De Soto Facility
SEC Petition-00246
Preliminary Review

Presented by:

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Teleconference Meeting of the Advisory Board's Work Group on Area IV of Santa Susana Field Laboratory

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Introduction and Background SEC Petition-00246

- SEC-00246 for the De Soto Facility was submitted on December 13, 2017, with the following proposed definition:

  "All workers who worked at the De Soto Avenue Facility in Los Angeles County, CA during the period from January 1, 1965 through December 31, 1995."

- The rationale provided in the original position read as follows:

  "NIOSH has determined it cannot reconstruct radiation dose for americium, thorium, or associated progeny at SSFL Area IV, 1965–988. Based on shared contractor and operational history, shared data limitations between SSFL Area IV/De Soto Facility, and the established presence of americium, thorium and associated progeny at De Soto Facility until at least 1995, the following petition is submitted."

Introduction and Background SEC Petition-00246 (cont.)

- March 1, 2018: SEC Petition-00246 qualifies for evaluation *(Note: the evaluated class remained essentially unchanged from the original petition submission)*
- July 3, 2018: NIOSH Releases the SEC Petition Evaluation Report (SEC ER)
- August 23, 2018: NIOSH presents the results of the SEC ER to the Advisory Board at Meeting 124 in Providence, RI
- Following discussions at the August Advisory Board meeting, SC&A was tasked with reviewing the main conclusions of the NIOSH SEC ER

Introduction and Background SEC Petition-00246 (cont.)

- NIOSH SEC Evaluation Contained Two Central Conclusions:
  - **Americium exposure potential and dose reconstruction:** “neither the documents available to NIOSH nor interviews with former workers revealed any history of fabrication of americium sources, or work with uncontained americium at the De Soto Avenue Facility. Contrasting previous NIOSH evaluations of radiological work at Area IV of SSFL, NIOSH has found no indication that De Soto had sources of americium associated with work processes.”
  - **Thorium exposure potential and dose reconstruction:** “NIOSH has identified detailed documentation of thorium work episodes in 1970 and 1979, providing source term, operational procedures, radiological protection protocols, names of individual operators, and dates of work. NIOSH has concluded that thorium-grinding operations in 1979 represent the bounding thorium internal exposures at the De Soto Avenue Facility during the operational period (January 1, 1965 through December 31, 1995). As presented in Section 7.2.3.1, NIOSH has sufficient personnel bioassay data (including per-work and post-work urinalysis), and job performance data, to allow it to develop a bounding dose estimate for workers with potential thorium exposures during the period from January 1, 1965 through December 31, 1995.”

