last record in Column 3 (i.e., 3,459) does represent the sum of the number of yearly measurements presented in that column.

- K-25 LEGe-based Detector: A total of 198 measurements were performed between January 13, 1992 and January 6, 1994. These results are contained in the Y-12 Delta View System image collection (described in Section 4.6). The majority of these measurements (147 of 198) were performed between January 13, 1992 and May 19, 1992 and contained Th-232 results in units of nCi. All of the 147 results were annotated with a preceding "<" flag along with the annotation "MDA activity reported." Some of the measurements performed after May 1992 (20 of 51) used a different reporting format that did not include any information specific to Th-232. Table 6-3D shows the yearly and monthly distribution of these data. For months that are not reported, no data were available.

Table 6-3D: Yearly and Monthly Distribution of K-25 LEGe-based Thorium Lung Count Data

Year	Jan	Feb	Mar	Apr	May	Nov	Dec	Total
1992	19	64	21	15	28	10	17	174
1993	1	NA	2	1	NA	NA	3	4

Source: [Martin Marietta 1989–1995]
NA = Not Available

- Y-12 LEGe-based Detector: NIOSH obtained an excerpt from the Y-12 ERS containing lung count measurements for 1992 through 1994 [Martin Marietta 1992–1993, Lockheed Martin 1994–1999]. This dataset (ERS) did not classify counts by analysis type (as was done earlier); however, all measurements reported results for Ac-228. NIOSH identified additional lung count measurements within the Delta View system that were inadvertently excluded from the Y-12 Dosimetry Records System. A total of 76 measurements were identified in the Delta View System for the period 1992–1994 [Martin Marietta 1992–1995]. Table 6-3E summarizes the available Ac-228 measurements between 1992 and 1994. A total of 2,196 measurements were performed between May 14, 1992 and December 29, 1994. Each of these measurements contains Ac-228 results in units of nCi. These results are contained in the excerpt file from the Y-12 electronic records system (as described in Section 4.7). Table 6-3E shows the yearly and monthly distribution of these data. Table 6-3F shows the number of individuals monitored and the number of Ac-228 results within this dataset.

Table 6-3E: Yearly and Monthly Distribution of Y-12 LEGe-based Thorium Lung Count Data

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1992	NA	NA	NA	NA	8	35	94	87	100	109	14	13	460
1993	90	68	77	93	109	86	82	95	72	55	36	23	886
1994	40	84	93	47	97	84	64	69	130	63	46	33	850

Source: [Martin Marietta 1992–1993; Lockheed Martin 1994–1999].

NA = Not Available

Table 6-3F: Thorium Records 1992-1994

Year	No. of Individuals	No. of Ac-228 Measurements
1992 [a]	452 [b]	460 [b]
1993	770 [b]	886 [b]
1994	719 [c]	850 [c]
Total	1616 [e]	2196

[a] Data start in May 1992.

[b] Source: [Martin Marietta 1992-1993]

[c] Source: [Lockheed Martin 1994-1999]

[d] Source: [Martin Marietta 1989–1995]

[e] NOTE: The values in Column 2 represent the number of unique individuals monitored during the specified years. In addition, some individuals were monitored in multiple years. Thus, the value in the last record in Column 2 (i.e., 1616) does not represent the sum of the values in that column; it represents the actual number of unique individuals monitored from 1992–1994. The Total values in the last record in Column 3 (i.e., 2196) and Column 4 (i.e., 2193) do represent the sum of the number of yearly measurements presented in those columns.

7.1 Pedigree of Y-12 Plant Data

This subsection answers questions that are necessary to perform a feasibility evaluation. Data Pedigree addresses the background, history, and origin of the data, such as:

- Have any site methodologies changed over time?
- Do the primary data source and secondary data source match?
- Are the data internally consistent?

All these factors form the basis of the researcher's confidence and later conclusions about the data's quality, credibility, reliability, representativeness, and sufficiency for determining the feasibility of dose reconstruction. The feasibility evaluation presupposes that data pedigree issues have been settled.

7.1.1 Internal Monitoring Data Pedigree Review

In determining the pedigree of the Y-12 Plant monitoring data and the sufficiency of available thorium data to bound worker doses, NIOSH evaluated the following:

- The overall suitability of the Y-12 Plant's internal monitoring program
- Internal thorium exposure sources and exposure potential of the workforce
- Internal exposure monitoring data availability and quality
- Internal reviews and assessments of Y-12 monitoring data

Y-12's radiation monitoring program has been well-documented and relevant documents have been captured and reviewed for appropriateness. NIOSH has found no evidence of significant deficiencies in monitoring program documentation, execution, or reporting that would prevent proper assessment of occupational thorium doses for the period under evaluation.

Although approaches to worker selection and sampling frequency have been modified over time, Y-12's internal monitoring program participation, since its inception, has been based on worker exposure potential. Monitoring results have historically been compared to Plant Action Values (PAV) that have been based on contemporary ICRP guidelines. Work adjustments and assignments have been made when results exceeded ten percent of PAVs. Over time, actual monitoring results have increasingly been used to guide program modification.

By the 1960s, routine urinalysis and *in-vivo* monitoring programs were maintained for all personnel assigned to work regularly with uranium, thorium, plutonium, and tritium [Union Carbide 1965, PDF p. 20]. Since that time, *in-vivo* radioactivity measurement has been used to determine lung activity (both uranium and thorium were reported). In these earlier years, workers considered to have exposure potential were scheduled for quarterly and spot urinalysis sampling, and *in-vivo* counts at approximately six-month intervals [Union Carbide 1963, PDF pp. 23, 40].

Based on measured worker-exposure experience and revised ICRP recommendations regarding excretion-rate indications of lung burdens, the selection and method of worker monitoring was modified in the early 1970s [Union Carbide 1972, PDF pp. 2–3]. This modification incorporated an increasing reliance on body-counting and a reduction in urinalyses.

As documented in Y-12's 1992 Technical Basis for the Internal Dosimetry Program, individuals are selected for participation in the bioassay program if they work in an area where routine air monitoring is performed. The frequency of participation depends on the air-monitoring results in their work area. The minimum lung count frequency described for areas where routine air monitoring is performed is once a year [Martin Marietta 1992, PDF p. 32–33].

As mentioned in Sections 4.6 and 4.7, and detailed in Section 6, Y-12 stored monitoring data in two repositories within the period currently under evaluation (1987–1994). These two repositories are: (1) the Delta View Imaging System, comprised of scanned images of hard-copy reports and monitoring data printouts associated with Y-12 personnel dosimetry data and *in-vivo* results; and (2) the site's electronic record system (ERS) containing analytical results by individual, ID, bioassay type, date, and radionuclide.

NIOSH compared the Delta View Imaging System dataset with the contents of the first two datasets made available from the ERS. Although most workers' results could be identified in both datasets, it became apparent that some discrepancies existed. Some workers' data was found in the Delta View system but not in the ERS (669 records for the 1989–1991 period and 169 records for the 1992–1994 period). In addition, NIOSH noted that worker records, regardless of year, were predominantly from the 7000- and 9000-series departments that contained subcontracted construction workers.

In May 2020, NIOSH sent a data capture request to Y-12 (ORO-FY20-008) to clarify the apparent data-repository discrepancies and assess this potential data-pedigree issue [ORAUT 2020n]. Y-12 records personnel responded on August 20, 2020 with a data file intended to augment the existing 1958–1991 electronic data system lung count dataset [Martin Marietta 1958–1991]. The file contains an additional 735 measurements for contract personnel that were previously excluded. Y-12 also provided a more-detailed accounting of other previously-identified missing records (i.e., those located in the Delta View system but not in the Y-12 dosimetry record system) that remained absent from the 735 additional records [Martin Marietta 1989–1991; 1992–1995].

For the 669 records NIOSH identified for the 1989–1991 time period:

- 568 were provided in the update file.
- 6 were determined to be invalid measurements by Y-12.
- 43 were measurements for non-employees at the Y-12 site (i.e., measurements performed for other facilities).
- 52 were valid measurements but were inadvertently excluded from the electronic dosimetry record system due to a migration error. Y-12 indicated that the Delta View version of these records serves as the copy of record.

For the 169 records identified for the 1992–1994 time period:

- 89 were determined to be invalid measurements by Y-12.
- 4 were determined to be actually present in the Y-12 dosimetry record-keeping system under a different SSN (i.e., the SSN on the paper record was incorrect).
- 76 were valid measurements but were inadvertently excluded from the electronic dosimetry record system due to a migration error. Y-12 again indicated that the Delta View version of these records serves as the copy of record.