SC&A Review Approach

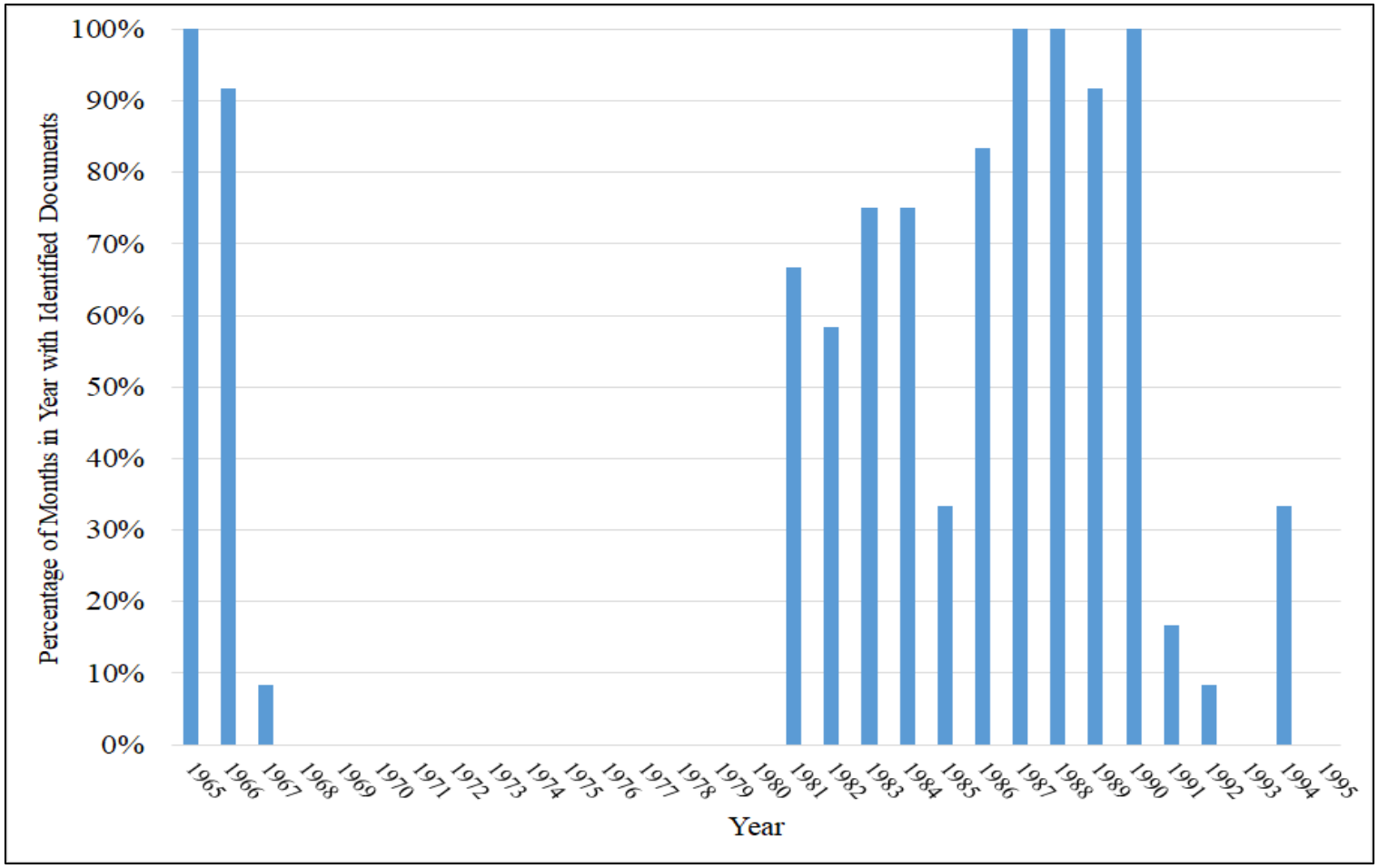
- Review of relevant available documentation contained in the Site Research Database (SRDB) as well as documents supplied by CORE Advocacy for Nuclear and Aerospace Workers
- Evaluation of documented interviews with former workers at the De Soto Facility and a signed affidavit supplied by a former Health Physicist at De Soto
- Examination of a substantial portion of the claimant population with job classifications with the likely potential for involvement in radiological operations. Review included:
  - Review of computer-aided telephone interviews (CATIs)
  - Review of statements in Department of Labor Case files (as appropriate)

Relevant Available Documentation

- In addition to retrospective historical documentation, SC&A's review focused on four primary document types:
  1. Health Physics Logbooks
  2. Tagged Area Entry Permits
  3. Routine Contamination Surveys
  4. Area Air Sampling Results/Personnel Air Sampling Results (lapel air samplers)
- SC&A observed significant temporal gaps for the primary documentation during the period under evaluation (SC&A Finding 1)

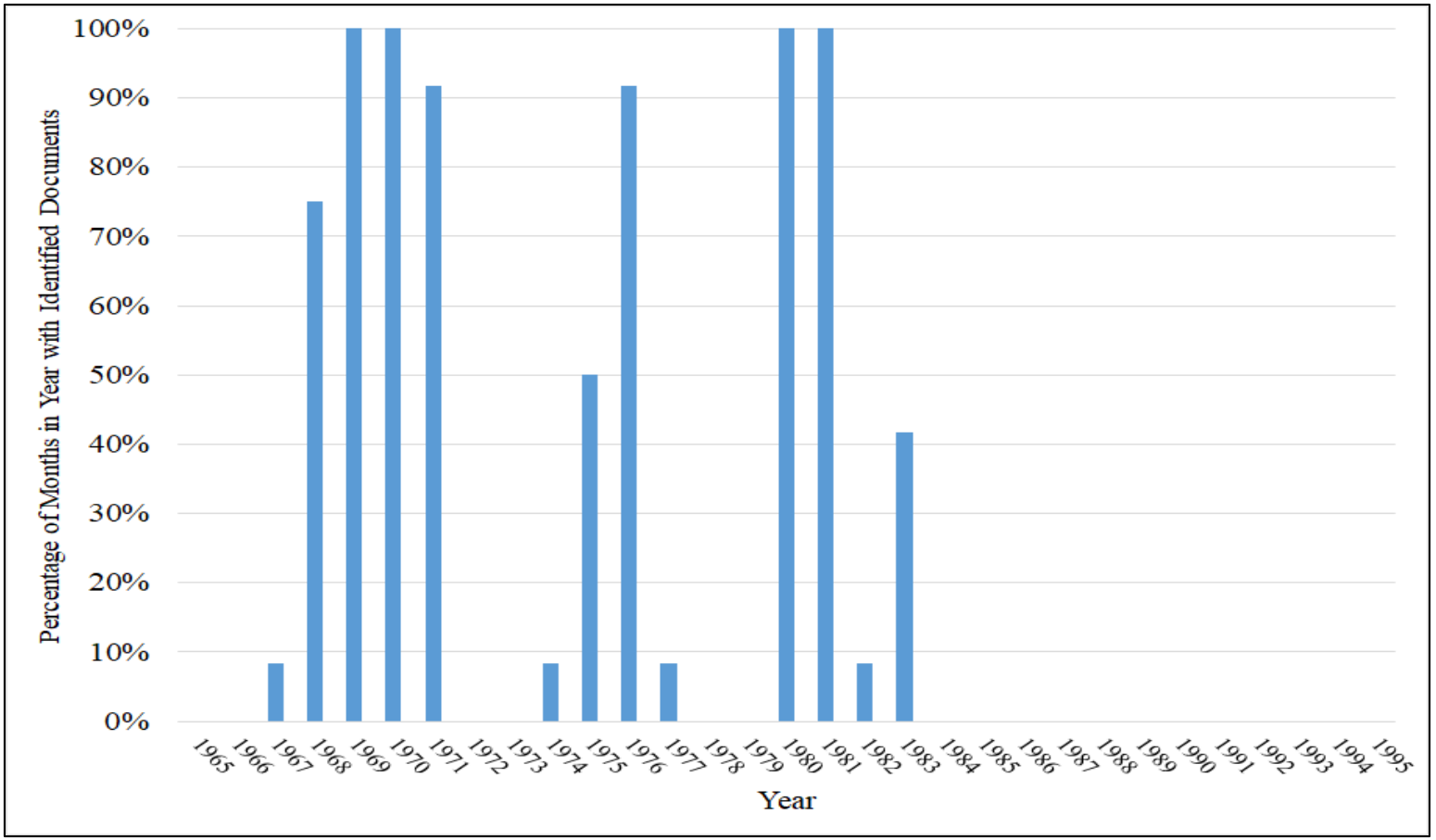
Relevant Available Documentation (cont.)

Health Physics Logbooks Available by Year



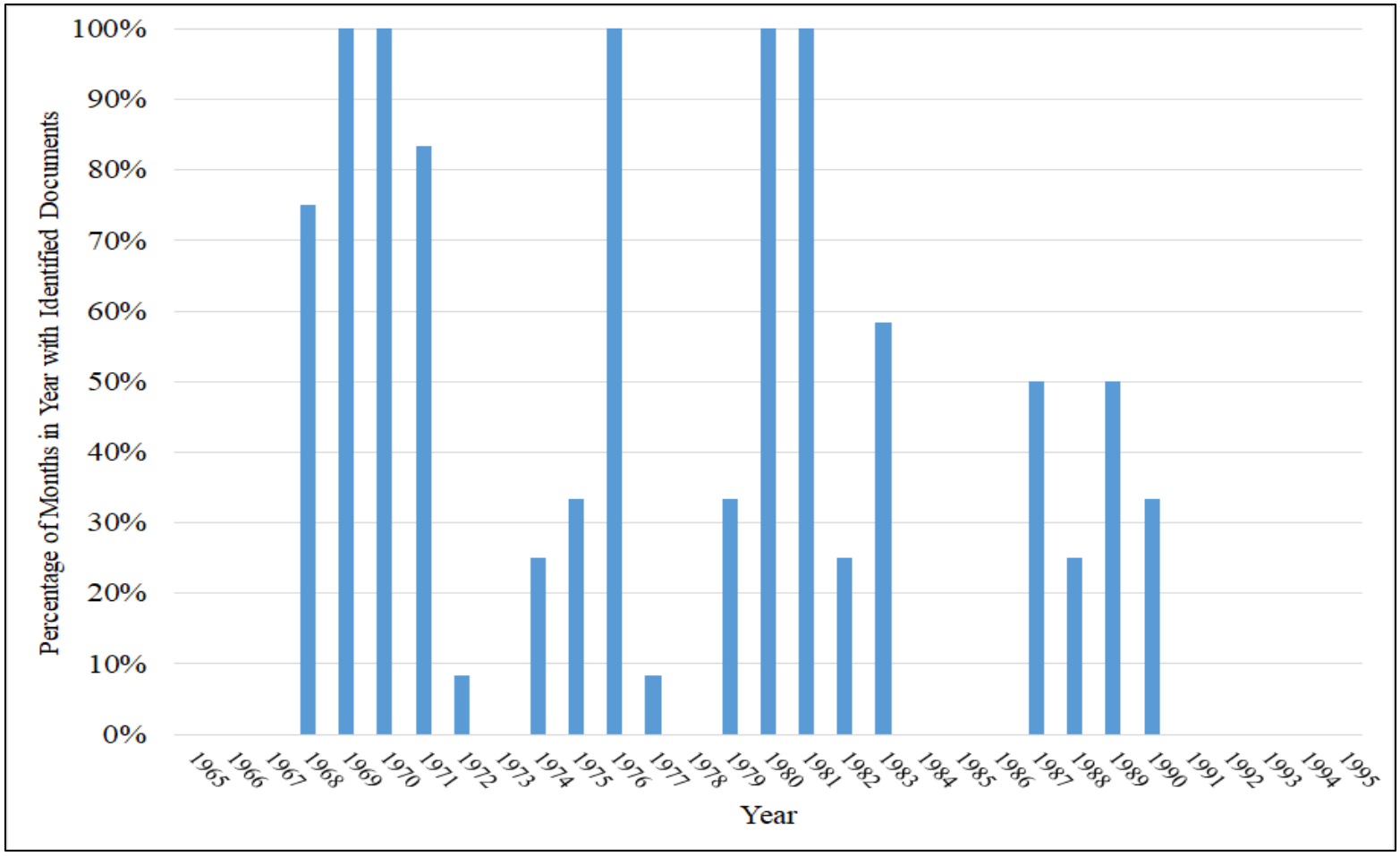
Relevant Available Documentation (cont.)