Though Y-12's "dose of record" for the period under evaluation occasionally resides in only one of two possible repository formats (i.e., the ERS and Delta View records systems), Y-12 has supplied NIOSH with both sources of the monitoring data applicable to the period under evaluation for this Addendum. Coupled with the results of NIOSH's evaluation of the Y-12 monitoring program, NIOSH concludes that the available monitoring data are sufficient in terms of quality, completeness, and representativeness for evaluating thorium intakes for the entire period under evaluation (1987–1994).

NIOSH's data pedigree evaluation concludes that data are of sufficient quality to use in bounding internal thorium doses from January 1, 1987 through December 31, 1994. Additional details regarding specific data availability and methods used to bound internal thorium doses are discussed below in subsection 7.2.

7.2 Evaluation of Bounding Internal Radiation Doses at Y-12 Plant

The principal source of internal radiation doses for members of the class under evaluation was airborne thorium particulate material. The following subsections address the ability to bound internal doses, methods for bounding doses, and the feasibility of internal dose reconstruction.

7.2.3 Methods for Bounding Internal Dose at the Y-12 Plant

The following subsections summarize the methods for bounding internal thorium dose at Y-12 during the period under evaluation in this Addendum (January 1, 1987 through December 31, 1994).

7.2.3.2 Methods for Analyzing Thorium Bioassay Data

Lung count results that include Ac-228 and Pb-212 data are now available for the period January 1, 1987 through December 31, 1991. These data can be used in the same manner described in the SEC-00250 Y-12 ER (and below) to bound thorium-related doses.

For the period June 1, 1992 through December 31, 1994, NIOSH only has access to Ac-228 lung count results. However, NIOSH developed a study of the Y-12 lung counting system (DCAS-RPRT-008) that establishes a relationship between the chest-wall thickness (CWT) for an individual being monitored by the lung counting system and the minimum detectable Pb-212 activity associated with that count [NIOSH 2020]. The CWT value is entered into the equation derived in DCAS-RPRT-008 (shown in Figure 7-1 below) to arrive at the minimum detectable Pb-212 activity. This Pb-212 activity, along with the already-available Ac-228 result, are then used in the same manner as the prior data (i.e., from 1987–1991) to bound the thorium dose.

For 1992 and 1993, NIOSH retrieved from the Delta View image collection the CWT values from the output files associated with the majority of these counting records (2193 out of 2196) [Martin Marietta 1989–1995]. The CWT value is provided for each measurement in the Y-12 Electronic Record Keeping System starting in 1994 [Lockheed Martin 1994-1999]. Table 7-1A below summarizes the available Ac-228 and CWT data between 1992 and 1994. Figure 7-1 farther below (Figure 10 in DCAS-RPT-008) shows the relationship between CWT and Pb-212 activity [NIOSH 2020, PDF p. 18]. The relationship shown in Figure 7-1 can be used to determine the Pb-212 activity based on CWT data when Pb-212 data are not available.

Table 7-1A: Thorium Records 1992-1994

Year	No. of Individuals	No. of Ac-228 Measurements	No. of CWT Measurements
1992 [a]	452 [b]	460 [b]	459 [d]
1993	770 [b]	886 [b]	884 [d]
1994	719 [c]	850 [c]	850 [c]
Total	1616 [e]	2196	2193

[a] Data start in May 1992.

[b] Source: [Martin Marietta 1992-1993]

[c] Source: [Lockheed Martin 1994-1999]

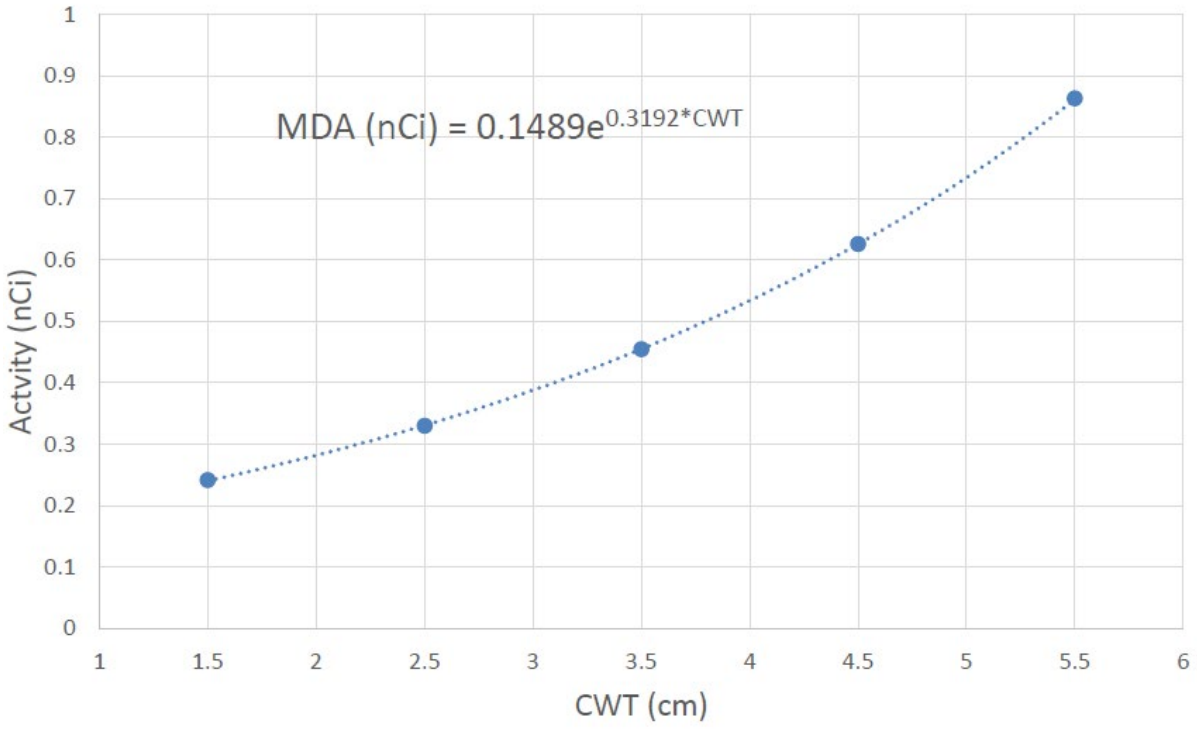
[d] Source: [Martin Marietta 1989–1995]

[e] NOTE: The values in Column 2 represent the number of unique individuals monitored during the specified years. In addition, some individuals were monitored in multiple years. Thus, the value in the last record in Column 2 (i.e., 1,616) does not represent the sum of the values in that column; it represents the actual number of unique individuals monitored from 1992–1994. The Total values in the last record in Column 3 (i.e., 2,196) and Column 4 (i.e., 2,193) do represent the sum of the number of yearly measurements presented in those columns.

The resulting Ac-228 and Pb-212 data are employed as specified in ORAUT-OTIB-0076, *Guiding Reconstruction of Intakes of Thorium Resulting from Nuclear Weapons Programs* [ORAUT 2014]. In summary, thorium intakes are evaluated using chest counts and DCAL (Dose and Risk Calculation) software computational methods to account for disequilibrium and independent kinetics. Additional assumptions include:

- Pb-212 and/or Ac-228 activities can be established.
- A two-separation thorium production process operated at Y-12 [ORAUT 2018e]; however, because the thorium may have been separated once before Y-12 received it, three separations will be assumed (this is a claimant-favorable approach).

Although Th-232 results were reported for lung counts performed during the period January 1992 through May 1992, NIOSH lacks sufficient information to interpret these results in a manner that would allow the determination of associated Th-228 and Ra-228 activities. Based on the inventory analysis presented in Section 5.2 of this Addendum, NIOSH concludes that data from June 1992 through December 1994 can be used to bound exposures during January 1992 through May 1992 because inventory quantities were consistent throughout the 1992–1994 time period.



Source: NIOSH 2020, PDF p. 18

Figure 7-1: MDA for Pb-212 as a Function of Chest Wall Thickness (CWT)

7.2.4 Internal Dose Reconstruction Feasibility Conclusion

NIOSH has determined that there are sufficient activity-based Pb-212 and Ac-228 *in-vivo* monitoring data to allow NIOSH to determine the associated intakes of thorium-232, thorium-228, and radium-228 with sufficient accuracy for the period from January 1, 1987 through December 31, 1994.

7.4 Evaluation of Petition Basis for SEC-00250

The following subsections evaluate the assertions made by the petitioner on behalf of petition SEC-00250 for the Y-12 Plant that were reserved for consideration in this Addendum (i.e., not resolved in the SEC-00250 ER published on July 17, 2019).

7.4.1 Uranium and Thorium Contamination Existed in the Machine Shop

Issue: The petitioner submitted *Additional Supporting Document re contaminated machines* [9201-01 Machines Contaminated, no date].