Tagged Area Entry Permits by Year



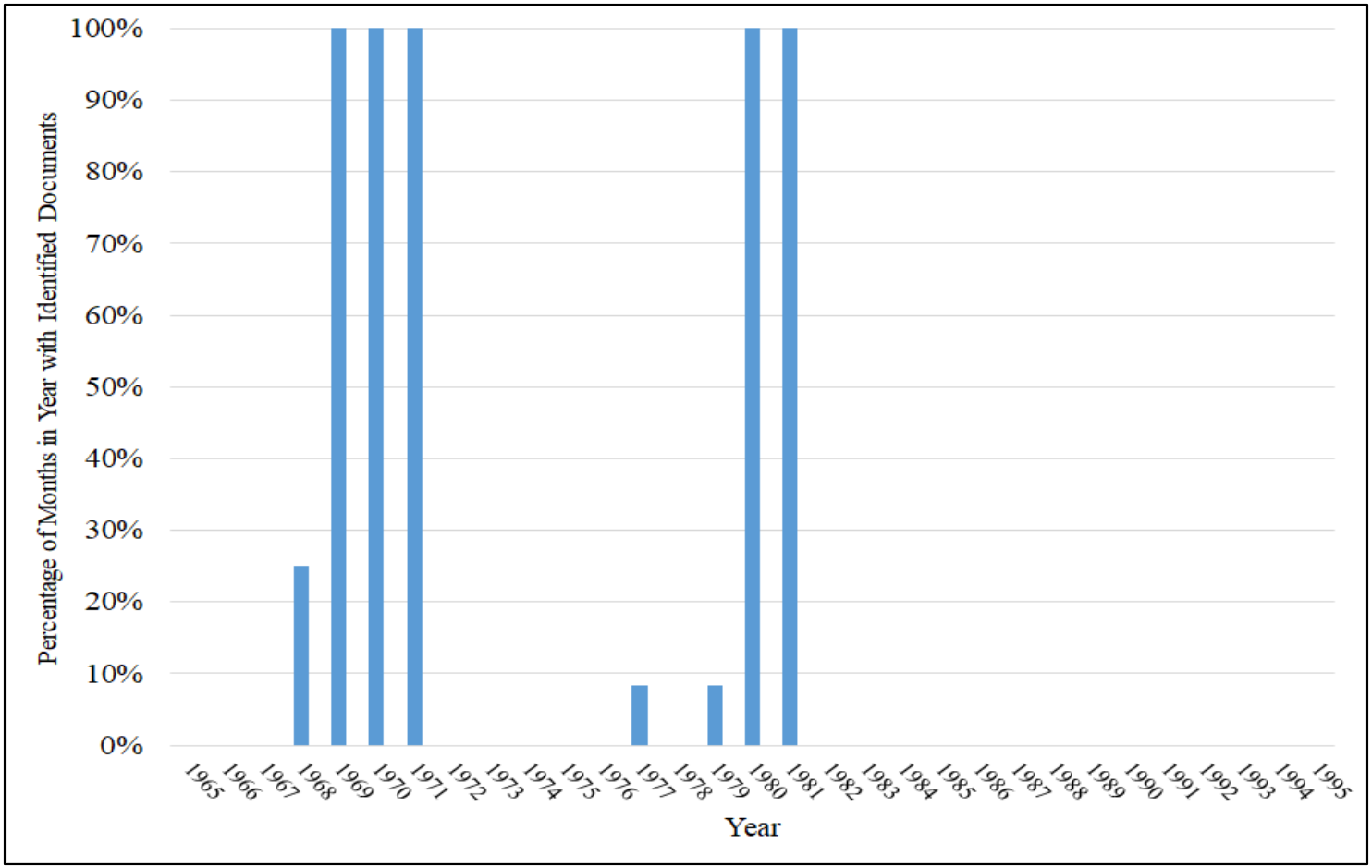
Relevant Available Documentation (cont.)