Response: The cited document consists of a two-paragraph narrative of unknown origin indicating that depleted uranium and thorium contamination was found on equipment in 9201-01 in 2012. The values quoted indicated that the contamination was "fixed" (i.e., removable contamination was not present). NIOSH was able to locate a radiological survey conducted on May 17, 2012 that identifies fixed contamination levels on a saw in 9201-1 with levels matching the value cited by the petitioner (i.e., 240,000 dpm/100 cm^2 fixed, no removable contamination) [BWXT 2012]. The identity of the activity

source (i.e., whether it was thorium, uranium, or some mixture of the two) was not provided on the survey.

NIOSH reviewed the available DOE Occurrence (ORPS) reports master list [DOE 2019a] and the DOE Noncompliance Tracking System (NTS) reports master list [DOE 2019b]. NIOSH was unable to locate any additional information from these two sources.

No specific detail on either the nature of the contamination or its accessibility to individual workers was located, nor was such information provided by the petitioner. Although NIOSH was unable to verify that the identified contamination was related to thorium activities, since the survey indicated that the activity was fixed (i.e., no removable component) NIOSH concludes that the petitioner-provided information is not inconsistent with the conclusion that dose reconstruction for thorium is feasible for the period under evaluation in this Addendum (January 1, 1987 through December 31, 1994).

7.5 Summary of Feasibility Findings for Petition SEC-00250

This report provides feasibility conclusions for completing dose reconstructions for employees at the Y-12 Plant from January 1, 1987 through December 31, 1994. NIOSH found that the available monitoring records, process descriptions, and source term data available are sufficient to complete thorium internal dose reconstructions for the proposed class of employees from January 1, 1987 through December 31, 1994.

Table 7-2 summarizes the complete results of the feasibility findings for SEC-00250, including the thorium finding documented in this Addendum.

Table 7-2: Summary of Feasibility Findings for SEC-00250

Source of Exposure	January 1, 1977 through July 31, 1979 Reconstruction Feasible (Yes or No)	August 1, 1979 through December 31, 1986 Reconstruction Feasible (Yes or No)	January 1, 1987 through December 31, 1994 Reconstruction Feasible (Yes or No)
Internal (U)	Yes	Yes	Yes
Internal (Th)	No	Yes	Yes[1]
Internal (calutron-cyclotron-related radioisotopes)	Yes	Yes[2]	NA[2]
External (Gamma, Beta, Neutron)	Yes	Yes[2]	Yes
Occupational Medical X-ray	Yes	Yes	Yes

[1] Previously "Reserved" in the SEC-00250 Evaluation Report, the evaluation documented in this Addendum concludes that reconstruction of internal thorium dose is feasible for January 1, 1987 through December 31, 1994.

[2] Isotopes Group calutron and cyclotron operations managed by ORNL X-10 but located on the Y-12 campus ended on December 31, 1983.

As of January 21, 2021, 2,763 claims have been submitted to NIOSH for individuals who worked at Y-12 Plant during the period under evaluation in this Addendum. Dose reconstructions have been completed for 2,616 individuals (~95%).

8.0 Evaluation of Health Endangerment for the Petition SEC-00250 Addendum

The health endangerment determination for the class of employees covered by this evaluation report is governed by both EEOICPA and 42 C.F.R. § 83.13(c)(3). Under these requirements, if it is not feasible to estimate with sufficient accuracy radiation doses for members of the class, NIOSH must also determine that there is a reasonable likelihood that such radiation doses may have endangered the health of members of the class. Section 83.13 requires NIOSH to assume that any duration of unprotected exposure may have endangered the health of members of a class when it has been established that the class may have been exposed to radiation during a discrete incident likely to have involved levels of exposure similarly high to those occurring during nuclear criticality incidents. If the occurrence of such an exceptionally high-level exposure has not been established, then NIOSH is required to specify that health was endangered for those employees who were employed for a number of work days aggregating at least 250 work days within the parameters established for the class or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

The evaluation presented in this Addendum is specific to internal dose reconstruction feasibility at the Y-12 Plant for the period from January 1, 1987 through December 31, 1994. NIOSH concludes that it has access to sufficient information to estimate the maximum radiation dose for every type of cancer for which radiation doses are reconstructed, and that could have been incurred in plausible circumstances by any member of the class for the period from January 1, 1987 through December 31, 1994.

NIOSH's evaluation determined that it is feasible to estimate radiation dose for members of the NIOSH-evaluated class with sufficient accuracy based on the sum of information available from available resources. Therefore, a health endangerment determination is not required.

9.0 Class Conclusion for the Petition SEC-00250 Addendum

Based on its full research of the class under evaluation, NIOSH found no part of the said class for which it cannot estimate radiation doses with sufficient accuracy. This class includes all on-site personnel who worked at the Y-12 Plant from January 1, 1987 through December 31, 1994.

NIOSH has carefully reviewed all material sent in by the petitioner, including the specific assertions stated in the petition, and has responded herein (see Section 7.4). NIOSH has also reviewed available technical resources and many other references, including the SRDB, for information relevant to SEC-00250. In addition, NIOSH reviewed its NOCTS dose reconstruction database to identify EEOICPA-related dose reconstructions that might provide information relevant to the petition evaluation.

These actions are based on existing, approved NIOSH processes used in dose reconstruction for claims under EEOICPA. NIOSH's guiding principle in conducting these dose reconstructions is to ensure that the assumptions used are fair, consistent, and well-grounded in the best available science. Simultaneously, uncertainties in the science and data must be handled to the advantage, rather than to the detriment, of the petitioners. When adequate personal dose monitoring information is not available, or is very limited, NIOSH may use the highest reasonably possible radiation dose, based on

reliable science, documented experience, and relevant data to determine the feasibility of reconstructing the dose of an SEC petition class. NIOSH contends that it has complied with these standards of performance in determining the feasibility or infeasibility of reconstructing radiation dose for the class under evaluation.

10.0 References

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Attachment One: Data Capture Synopsis

Table A1-1: Summary of Holdings in the SRDB for the Y-12 Plant

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Primary Site/Company Name: Y-12 Plant 1942-present, DOE Alternate Site Names: Y-12 National Security Complex Physical Size of the Site: 811 acres holding over 350 buildings. Site Population: In 1945, more than 22,000 workers at the site. During the Cold War 8,000 people worked around the clock. Noted 6,866 employees in June 1963 and 6,000 in 2011. In October 2018, Y-12 reported more than 4,700 federal and contractor employees work at the site.	Bioassay data, 86-inch cyclotron program and radiation protection, buildings and years where thorium was present, foundry health physics, handling and working with Np, in-vivo monitoring program and results, list of names and badge numbers, neutron field measurement, uranium air limits and their impact on Y-12, personnel notebooks, plant procedures, plutonium air problem, progress reports, radiation generating devices, radiation safety manual, radiological incidents, radiological surveys (airborne, contamination, etc.), record book of materials, run sheets from 86-inch cyclotron, separation of isotopes, neutron film results, sunflower foundry employees, thorium program lung count results, transuranic hazard assessment, uranium in effluent, urinalysis and fecal sample program related information, various technical basis documents, applying thorium surface contamination limits, internal dosimetry program, background subtraction and critical level for ET1 dosimeters, estimating the shallow dose equivalent, dosimetry quality control program information, building radiation and contamination periodic surveys, neutron-photon radiation surveys, container surveys for outgoing shipments, calibration and operation of the in-vivo lung counter, employee bioassay and film/TLD reports, plant health physics quarterly reports, thorium contamination survey results, thorium air sample results, air sampling system and locations, thorium processing, a process knowledge expert interview, data reduction software for in-vivo counting, dosimetry data with thorium in-vivo counts for a Y-12 employee, a 1964 Y-12 radiation safety manual, a whole body count column header key, 1951-1999 lung count data, the old, da, and dah external dosimetry databases, protective force orders, dose rates of portal monitor check sources, history of accountable Y-12 sources, various revisions of the Y-12 external dosimetry TBD, Y-12 reviews and explanations of the external dosimetry databases, Y-12 reconciliation of differences between the internal dosimetry database and DeltaView bioassay result cards, and a survey to support finding contaminated hoses and saw.	09/28/2020	968