Routine Contamination Survey Reports by Year



Relevant Available Documentation (cont.)

Area Air Sampling Results by Year
(percentages do not include personnel lapel samplers)



Americium Exposure Potential – Overview

- Potential sources of internal americium exposure:
  - Handling and/or processing of decladded spent nuclear fuel
  - Fabrication of sealed americium sources and/or loss of integrity of existing americium sources
  - Involvement in Transuranic Management by Propartitioning-Separation (TRUMP-S) program activities that may have included americium as well as other transuranic material
  - Loss of integrity of radioactive smoke detectors containing americium

Americium Exposure Potential – Decladded Spent Fuel

- No identified evidence of decladding activities of spent nuclear fuel occurring at the De Soto site
- SC&A identified several examples of spent fuel arriving and being stored at the De Soto site; however, no direct evidence of handling or processing of decladded spent fuel
- SC&A did identify one example of a contaminated tray found in Building 4 (radiological laboratory building) that was indicated to have been used to clean sodium off of decladded fuel elements
  - Not clear where the fuel had been decladded
  - Assuming the declad fuel element was irradiated, the contamination in the tray would be expected to contain transuranic material (including americium)
  - This example is the subject of SC&A Finding 2

Americium Exposure Potential – Am-241 Sources

- Encapsulated americium source material at De Soto is well documented
  - Notice of Violation (NOV) in 1994 indicated that the required 6-month leak check was late by between 1–8 days
  - 1994 NOV was a repeat violation that was also noted in 1991
  - No evidence identified of americium sources actually leaking during the period under evaluation
- SC&A did not identify evidence of the fabrication of new Am-241 sources occurring at De Soto, though the facility was licensed to perform such fabrication

Americium Exposure Potential – TRUMP-S

- Documentation identified from 1989 of TRUMP-S material arriving at De Soto and potentially becoming “lost”
  - TRUMP-S material was placed in a radiological storage locker upon arrival at De Soto; however, administrative paperwork failed to notify the proper health and safety staff
  - Material was eventually located, and the packaging was intact with no external contamination
  - Cited documents indicate the TRUMP-S material consisted of depleted uranium and plutonium (americium is not mentioned)
- SC&A did not identify evidence or documentation of the actual use of any TRUMP-S material at De Soto