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
State Contacted: NA	State was not contacted due to Y-12 being an active Department of Energy site.	NA	NA
Albany Research Center	A 1950 report on the chemical properties of californium and quarterly radiation reports.	03/21/2013	2
Ames Laboratory	Ames histories, 1951-1953 radiation work permits, survey reports, and thorium shipments to other facilities.	01/25/2016	8
Argonne National Laboratory-East	Organization of National Nucleonic Program, personnel procedure for transferring to Y-12 in 1943, monthly Operation Clean Sweep status reports, a 1951 chemical processing meeting program, 1953 Radiological Physics Division reports, EBR-I construction plans, and plutonium scrap processing information.	01/29/2020	7
Battelle Laboratory-King Avenue	Thorium reports, a 1951 material balance report, a radiation excursion in Building 9213, an AEC material transfer matrix, and a nuclear battery report.	01/09/2013	7
Brookhaven National Laboratory	Ambient air monitoring parameters at DOE facilities and monthly reports.	10/22/2008	4
Cincinnati Public Library	A Manhattan Project History.	08/06/2008	1
Claimant Provided	Work products from inter-agency working groups and links between exposure to occupational hazards and illnesses in the DOE contractor workforce, an extrusion video, radon measurements, a site walking tour, a contamination survey and environmental report, a hearing before the workers' compensation board state of New York, Y-12 contaminated scrap shipped to the East Tennessee Technology Park, and a Y-12 building directory.	01/04/2019	9
Colorado Mesa University	Recovery of uranium from carnotite ores, progress reports of carnotite studies, separation of uranium from urine, stack sampling, radiation emergencies, and new methods for interpreting neutron data from various dosimeter types.	10/16/2012	10
DCAS SEC Viewer	Occupational dose reports, Special Exposure Cohort petitions, a Special Exposure Cohort Petition Qualification report, radiological surveys, a Defense Nuclear Facilities Safety Board audit report, and a response to a Defense Nuclear Facilities Safety Board recommendation.	10/21/2019	13

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Department of Labor / Paragon	Background report and evaluation of resurvey requirements for the former Atomic Energy Commission portion of the Lake Ontario Ordinance Works (LOOW), request for scrap evaluation, shipment of Schenectady wastes to Oak Ridge, a complex-wide mixed waste report, a mercury waste management report, notice of a recommended claimant decision, and a visit from Cotter Corporation personnel.	03/15/2019	13
DOE Albuquerque Complex NNSA	NURE activation analysis system correspondence.	01/13/2012	1
DOE Environmental Consolidated Business Center (EMCBC) - Denver	Rocky Flats thorium shipments to Y-12.	02/12/2014	1
DOE Environmental Measurements Laboratory	Air sampling for the control of internal exposure from enriched uranium at Y-12, a beryllium study, criticality alarms and accident dosimetry, and in-vivo counting as a device for evaluating uranium exposure.	01/21/2011	4
DOE Germantown	Beryllium history, waste disposal, monthly accountability reports, thorium information, site histories, Manhattan District History sections, records holding area search procedures, DOE reasonable search protocol spreadsheet, a 1965 plant missions matrix, accountability station codes, and a data tracking spreadsheet.	09/17/2015	23
DOE Legacy Management - Grand Junction Office	Accomplishments of the National Lead Company of Ohio, Electro Metallurgical weekly production report, requests for material transfers, storage/disposal requests, electromagnetic separation of isotopes at Oak Ridge, results of mobile gamma scanning activities, results of soil sample analysis, return of thorium from Savannah River programs, return of thorium from Davison Chemical, LOOW production report describing materials shipped to Y-12, budget reviews, an accidental radiation excursion at Y-12, a contractor list, lithium metal purchase contracts, and history of Hanford.	08/30/2011	59

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
DOE Legacy Management - Morgantown	Health and mortality studies of federal nuclear workers, uranium in urine samples, appraisal of occupational medical program, bioassay department highlights report, comparison of FMPC's uranium in urine sample results with Y-12's results, comprehensive epidemiologic data resource, DOE studies finding excess cancer mortality at several DOE nuclear facilities, disposal of thorium residues, Extrusion Plant (RMI) receipts and shipments, progress and production reports and orders, material balance report by facility, plutonium content of NLO feed materials, production order enriched uranium to Y-12, results of uranium urines, thorium shipments, thorium bioassay, recycled uranium data, trip reports, FUSRAP reports, environmental reports, uranium urine exchange program information, report of analysis, comparisons of various sites' bioassay programs, transmittal of a bioassay investigation, and TLD monitoring.	08/26/2019	171
DOE Legacy Management - MoundView (Fernald Holdings, includes Fernald Legal Database)	Air emissions annual report, annual report of the Health and Safety Division, Colonie site receipts of depleted uranium, DOE health and mortality study, environmental reports, Grand Junction processing of feed material scraps, incineration of radioactive solid wastes, major thorium campaigns and accountability documents, radioactive waste shipments, radiological incidents, shipping and receipt documents for enriched uranium and thorium, thorium bioassay investigations, thorium derby metal for Y-12, thorium nitrate specifications, trip reports, and Y-12 Plant thorium powder or pellet procurement specifications.	02/01/2012	86
DOE Legacy Management - MoundView (Fernald Holdings, includes Fernald Legal Database) / Albany Research Center	The 1958 symposium on uranium industry occupational health experiences.	09/30/2003	1
DOE Legacy Management - Westminster	Complex-wide external dosimetry technical basis document, plutonium/actinide recovery history, lifetime dose calculations from systemic burden and lung count data, technical services quarterly report, Elza Gate bioassays sampling logs, NIOSH worker study protocol comments, and reports of analysis.	01/14/2016	6
DOE Nuclear Materials Management and Safeguards System (NMMSS)	Material transfers between Y-12 and Rocky Flats, Y-12 thorium inventory, and transactions tables and graphs.	12/17/2019	3

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
DOE Oak Ridge Operations	Material accountability reports, description of thorium processing, safety meetings, PCB meetings, bioassay results, external exposure results, TLD processing, fluorine control, artificial urine reports, asbestos worker files, the mobile body counter, U-233 history and inventories, trip reports, TLD problems, respiratory program occurrence report, periodic progress reports, and environmental reports.	01/13/2014	66
DOE Oak Ridge Operations Records Holding Task Group (RHTG) Vault	Building index, contamination control, discontinuation of DuPont film, employee work history records, external exposure reports, film badge program, foundry beta radiation control, health physics records, internal exposures at Y-12, personnel participating in decontamination work, monthly health physics report, collection and recovery of airborne tuballoy, monthly production reports, production statistics and thorium inventories, radiological incidents, radiological surveys, reduction of radiation exposures, technical basis for beta skin dose calculations at the Y-12 plant, uranium dust concentrations, urinalysis and whole body count information, African Metals invoices, materials in 0101 area - Clinton Engineer Works, review of shipment recovery values, and the storage of U-235 from Los Alamos at Clinton Engineer Works.	02/10/2020	165
DOE Office of Scientific and Technical Information (OSTI)	Closed-cycle beta process, alpha II calutron development, uranium recovery by spray cleaning, thorium receipts, radiological surveys, pocket meter logbook notes, material transfers, coating of metallic thorium, material inventories, health physics logbooks, personnel monitoring, internal exposure study, applied health physics program review, calibrating and reading TLDs, periodic reports, and airborne uranium.	09/24/2018	86
DOE Portsmouth Paducah Project Office (PPPO)	Transfers of enriched uranium to Y-12, transfers of Reduction Pilot Plant contaminated scrap to Y-12, 1950-1951 Oak Ridge National Lab flash estimates, neutron threshold detection modification project, and confirmatory accountable material inventory and measurements.	02/20/2020	7
East Tennessee Technology Park (ETTP) & Oak Ridge Gaseous Diffusion Plant (K-25)	Special form material procedures, health physics procedures, implementation plan for DOE Order 5480.11, the ETTP internal dosimetry program, technical basis, and evaluations, 10 C.F.R. 835 implementing program documents, worker safety and health program documents, a nondestructive assay survey, 1958 radiation protection training programs, a radiological work authorization, and Oak Ridge Reservation annual air emission reports.	01/24/2019	46

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Federal Records Center - Atlanta	Uranium tolerances, finger film, biological research at Mound, tritium information, and an Oak Ridge Operations Office health protection status report.	08/12/2004	5
Federal Records Center - Boston	Personnel termination exposure summaries.	04/27/2012	1
Federal Records Center - Chicago	Contamination control limits, a tritium release limits position paper, radiological control manuals, and technical basis documentation.	06/20/2013	6
Federal Records Center - Dayton	Radiation dose determinations from indium foils in multi-plant security badges, limits for material from K-25 and Y-12 potentially contaminated with tritium, a Health Physics Division annual report, transfers of highly enriched uranium, a RCRA facility investigation, K-25 closure plans, and dose estimates for a Y-12 incident.	06/06/2014	9
Federal Records Center - Denver	Mortality among radiation workers at a plutonium weapons facility, beryllium purchasing, fire protection workshop proceedings, a 1967 review of criticality accidents, a reference to Y-12 degraded building conditions, and a listing of mixed waste streams.	09/12/2017	6
Federal Records Center - Kansas City	Reports of urinalysis with sample routing logs, Tiger Team findings, a 1990 de-identified annual exposure report summary, and the process for handling contaminated parts returned to Kansas City Plant.	10/09/2013	5
Federal Records Center - Lee's Summit	DOE unusual incident reports, a volumetric release analysis, environment, safety, and health performance indicators, 1988 bioassay results, a West Valley fact book, analyses of Tiger Team findings, waste minimization, mixed waste evaluation and strategies, DOE safety and health indicators, and an effluent system report.	06/08/2016	40
Federal Records Center - San Bruno	Beta run reports, personnel medical records handling, personnel assignment logs, schedule for track B, a personnel dosimetry intercomparison, medical and health physics quarterly reports, plutonium and fission products metabolism, and health chemistry accident reports.	02/12/2018	14
Feed Materials Production Center (FMPC) / SRDB	Oak Ridge Reservation Environmental Report for 1988 Volume 1: Narrative, Summary, and Conclusions.	12/18/2020	1
Fernald / SC&A	Mobile in-vivo radiation monitoring laboratory brochure.	06/26/2003	1
General Atomics	The 1958 criticality incident at Y-12.	08/16/2005	1
Goldberg, Persky, and White PC - Mancuso Collection	A 1973 contractor list, a records retention discussion, correspondence, the health and mortality study manual draft, annual film badge and bioassay summaries 1947-1968, and a local news article regarding a small fire in 1976.	01/10/2017	9
Hagley Museum & Library	General history of Clinton Engineer Works, race for the bomb, the Hanford story, and uranium experimental program on heat treatment.	09/29/2010	8

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Hanford	In-vivo counting method for determining the uranium lung burden, annual and monthly progress reports, environmental monitoring and protection committee information, smelting uranium-contaminated ferrous metal scrap, production of tritium, health physicist reports, a wastewater treatment review, inventories, material losses, uranium mass balance project document index and attachments, accountability reports, accountability survey data, and inspection criteria for enriched uranium powder.	04/16/2019	61
Hanford / SRDB	Health Physics Survey of Ferrous Metal Smelting Operation.	04/07/2020	1
Idaho National Laboratory (INL)	Material transfers between Y-12 and INL facilities, handling of Y-12 material at INL, correspondence, visitor badge reports, criticality safety evaluations, a documented communication, a list of publications, visitor traffic logs, a contaminated rail car report, ICPP Visitor Cards, and employee previous exposure histories.	11/19/2018	162
INL Electronic Document Management System (EDMS)	The results of an EDMS keyword search.	06/29/2016	1
Interlibrary Loan	Environmental levels of radioactivity at Atomic Energy Commission installations, work history reports for oxide conversion facility, proceedings of a short criticality safety course, the Seaborg journal, and the proceedings of an incineration conference.	05/29/2012	24
Internet - Defense Technical Information Center (DTIC)	An occupational dose reconstruction bibliography, uranium alloy metallurgy bibliography, defense nuclear facilities safety board reports to Congress, actinide research quarterly reports, physical metallurgy of uranium alloys, the characterization of enriched uranium oxide particles, best manufacturing practices, Y-12 nuclear forensic capabilities and experience, hollow-anode ion source for the cyclotron, and the Defense Nuclear Facilities Safety Board 23rd annual report to Congress.	03/26/2019	25
Internet - DOE	Environmental assessments of proposed Y-12 projects and effluent releases.	01/09/2014	2
Internet - DOE Comprehensive Epidemiologic Data Resource (CEDR)	Health physics hygiene progress reports and the impact of downsizing and reorganization on employee health and well-being at the DOE Y-12 Plant.	01/23/2010	3
Internet - DOE Hanford Declassified Document Retrieval System (DDRS)	Fourth Atomic Energy Commission Air Cleaning Conference, specifications for Savannah River Site slugs, periodic department reports, trip reports, and a shipment of uranium rods to Y-12.	09/22/2015	9
Internet - DOE Health, Safety, and Security (HSS)	10 C.F.R. 835 exemption requests and the twenty-fourth DOE annual radiation exposures report.	02/07/2017	3

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Internet - DOE Legacy Management	Preliminary survey of the Elza Gate warehouse area, removal of uranium from soil, beryllium-associated worker registries, annual occupational exposure reports, a former worker medical screening report, the Legacy Management strategic plan comments resolution legend, and documentation supporting the overpacking of waste thorium at Fernald including Y-12 generated waste.	04/08/2019	13
Internet - DOE Legacy Management Considered Sites	A 1951 monthly progress report.	10/25/2007	1
Internet - DOE National Nuclear Security Administration (NNSA) Library	Violation citations related to a uranium fire, the final site-wide environmental impact statement, the history of the Nuclear Materials Management and Safeguards System, and the consolidation of the site's nuclear footprint.	11/16/2015	5
Internet - DOE Noncompliance Tracking System (NTS)	Noncompliance with Nevada Test Site waste acceptance criteria, a discussion of isolated non-uranium contamination areas, inadequate control of materials used in maintenance of enriched uranium oxide, calibration program deficiencies, a glovebox fire, deficiencies in radiological work permit compliance, missed routine bioassay samples, and unanalyzed material in Building 9720.	03/11/2019	9
Internet - DOE Oak Ridge Operations	Release of a parcel of land to the city of Oak Ridge, the demolition of Building 3704, photographs of Building 9401-2, environmental waste management plans, and the 2016 Oak Ridge Reservation annual environmental report.	01/07/2019	8
Internet - DOE Occurrence Processing and Reporting System (ORPS)	Personnel contamination reports and roll-ups, legacy contamination discoveries, legacy contamination roll-ups, contaminated items discovered in areas not controlled for contamination, personnel intakes of radioactive material, radioactive material spills, uranium fires, and criticality safety infractions.	09/14/2020	76
Internet - DOE Office of Scientific and Technical Information (OSTI)	The 2006 Oak Ridge Reservation annual environmental report, a 1958 Argonne National Laboratory Chemical Engineering Division report, a 2016 air emissions report, pedestrian special nuclear material monitors, fuel fabrication research and reports, transportation plans, quality assessments, an analysis of personnel error occurrence reports, a summary spent fuel report, materials characterization capabilities of DOE laboratories and production plants, and a scoping package for environmental remediation.	10/26/2020	27

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Internet - DOE OpenNet	Criticality accident at the Y-12 Plant, declassification of the quantity of enriched lithium produced at Y-12, Manhattan District history, monthly status and progress reports, semiannual reports of the Atomic Energy Commission, operational accidents and radiation exposure experience, release of radioactivity to the environs request by AEC, uranium dust exposure and lung cancer risk in four uranium processing operations, trip reports, Oak Ridge Institute of Nuclear Studies medical research reports, a californium-252 report, fuel slug studies, Manhattan Project field progress reports, material transfers, a plant tour, National Radiobiology Project interviews, Massachusetts General Hospital uranium study, calculation of potential incident doses, radiobiology reports, neutron exposure dosimetry by in-vivo sodium-24 measurements, organization charts, material transfer security requirements, material balance reports, a beryllium study surveillance, and an injury claim.	06/15/2020	157
Internet - DOE OPEXShare	Uranium Accumulation Discoveries at Y-12.	07/08/2020	1
Internet - DOE OSTI Energy Citations	Clean atmosphere approach to radiological decontamination of concrete surfaces, model for uranium lung clearance at the Y-12 Plant, Y-12 discharge of enriched uranium to the sanitary sewer, study of TLD beta calibration factor for exposure to depleted uranium, coaxial germanium detectors in the Y-12 in-vivo monitor, disposal of United Nuclear Company materials at Y-12, environmental survey report, modeling of Elza Gate contaminated material, a Pinellas Plant feasibility study, a report on remediation through natural phenomena, a mathematical model for lung counting, the feasibility of in-vivo thorium measurements, ORNL Chemical Technology Division reports, a 2011 DOE occupational radiation exposure report, a nuclear accident dosimetry intercomparison study, the disposal of spent nuclear fuel, and the abstracts from a pollution prevention conference.	08/28/2013	54