Americium Exposure Potential – Smoke Detectors

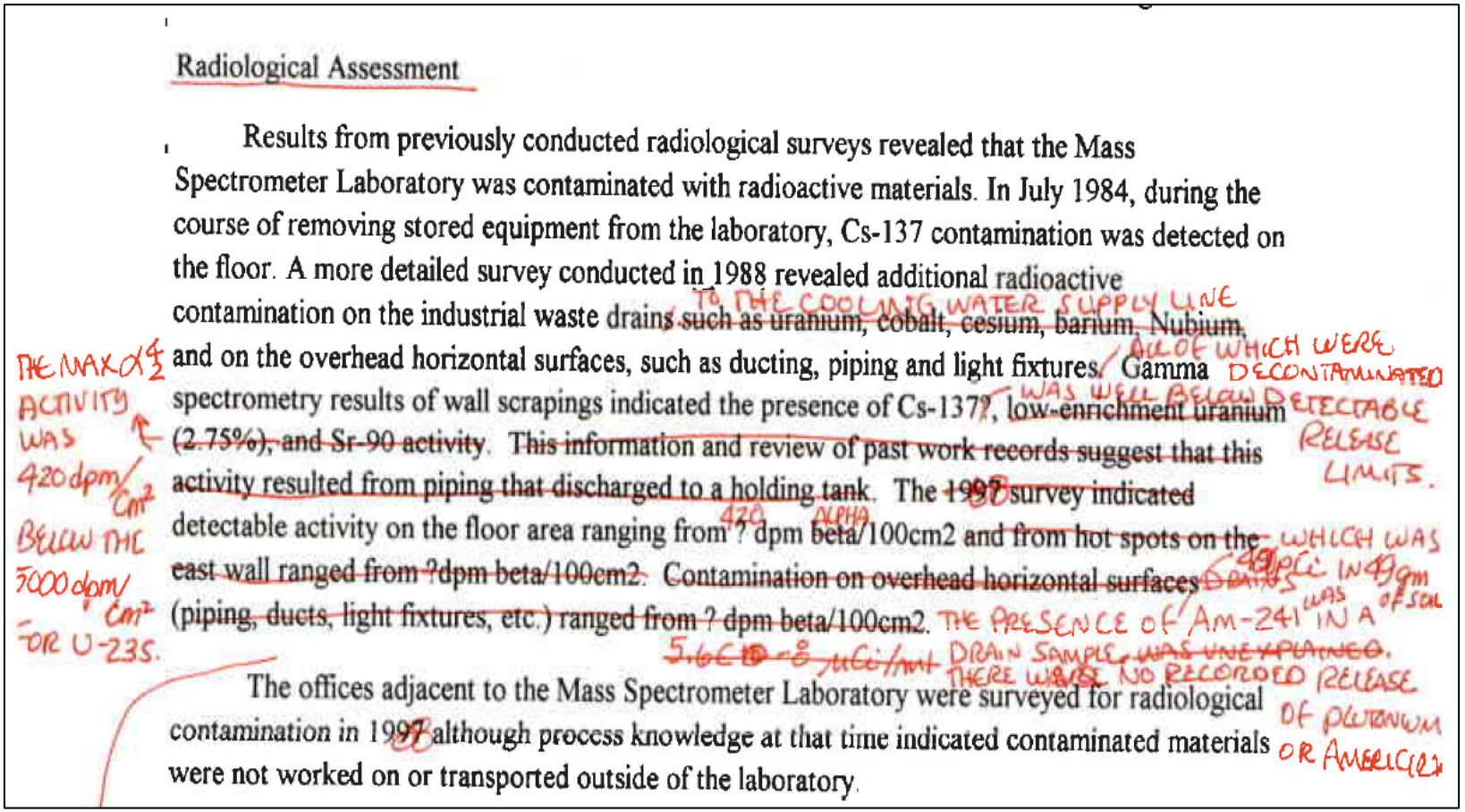
- Smoke detectors do not appear to have been in use at De Soto until April 1985
- While preventative maintenance (such as general cleaning) was performed at the detector location, all actual repair work that may have exposed the source material was performed at the electrical shop at SSFL
- A radiological study of the exposure potential from preventative maintenance indicated little to no exposure potential
  - All cleaning materials used were below the NRC levels for release to uncontrolled areas
  - Workers involved in the preventative maintenance submitted bioassays that indicated no detectable activity

Americium Exposure Potential – Other

- SC&A identified documentation describing a survey of the industrial waste drains in the Mass Spectrometry Lab (Building 4 at De Soto)
- The document appears to have been edited internally by site personnel (i.e., it contains red strikethrough marks and sentence additions/edits)
- Edits physically written on the document indicate that Am-241 was found in the industrial waste drains
- Edits also note that no release of americium or plutonium occurred
- The source of the Am-241 allegedly detected in the drains is not currently known by SC&A (SC&A Finding 3)

Americium Exposure Potential – Other (cont.)