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Internet - DOE OSTI Information Bridge	DOE Complex buried waste characterization assessment, Conversion and Blending Facility highly enriched uranium to low enriched uranium as uranium hexafluoride, disposition of highly enriched uranium obtained from the Republic of Kazakhstan environmental assessment, electromagnetically enriched isotopes inventory, environmental evaluation and reports, export license issued for DOE Oak Ridge for shipment of uranium-235, human radiation experiments, in-vitro data and comments, list of ERDA radioisotope customers, occupational dose reduction, post construction report for the United Nuclear Corporation disposal site, radiological risk assessment of a radioactively contaminated site, remedial investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, sampling approach for characterization of the Scarboro community, testing of the Y-12 Plant criticality accident alarm system detectors at the Sandia Pulsed Reactor Facility, metal fabrication program for the Clinton Engineering Works and the Hanford Engineering Works including the dummy slug program, waste vitrification projects, Y-12 salvage yard scrap metal characterization study, Y-12 Plant solid waste management system, a beryllium exposure assessment, a uranium hydride report, and hazardous and mixed waste generation.	08/26/2013	172
Internet - DOE OSTI.Gov (formerly OSTI SciTech Connect)	High-level radioactive waste reports, low-level radioactive waste reports, spent nuclear fuel strategic plans, spent fuel storage, environmental reports, groundwater protection and quality reports, waste generation and pollution prevention reports, a tank characterization survey, a Y-12 Tiger Team assessment, dosimetry quality assurance, the status of environmental initiatives, periodic project reports, life cycle analysis approach to D&D projects, strategic special nuclear material inventory differences, an Oak Ridge dose reconstruction report, a SNAP reactor program progress report, and control technology for radioactive atmospheric emissions.	08/28/2018	120
Internet - Energy Employees Claimant Assistance Project (EECAP)	A RCRA landfill analysis for the United Nuclear Corporation disposal site, assessment of enriched uranium storage safety issues, Development Division periodic reports, operation of the chip oxidation facility, uranium removal from contaminated soils, radiological analysis of groundwater data, and reduction of airborne radioactivity levels at the Building 9201-5 arc melt sawing operation.	03/26/2014	14

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Internet - Google	Accountability and control of sealed radioactive sources, annual site environmental reports, Clinton Engineer Works photos, Clinton Laboratory expands to Y-12 buildings, depleted uranium operations at Y-12, division progress reports, Eastman at Oak Ridge during World War II, environment monitoring assessment and reports, epidemiological studies, evaluation of iodine-131 releases, historical evaluation of the film badge dosimetry program at Y-12, liquid waste disposal at Oak Ridge National Laboratory, major relocation of highly enriched uranium completed at Y-12, Manhattan Engineer District history, neutron and gamma dosimeter intercomparison study, Oak Ridge, Tennessee, warehouses site fact sheet, operating Oak Ridge's calutrons, radiological incidents, site X, Oak Ridge, Tennessee (map), status of highly enriched uranium processing capability at Y-12 building 9212, study of metal hydrides, toxicological profile for uranium, Oak Ridge 86-inch cyclotron, urine bioassay program, personal air sampling (PAS) data in the internal dosimetry program, Y-12 history and fact sheet, environmental restoration, DOE occupational radiation exposure reports, characterization of contaminated scrap metal, oral history interviews, transuranic waste management, the characterization strategy for Building 9201-5, contractor performance evaluation reports, the determination of thorium in thorium metal, unexpected uptakes, Project Sapphire dose rate analysis, IAEA technical reports, a plutonium experiment report, and a Y-12 fact sheet.	08/18/2020	545
Internet - Hathitrust	A 1962 dosimetry badge orientation experiment.	10/21/2015	1
Internet - Health Physics Journal	Identification of Oak Ridge Reservation emission sources, a urinalysis intercomparison study, an analysis of cesium body burdens, the retention of uranium in the chest, radioactivity distributions in the metallurgical processing of thorium, and a comparison of lung dose estimates from air sampling and bioassay data.	03/26/2019	7
Internet - Idaho National Laboratory (INL)	Shipments of purified uranium powder to Oak Ridge.	07/13/2016	3
Internet - International Atomic Energy Agency (IAEA)	The status of stable isotope enrichment and services.	12/19/2016	1
Internet - Journal of Occupational and Environmental Hygiene	No relevant documents identified.	03/26/2019	0
Internet - National Academies Press	Complex-wide safety and health management, research opportunities in D&D projects, [Name redacted] biographical memoirs, contaminated sites risk-informed decision making, and radioactive waste reports.	06/01/2020	6

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Internet - National Institute for Occupational Safety and Health (NIOSH)	Special exposure cohort petition evaluation reports, NIOSH residual radioactive and beryllium contamination reports, designation of additional members of the SEC, the minutes of Work Group meetings, the Kansas City Plant issues matrix, and an Advisory Board on Radiation and Worker Health review of the Y-12 site profile.	12/16/2020	38
Internet - National Service Center for Environmental Publications (NSCEP) (formerly NEPIS)	Environmental radiation data, environmental cleanup standards and regulations, transuranium elements dose limits and radiation protection, Y-12 records of decision, Superfund reports to Congress, and an overview of waste solidification and stabilization at Superfund sites.	02/09/2016	19
Internet - National Technical Information Service (NTIS)	Feasibility study of the correlation of lifetime health and mortality experience of AEC and AEC contractor employees progress reports.	08/21/2006	2
Internet - Nuclear Regulatory Commission (NRC) Agencywide Document Access and Management (ADAMS)	DOE inventory report, evaluation of the potential for recycling of scrap metals from nuclear facilities, feasibility study for the United Nuclear Corporation disposal site at the Oak Ridge Y-12, integrated database U.S. spent fuel and radioactive waste inventories, projections, and characteristics, a soil management plan for the Oak Ridge Y-12, disposition of surplus highly enriched uranium, environmental impact statements, a Y-12 safety analysis report, advance notifications of shipments, facility hazard assessments, export licenses and shipments, NRC export license applications, receipt of fuel from the BWX Technologies CX-10 reactor, and a 60-day notification of a materials transfer incident.	05/11/2020	137
Internet - Oak Ridge National Laboratory (ORNL)	ORNL Division and Laboratory periodic reports mentioning Y-12, radiation safety for Y-12 Building 9204-3 isotope separation operations, report on a calutron ion source, the recovery of uranium from acid liquors, a 1979 thorium utilization progress report, an Isotopes Development Center research planning meeting, and Oak Ridge Reservation annual environmental reports.	06/18/2019	169
Internet - Portsmouth Gaseous Diffusion Plant	The 1980 DOE Analytical Services Forum.	09/07/2009	1
Internet - University of North Texas	The evaluation of Organic Moderated Reactor Experiment fuel elements containing uranium oxide from Oak Ridge and the specification for Y-12 uranium in the High Flux Isotope Reactor fuel elements.	02/04/2020	2
Internet - US Army Corps of Engineers (USACE)	A 2016 Formerly Utilized Sites Remedial Action Program (FUSRAP) update.	05/17/2018	1
Internet - Washington State University (U.S. Transuranium and Uranium Registries)	No relevant documents identified.	04/08/2019	0

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Internet - Y-12	Y-12 anecdotes including one on thorium production.	08/01/2018	1
Iowa State University Library	An interview with [Name redacted].	09/18/2013	1
Iron Mountain Storage Facility, Cranberry, PA	Survey of control over source and special nuclear materials, National Distillers and Chemicals Corporation.	09/11/2006	3
Kansas City Plant	Statement of [Name redacted] before the subcommittee on Military Procurement Committee on National Security, US House of Representatives, radiological incidents, receipt of potentially contaminated parts, radiological surveys and air samples, operations reports, and dosimetry services.	03/04/2015	21
Kansas City Plant / SC&A	Notes from the review of Kansas City Plant classified documents.	08/16/2013	1
Lawrence Berkeley National Laboratory (LBNL)	Laboratory contracts 1948.	02/06/2007	1
Lawrence Berkeley National Laboratory (LBNL) / SC&A	Long-range studies of uranium workers and Oak Ridge radiation worker population.	05/13/2009	1
Lawrence Livermore National Laboratory (LLNL)	Project Pluto meeting minutes, a glove box incident report, determinations of possible excursion yields and exposure rates, feasibility of liquid material transfers, and the Rocky Flats body counter.	11/16/2017	11
Los Alamos National Laboratory (LANL)	Excursions at the Oak Ridge criticality experiments facility, nonnuclear consolidation environmental assessment, polonium contamination at Pajarito, low-level mixed waste streams for the DOE Complex, corrected information on a plutonium shipment, a uranyl nitrate slurry problem, decontaminating plutonium from oralloy parts for Y-12, radioactive waste disposal and related issues, and reference to a Y-12 document in a LANL radiological work permit.	10/14/2019	12
Los Alamos National Laboratory (LANL) - LAHDRA	Waste minimization at a plutonium processing facility, a low-level complex-wide mixed waste report, spent fuel inventories, and an environmental impact statement for the storage and disposition of weapons-usable fissile material.	12/13/2007	5
Mel Chew & Associates	A 1994 radiation exposure summary, laboratory procedures for thorium analyses, individual and group exposure histories, fecal uranium measurements, the uranium in urine program, recycled uranium data spreadsheets, and plutonium urine results.	12/14/2014	62
Metals & Controls Corp	Analysis of possible nuclear material losses and possible liabilities associated with present fuel manufacturing.	08/24/2004	1
MJW	Proceedings of a short nuclear criticality safety course.	10/16/2003	1

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Mound	Disposition of depleted salvage material, exposure to polonium from a neutron source, fabrication of weapon components, a shipment of irradiated bismuth slugs, polonium characteristic X-rays, polonium hazards, and correspondence concerning a lithium compound.	05/18/2010	11
Mound Museum	Schedule of material transfers.	07/14/2008	1
National Archives and Records Administration (NARA) - Atlanta	AEC handbook on Oak Ridge operations, annual health protection review, bioassay results and procedures, calutron beam study, control of radiation hazards by Carbide and Carbon Chemicals Division, environmental data, equipment numbering system, film badge program description, hazards of piles at Y-12, monthly accountability reports, organization charts, personnel exposure data, progress reports, radiological and criticality incidents, radiological surveys, report of annual health protection review - New Brunswick Lab, reports of destruction of classified material, radiochemistry reports, shipments from Metal Hydrides to AEC facilities, shipping receipts, work done at Iowa State College, first aid stations, and handling fissionable material.	09/01/2015	147
National Archives and Records Administration (NARA) - Atlanta / SC&A	Decontamination of gloves.	09/26/2003	1
National Archives and Records Administration (NARA) - Chicago	Fuel preparation for the ZPR-III Reactor.	06/12/2015	1
National Archives and Records Administration (NARA) - College Park	Meteorological conditions, machining of uranium metal, accountability reports, thorium reports, researcher notes, Manhattan District history sections, and monthly status and progress reports.	03/11/2014	23
National Archives and Records Administration (NARA) - Kansas City	Historical information from property insurance association on Niagara Falls Storage Site / African Metals leased areas, a survey of the Nuclear Chemicals and Metals Facility before and after a shipment to Y-12, radon emission data, TLD occupational exposure reports, a trip report, and the 1995 transuranic waste baseline report.	07/11/2016	6
National Archives and Records Administration (NARA) - Seattle	Material transfers and a continuous air monitor calibration.	08/23/2017	5
Nevada Test Site (NTS)	The Y-12 electron beam welder, references to Y-12 bioassay protocols, RWP sign-in sheets, and shipments of reactor fuel and waste from NTS to Y-12.	12/12/2018	6
New York State Archives	A Manhattan District history section, SF material accountability reports 1952-1958, and waste disposal at Lake Ontario Ordnance Works.	03/20/2012	3

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
New York Department of Environmental Conservation	Recovery of uranium from Sylvania scrap and disposal of special material under Contract AT(40-1)-2558.	07/31/2008	2
NIOSH	Production and use of recycled uranium, audit report confirmatory bioassay testing at selected sites, highly enriched uranium safety and health vulnerabilities associated with storage of highly enriched uranium, Los Alamos Scientific Laboratory information, nondestructive testing of uranium, radioactive waste shipment, recycled uranium mass balance project, history of the Oak Ridge National Laboratory's first 25 years, strikes at Y-12, the evaluation of health physics problems in thorium processing, trip reports, AEC reports to Congress, documented communications, worker outreach meeting minutes, recycled uranium processing at Fernald, neutron dose assignment white paper, ORAU report on estimating radiological dose, Y-12 history documents, SC&A reviews and NIOSH responses, an evaluation of the Pb-212 lung count detection limit, and an update for the Advisory Board on Radiation and Worker Health.	12/02/2020	74
NIOSH - Health Related Energy Research Branch (HERB) Library	Oxide conversion facility work history reports.	09/08/2003	1
NIOSH / SC&A	BWXT-ORAU correspondence 2003-2005, recycled uranium project report, highly enriched uranium working group reports, Np-237 and U-238 alloy radiation safety requirements, remarks on personnel monitoring at Y-12, technical basis document for the internal dosimetry program at Y-12, uranium urinalysis program, and a Y-12 Complex description.	02/05/2009	16
NIOSH OCAS Claims Tracking System (NOCTS)	A 1957 special separations logbook and a log entry regarding an Am-241 lung burden.	10/16/2018	2
Nuclear Regulatory Commission (NRC) Public Document Room	A trip report, the sixth intercomparison of nuclear accident dosimeters, the draft environmental assessment for treatment of low-level and mixed waste, in-vivo counts for two Kerr-McGee employees involved in a thorium explosion and the Town of Tonawanda, NY, a radiological contingency plan, characterization of a Mallinckrodt plant, U-233 report, and references to Y-12 in a NUMEC license renewal application.	04/23/2018	10

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Oak Ridge Associated Universities (ORAU)	Brief history of the Y-12 external monitoring program, correction factors for film badge data, dosimetry records and radiation hazards questionnaire, film badge data, names of persons having dosimetry information, radiation dosimetry for epidemiologic lung cancer study, history of buildings at Y-12, information on the calutron program for uranium enrichment, plutonium urinalysis results, health physics reports for buildings and departments, polonium urinalysis reports, uranium and plutonium urinalysis reports, individual employee bioassay reports, tritium urinalysis reports, Building 9805-1 tritium reports, high dose investigation reports, and letter regarding worker radiation exposure data used in epidemiological studies.	09/09/2020	231
Oak Ridge Associated Universities (ORAU) / Mel Chew & Associates	Tritium urinalysis reports.	05/14/2012	4
Oak Ridge Institute for Science and Education (ORISE)	Data collection and validation for the Oak Ridge nuclear facilities mortality study.	06/11/2003	1
Oak Ridge Library for Dose Reconstruction	Status report on Clinch River study, high-flux isotope reactor description, engineering development of hydraulic fracturing as a method for permanent disposal of radioactive wastes, contaminant releases, uranium releases, annual applied health physics reports, environmental levels of radioactivity, aerial radiological surveys, annual environmental reports, waste disposal reports, recovery of uranium from fiberglass air filters, incident reports, historical uranium releases, fallout measurements, material accountability reports, stack sampling, facility and department periodic reports, analysis of the 1989 UF6 release, and worker mortality rates.	08/15/2011	301

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Oak Ridge National Laboratory (X-10)	Radiological incidents, history of the Analytical Chemistry Division of Oak Ridge National Laboratory, Aircraft Nuclear Propulsion Project progress report, cyclotron operations, electromagnetic isotope separations, evaluation of neutron dosimetry, exposures received from typical diagnostic X-ray examinations at ORNL, health physics instrument manual, neutron dosimetry with the ORNL badge, Oak Ridge 86-inch cyclotron, X-ray facility reviews, production of radioisotopes in the ORNL 86-inch cyclotron, quarterly progress report, radiation safety manual, stable isotope separation in calutrons, technical basis for nuclear accident dosimetry, inventory of electromagnetically enriched isotopes, X-10 medical X-ray compliance survey, Y-12 film monitoring program, releases of thorium in Building 9204-1, 86-inch cyclotron target ruptures, area, equipment, and personnel contamination occurrence reports, periodic ORNL Division reports including material accountability, isotopic power materials, isotopes development center, and operations and individual dosimetry records.	03/31/2016	290
ORAU Team	Accounting for incomplete personal monitoring data on penetrating gamma doses, exposure matrix for the Mallinckrodt Chemical Company, effect of threshold energy and angular response of NTA film on missed neutron dose at Y-12, annual report radiation exposures for DOE and contractor employees, radiological incidents, external radiation monitoring at Y-12, health and mortality among contractor employees at DOE facilities, history and evaluation of the film badge dosimetry program at Y-12, potential missed dose to nuclear weapons assemblers, specific tables of isotopic production, Tiger Team assessment of the Pantex Plant, Y-12 exposure database, analysis of electronic personnel exposure data from Y-12, documented communications, technical basis documents, data capture strategies, technical information bulletins, thorium air sample data spreadsheet, Y-12 quarterly health physics reports, in-vivo input and output radiation monitoring reports, quarterly health physics and industrial hygiene reports, annual body counter reports, an example of actinium and lead body counting reporting, and neutron dose from highly enriched uranium.	03/28/2019	153