Excerpt from 1997 Radiological Survey



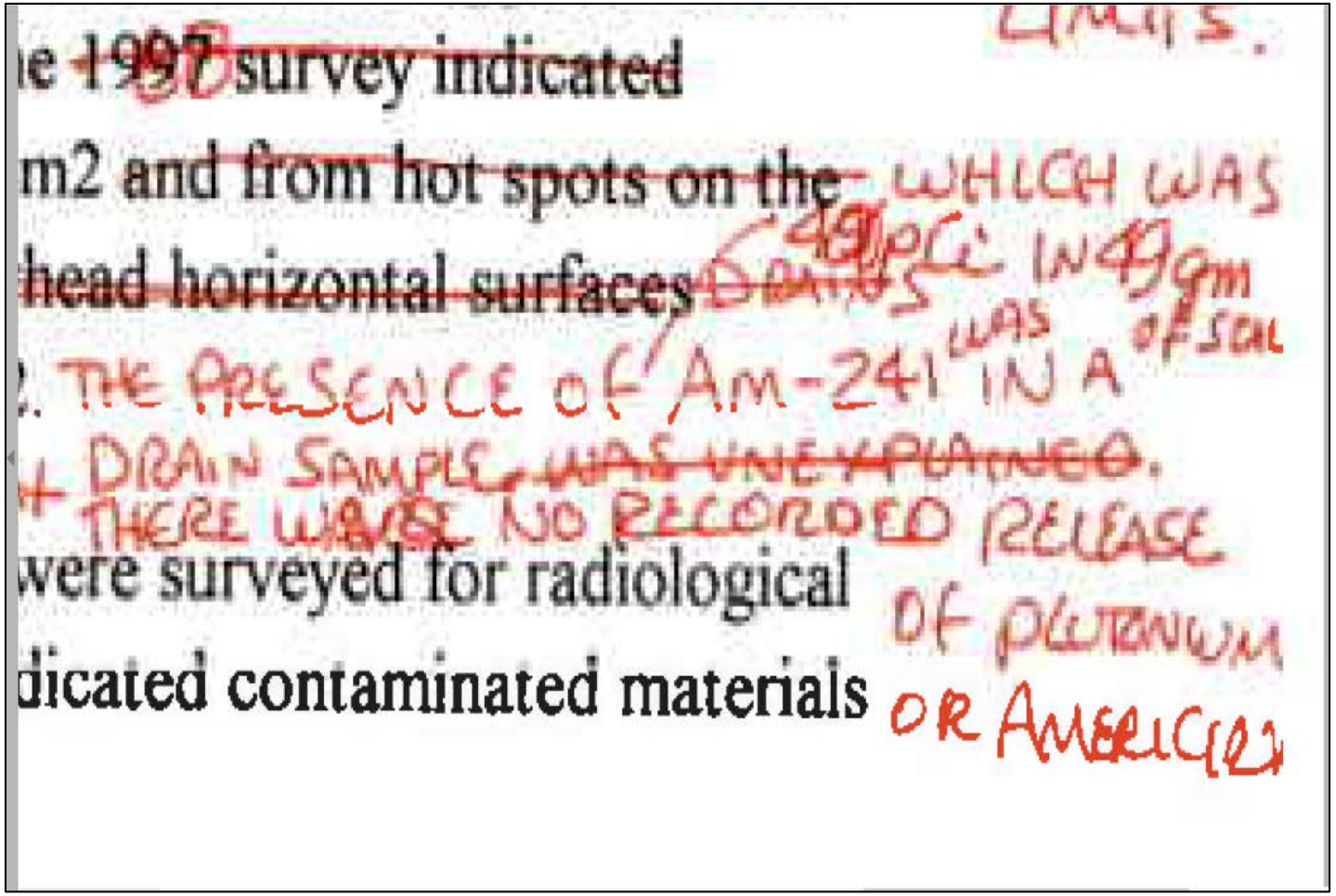
Radiological Assessment

Results from previously conducted radiological surveys revealed that the Mass Spectrometer Laboratory was contaminated with radioactive materials. In July 1984, during the course of removing stored equipment from the laboratory, Cs-137 contamination was detected on the floor. A more detailed survey conducted in 1988 revealed additional radioactive contamination on the industrial waste drains such as uranium, cobalt, cesium, barium, Nubium, and on the overhead horizontal surfaces, such as ducting, piping and light fixtures. Gamma spectrometry results of wall scrapings indicated the presence of Cs-137, low-enrichment uranium (2.75%), and Sr-90 activity. This information and review of past work records suggest that this activity resulted from piping that discharged to a holding tank. The 1997 survey indicated detectable activity on the floor area ranging from ? dpm beta/100cm2 and from hot spots on the east wall ranged from ?dpm beta/100cm2. Contamination on overhead horizontal surfaces (piping, ducts, light fixtures, etc.) ranged from ? dpm beta/100cm2.

The offices adjacent to the Mass Spectrometer Laboratory were surveyed for radiological contamination in 1997 although process knowledge at that time indicated contaminated materials were not worked on or transported outside of the laboratory.

Americium Exposure Potential – Other (cont.)

Magnified Portion Showing Edits Adding Am-241



Thorium Exposure Potential

- NIOSH SEC ER identified three distinct thorium operations:
  1. Fabrication of thorium fuel simulant discs in June 1970
  2. Post-test analysis of thorium capsules that had undergone destructive testing offsite occurring 6/15/1970–7/30/1970
  3. Grinding of approximately 540 thorium plates 2/28/1979–3/12/1979
- The 1979 grinding operation included pre- and post-operational bioassay sampling, which was used to develop a representative thorium intake for the operation
- NIOSH SEC ER concludes the calculated thorium intake from the grinding operation can be used to represent internal thorium exposures to workers at De Soto during the evaluation period

Thorium Exposure Potential (cont.)

- Additional activities with thorium:
  - Smear contamination surveys in support of a thorium source program that appears to have occurred in Buildings 4 and 5 in 1969
  - Personnel air sampling results from thorium operations in Room 11H36 (Building 1) in 1969
  - Tagged Area Entry Permit for the inspection of “Ca-Th-Mo” fuel simulant discs in March 1970
  - Personnel air sampling result involving a ThO_2 cutting operation in 1971
  - Several references to Sodium Reactor Experiment (SRE) fuel and/or materials arriving at De Soto but no indication of intended future use other than storage
- Personnel air sampling results are provided in the units of µCi-hr/cm^3; however, the actual time spent on the activity is not always indicated to allow for direct comparison to the thorium-grinding operation
- NIOSH should consider these additional activities to assure that the grinding operation is sufficiently bounding and provide guidance to assure that unmonitored intakes are appropriately assigned

Documented Interviews Relevant to SEC-00246

- The NIOSH SEC ER documents interviews with just two individuals as part of the evaluation of SEC-00246 (SC&A Finding 4)
  - One interviewee did not work at De Soto until the 1990s and gave information based on retrospective summary documentation
  - The other worked in non-radiological areas at De Soto beginning in the late 1970s but likely had knowledge of radiological operations
- Seven additional interviews in the SRDB were performed prior to the submission of SEC Petition 246 and involved work at De Soto
  - Three of the seven interviewees do not appear to have worked at De Soto during the period of interest
  - Remaining four interviewees do not specifically discuss americium or thorium at De Soto

Documented Interviews Relevant to SEC-00246 (cont.)

- DOE and EPA conducted interviews in 2010 and 2011 with former SSFL workers (including those who spent time at De Soto)
- 121 total interview summaries were cleared for release
- 41 of the 121 interviews reported work during the De Soto SEC evaluation period
- 13 of 121 interviews contained information relevant to SEC-00246
  - Neither americium nor thorium exposure during the SEC period was specifically mentioned
  - The 13 former workers (in particular those who discussed fuel fabrication) may represent suitable future interview candidates, if deemed necessary

Overview of the Claimant Population

- 257 total claims with relevant covered employment at De Soto at the time of SC&A's review
- SC&A examined the CATI files (and DOL case files as appropriate) for 187 of the 257 claims (~73%) *(Note: only 165 of the 187 reviewed claims had CATI reports completed)*
- Reviewed claims selected based on job titles with a likely potential of involvement in radiological work
- Only a small fraction of the reviewed claimant population indicated exposure to thorium and/or americium. Six of these CATIs were conducted directly with the energy employee and may represent suitable future interview candidates, if deemed necessary.

Petitioner-Supplied Documents

- CORE Advocacy for Nuclear and Aerospace Workers provided 20 primary reference documents specific to De Soto, with 59 individual items identified as relevant to SEC-00246 *(Note: several documents provided were duplicates of documentation that had already been captured and included in the SRDB)*
- Documents provided by CORE Advocacy included a signed affidavit from a former worker
  - The affidavit did not provide direct indications of exposure potential to unencapsulated americium, decladded spent nuclear fuel, or additional thorium fuel fabrication operations.
  - The worker was re-interviewed by SC&A and NIOSH on 11/14/2018; the results have not yet been finalized.

Petitioner-Supplied Documents

- SC&A reviewed each item presented by CORE Advocacy and the supporting reference documentation
  - SC&A did not identify evidence in the additional documentation of an internal exposure hazard to unencapsulated americium that occurred at De Soto
  - Evidence of spent fuel arriving at De Soto in the additional documentation did not directly indicate processing of, and by extension an exposure potential to, decladded spent fuel elements containing transuranic material
  - SC&A did not identify operations, such as direct processing of SRE fuel rods, or other thorium activities that would present a greater hazard than the thorium fuel plate-grinding operation in 1979, which has been proposed for coworker assignment

Summary of Findings

- **Finding 1:** SC&A noted significant temporal gaps in available primary documentation such as Health Physics Logbooks, Tagged Area Entry Permits, Contamination Smear Surveys, and General Air Sample Reports. The disposition of additional primary documentation for De Soto is not known at this time.
- **Finding 2:** A health physics logbook entry involving a contaminated tray that had been used to clean decladded fuel was found in a De Soto hood in the fuel fabrication area. Contamination from decladded fuel (assuming irradiation) would contain Am-241 and potentially Th-232, depending on the original fuel composition.
- **Finding 3:** Internal editing of a 1997 document concerning the Mass Spectrometry Laboratory indicated that a 1988 survey detected Am-241 in the facility industrial waste drains. The source of the Am-241 is not currently known.
- **Finding 4:** Only two individuals were specifically interviewed about De Soto radiological conditions after the submission of Petition-00246 in December 2017. SC&A has identified several potential future interview candidates, if deemed necessary.

Preliminary Conclusion

Although SC&A did not find evidence of operational processes involving unencapsulated americium at De Soto, at least one incident of material potentially contaminated with the transuranic material associated with decladded fuel was identified. Furthermore, it appears that americium was detected in the Mass Spectrometry Lab drain samples in 1988 whose provenance is unknown.

SC&A has not identified direct evidence of thorium operations occurring at De Soto during the period under evaluation that would not be bounded by the calculated intake rates derived from the 1979 grinding operation that is being proposed for coworker application.

However, SC&A also noted significant temporal deficiencies in the available primary documentation of health physics activities at De Soto. Furthermore, the available documented interviews directly associated with radiological conditions at De Soto under evaluation for SEC-00246 are clearly limited at the current time.

Work Group Recommendations and/or Path Forward

TBD

Questions?