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Paducah Gaseous Diffusion Plant	Alpha hazards from neptunium, computer program for whole body count, disposal of stored "tru" waste, environmental assessments and reports, estimates of transuranium alpha fed to Paducah cascade, exposure assessments, health protection information on uranium metal, in-vivo monitoring results, inventory of radioactivity released to environment, land burial of radioactive waste at the Paducah Plant, licensing of byproduct material, neptunium and plutonium plant material balance, dust studies, radiation protection program, radioactive contaminants in Paducah scrap, radioactive effluent release, monitoring and control, radioactive waste management, radiological incidents, study of plutonium and fission products, technical basis for the Centralized External Dosimetry System, trip reports, waste disposal criteria, and Y-12 TLD results that include Paducah area dosimeters.	10/06/2006	13
Pantex	Monitoring procedures for items from Y-12 received at Pantex.	07/19/2011	1
Personal Files – [Name redacted]	The sixteenth through the twenty-first DOE annual reports of radiation exposure.	10/11/2006	6
Personal Files – [Name redacted]	A DOE contractor health and mortality report.	04/06/2010	1
Personal Files – [Name redacted]	Office of Oversight Radiological Protection task team reports, a DOELAP status report and handbook, dosimetry program reviews, Bechtel-Jacobs technical basis documents, a Building 9201-2 characterization, the development of IMBA, a radiation dosimeter pamphlet, and meeting minutes.	07/16/2018	19
Reactive Metals, Inc. (RMI)	Historic radionuclide releases from Oak Ridge Operations facilities, 1987, a 1985 uranium release report, report of a 1985 Martin Marietta Energy Systems visit to RMI, and RMI's 1980, 1983, 1984, and 1987 environmental management appraisals.	08/17/2006	5
Rocky Flats Environmental Technology Site (RFETS)	The flammability and explosion potential of transuranic waste and audit responses.	08/31/2012	2
Sandia National Laboratories-Albuquerque	Technical basis for workplace air monitoring of airborne radioactive material at Y-12, Ross Aviation shipment surveys and documents, the 1991-1993 ORNL bioassay QC program, Webdose database external doses 2006-2008, and approval of the revised Radiological Control Manual.	09/09/2014	7

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Savannah River Site (SRS)	Dosimetry visitors cards, radiation survey log sheets, a trip report, material transfers, SRS monthly reports, the thoria fuel irradiation program, californium packaging facility, laboratory fume hood minimum acceptable face velocities, and the SRS response to the 1998 DOE Bioassay Enforcement Moratorium.	02/28/2019	15
S. Cohen & Associates (SC&A)	Assessment for acceptance of enriched uranium at Y-12, radiation worker health at Y-12, Oak Ridge reservation annual site environmental report, photographic film as a pocket radiation dosimeter, recycled uranium mass balance project information, a trip report, criteria for acceptance of enriched uranium at Y-12, incident reports, unclassified thorium documents, special nuclear material licensing, documents issued to SC&A by BWXT Y-12, and documented communications.	04/26/2011	21
SC&A / Atlanta NARA	Thorium metal processes.	09/26/2003	1
SC&A / Idaho National Laboratory	Environmental report, airborne radionuclide waste management information, a mercury shipment, a survey of waste management practices, and Idaho Chemical Processing Plant periodic reports.	06/24/2010	13
SC&A / Internet - DOE OpenNet	Linking Legacies.	05/24/2017	1
SC&A / NIOSH	The generation and flow of recycled uranium.	08/14/2003	1
SC&A / Y-12	Mobile lung counter data, and fires and explosives investigations.	07/28/2010	2
Science Applications International Corporation (SAIC)	Annual summaries of whole body radiation exposures to external penetrating radiation, 1960-1973.	09/02/2004	14
SLAC National Accelerator Laboratory	1969 Visitor badge neutron and photon results.	01/29/2018	1
Southern Illinois University	Nuclear fuel fabrication, Oak Ridge site description, observations on uranium exposures, visit requests, and the transcripts of Advisory Board on Radiation and Worker Health meetings.	11/01/2008	9
University of Colorado Norlin Library	A formal safety program cost/benefit study.	04/10/2006	1
University of Rochester Radiation Safety Office	Return of uranium peroxide to Oak Ridge, 1961 material accountability reports, and a 1961 nuclear materials management station code listing.	08/20/2008	3
University of Tennessee Library	Creation of Clinton Engineer Works, a health physics report, health physics and exposure records, a calutron newspaper article, personnel monitoring records, the Biology Division Hot Laboratory, the decontamination of Building 9204-1, burial of Y-12 wastes, and a survey of Building 9206.	10/11/2011	14

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded to SRDB
Unknown	Annual radiation dose reports, annual environmental reports, designation of race tracks by number Y-12 and extension, dosimeter response characterization, estimation of radiation doses to the lungs of early uranium workers, excretion of uranium from mixed exposures under industrial conditions, fifth semiannual report of the atomic energy commission, flow of materials through the nuclear weapons complex, glossary of Y-12 coded terminology, health physics survey instruments used at Clinton, in-vivo method to determine uranium lung burden, Mallinckrodt Plant inspections, miscellaneous Fernald documents, monthly status and progress reports, neutron dose equivalent and energy spectra measurements at ORNL and Y-12, overview of the history of Y-12, protective equipment evaluation, radiation safety manual, radiological incidents, radiological surveys, relationship between in-vivo and urinalysis data collected, Rocky Flats site history, Simonds Saw & Steel material balance report, Westinghouse Nuclear Fuels Division and Westinghouse Atomic Power Development information, a Comprehensive Epidemiologic Data Resource brochure, and X-ray radiation measurements in calutron cubicles.	03/14/2011	230
Unknown / SC&A	The 1991 DOE indoor radon study.	10/09/2003	1
Unknown / SRDB	Environmental monitoring reports and environmental levels of radioactivity for Oak Ridge facilities.	12/18/2020	12
Unknown / Y-12	The Y-12 outdoor scoping survey.	06/10/2004	1
United States Army Corps of Engineers (USACE)	Lake Ontario Ordnance Works document search and remediation reports.	11/29/2007	2
United States Enrichment Corporation (USEC)	A 1977 radiation termination report, the ERDAM 0525 annual occupational exposure reporting form, and a US Navy report on radioactive wastes.	10/06/2006	3
Weldon Spring	Analysis of long term data on uranium in air at Y-12.	11/29/2004	1
Westinghouse Site (MO)	Accidental radiation excursion at Y-12, estimated lung exposure, in-vivo count results, and procedures and assignments for restricted personnel.	04/09/2009	7
Westinghouse Nuclear Fuels Division (WNFD)	1968 - 1972 Shipping information and orders.	04/24/2009	1
Y-12 / SC&A	Medical examination reports, occupational medical review reports, environmental pollution and control data, radiation exposure data, and Y-12 specifications for recycle material receipts.	07/28/2010	5
TOTAL			**5,576**

Table A1-2: Database Searches for the Y-12 Plant

Database / Source	Keywords / Phrases	Hits	Selected
Defense Technical Information Center (DTIC) http://www.dtic.mil/dtic/ *(Link no longer active)* COMPLETED 03/26/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	14,950	6
DOE Hanford Declassified Document Retrieval System (DDRS) and Public Reading Room http://reading-room.labworks.org/Catalog/Search.aspx COMPLETED 04/05/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	4	1
DOE Legacy Management Considered Sites https://www.lm.doe.gov/Considered_Sites/ *(Link no longer active)* COMPLETED 04/08/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	3,872	2
DOE National Nuclear Security Administration (NNSA) - Nevada Site Office https://nnsa.energy.gov/library COMPLETED 04/01/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	1,468	4
DOE Noncompliance Tracking System https://nts.ntc.doe.gov/NTSReports/Search *(Link no longer active)* (Subscription required) COMPLETED 10/04/2018	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	158	1
DOE Occurrence Reporting and Processing System https://orps.doe.gov/ORPS/orps.asp *(Link no longer active)* (Subscription required) COMPLETED 10/04/2018	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	817	0
DOE OpenNet http://www.osti.gov/opennet/advancedsearch.jsp *(Link no longer active)* COMPLETED 04/05/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	3,882	133
DOE OSTI.Gov https://www.osti.gov/search/ COMPLETED 04/22/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	409,550	50
Energy Employees Claimant Assistance Project (EECAP) http://www.eecap.org COMPLETED 03/26/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	19	0
Google http://www.google.com COMPLETED 04/09/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	4,732,597,100	36
Health Physics Journal http://journals.lww.com/health-physics/pages/default.aspx COMPLETED 03/26/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	219	1

Database / Source	Keywords / Phrases	Hits	Selected
Journal of Occupational and Environmental Hygiene https://oeh.tandfonline.com/ COMPLETED 03/26/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	9	0
National Academies Press http://www.nap.edu/ COMPLETED 04/08/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	15,124	0
National Service Center for Environmental Publications (NSCEP) http://nepis.epa.gov/ COMPLETED 04/09/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	317	14
NRC ADAMS Reading Room https://adams.nrc.gov/wba/ COMPLETED 04/05/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	1,210	83
United States Army Corps of Engineers (USACE) http://www.usace.army.mil/ COMPLETED 04/08/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	10	0
U.S. Transuranium & Uranium Registries http://www.ustur.wsu.edu/ COMPLETED 04/08/2019	Database search terms and Internet URL are available in the Excel file called "Y-12 Rev 03, (SEC-00250) 02-15-2021"	29	0