Santa Susana Field Laboratory (Area IV) SEC Petition-00235 Preliminary Review

Presented by:

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Introduction and Background SEC Petition-00235

- Periods prior to 1989 at SSFL are covered by three previous SECs:
  - SEC-00093 (January 1, 1955, through December 31, 1958): Inability to reconstruct both internal and external exposures to individual members of the class.
  - SEC-00156 (January 1, 1959, through December 31, 1964): Inability to reconstruct internal exposures for individual members of the class (lack of sufficient bioassay for coworker analysis).
  - SEC-00234 (January 1, 1964, through December 31, 1988): Inability to reconstruct internal exposures to americium and thorium for individual members of the class.

Introduction and Background SEC Petition-00235 (cont.)

- Original petitioner requested definition:

"All employees of North American Aviation, to include corporate successors and subcontractors who worked at Area IV of the Santa Susana Field Laboratory (SSFL) from December 31, 1964 through the present."

- Class evaluated by NIOSH:

"All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at Area IV of the Santa Susana Field Laboratory in Ventura County, California, from August 1, 1991 through June 30, 1993."

Introduction and Background SEC Petition-00235 (cont.)

- Note from SEC-00234 Conclusions (class added up to 1989):

  "NIOSH has not identified any data that suggest the possibility for significant operational thorium or americium exposures after 1988 that cannot be bounded. Therefore, NIOSH has established an end date of December 31, 1988, for this SEC class."

- NIOSH's evaluated period for SEC-00235 (August 1, 1991–June 30, 1993) is based on the use of the bioassay contractor Controls for Environmental Pollution (CEP) during this timeframe.
- CEP had been implicated in data falsification related to the bioassay program at Sandia National Laboratory, and any results are considered invalid.
- Available in vitro results from CEP cannot be used either individually or in coworker models at SSFL (note: NIOSH does not utilize bioassay results evaluated by CEP for SSFL or any other covered site under EEOICPA).

Introduction and Background SEC Petition-00235 (cont.)

- NIOSH released its Petition-00235 Evaluation Report on May 11, 2017
- Summary of NIOSH Feasibility Determination/Conclusions
  - No issues had been identified with the reconstruction of external exposures or medically related exposures. External dose to unmonitored workers can be reconstructed using derived coworker external doses (ORAUT-OTIB-0077).
  - In vitro monitoring results were disqualified; however, an adequate whole body count (in vivo) program was still in use during this time.
  - Confirmatory bioassay performed after CEP was removed as bioassay contractor showed no measurable internal exposures.
  - Internal coworker intakes have been developed from bioassay results during the operational period (up to 1988) for uranium, plutonium, and fission products that can be used to reconstruct internal exposures during the residual period (including the CEP period).

Introduction and Background SEC Petition-00235 (cont.)

- SEC ER discussed with SSFL/De Soto WG on December 4, 2017, with two follow-up action items for NIOSH:
  - Item 1: Evaluate available air sampling data during the CEP period to help confirm that radiological conditions during this period are sufficiently similar and/or bounded by the conditions during the operational period.
  - Item 2: The SEC-00235 SEC ER did not specifically discuss the potential for exposure to americium and thorium internal sources terms. NIOSH to specifically investigate and discuss the internal exposure potential to these sources.
- NIOSH delivered two white papers to the Work Group in November 2018 to address these two issues.
- NIOSH presented the two white papers to the Work Group on December 3, 2018, at which time SC&A was tasked with review of the new information.
- SC&A delivered its review of the two white papers via the single document: *"Review of Remaining Internal Dose Topics Related to the Evaluation of SEC-00235 at the Santa Susana Field Laboratory"* (February 20, 2019).

SC&A Review Approach

- Site Research Database (SRDB): Review of currently available documentation in the SRDB (2,726 total documents for Area IV; however, only a subset are directly related to SSFL operations after 1988)
- Boeing Incident Database: Review of relevant incidents files contained in the Boeing Incident Database supplied by the petitioner (Core Advocacy for Nuclear and Aerospace Workers)
- Evaluation of general area gross beta and gross alpha air sampling data to compare the relative internal exposure potential during the SEC/CEP period

Review of SRDB Documentation

- Purpose:
  - Identify documentation of radiological projects involving americium and/or thorium during the post-1988 period at SSFL
  - Identify documentation related directly to the SEC/CEP period that might invalidate the use of operational coworker intakes to reconstruct internal exposures
- Document types contained on the SRDB and reviewed include (but are not necessarily limited to):
  - General Area (GA) Air and Breathing Zone (BZ) results
  - Contamination Surveys
  - Environmental Monitoring Evaluations
  - Accident/Incident Reports
  - Decontamination and Decommissioning Evaluations
  - Other Planning/Occurrence Reports

Review of SRDB Documentation (cont.)

- SRDB Documentation Includes interviews with former workers with knowledge of radiological conditions during the period of interest:
  - *"As the various ETEC activities were terminated, the potential exposures to alpha-emitters reduced significantly. As mentioned above, the primary isotopes of concern became Cs-137 and Co-60. While alpha-emitters were also part of the source-terms in Building 20 and the RMHF, these were at very low levels and were not routinely found in the contamination surveys of these locations."*
  - *"It is my opinion that Am-241 and thorium would have been minor contributors, if any, to internal dose. It is likely that this rationale is why there were relatively few bioassay requests made historically for these radionuclides. If Am-241 and thorium had been a significant internal dose contributor in the workplace of SSFL or De Soto, then it would logically have also been a potential environmental contaminant. This is not the case as demonstrated by the USEPA. The USEPA Area IV Radiological Study (2009–2012)… So, neither americium nor thorium are or were an environmental issue. One could arguably extrapolate back and imply that it was also not a workplace issue at SSFL or at De Soto, or at least, less so than uranium, plutonium, and mixed fission products, for which we had more than adequate bioassay data."*

Review of SRDB Documentation (cont.)

SC&A conclusions based on SRDB documentation:

- SC&A did not identify any evidence of significant thorium or americium operations or unique exposure potential that would represent an unmonitored exposure that could not be feasibly bounded.
- SC&A did not identify evidence that suggests the internal exposure potential during the CEP period was significantly different than the operational period, which would preclude the use of occupationally derived coworker intakes for plutonium, uranium, and mixed fission products.

Review of Boeing Incident Database

- Purpose:
  - Identify incidents involving americium and/or thorium during the post-1988 period at SSFL
  - Identify radiological incidents during the CEP period that might preclude the ability to perform dose reconstruction with sufficient accuracy
- Overview:
  - Approximately 71 incident files related to SSFL post-1988 (19 of which involved the detectable spread of contamination)
  - 10 incident files related to SSFL during SEC-00235-evaluated period/CEP period (1 of which involved the detectable spread of contamination)

Review of Boeing Incident Database (cont.)

SC&A Conclusions:

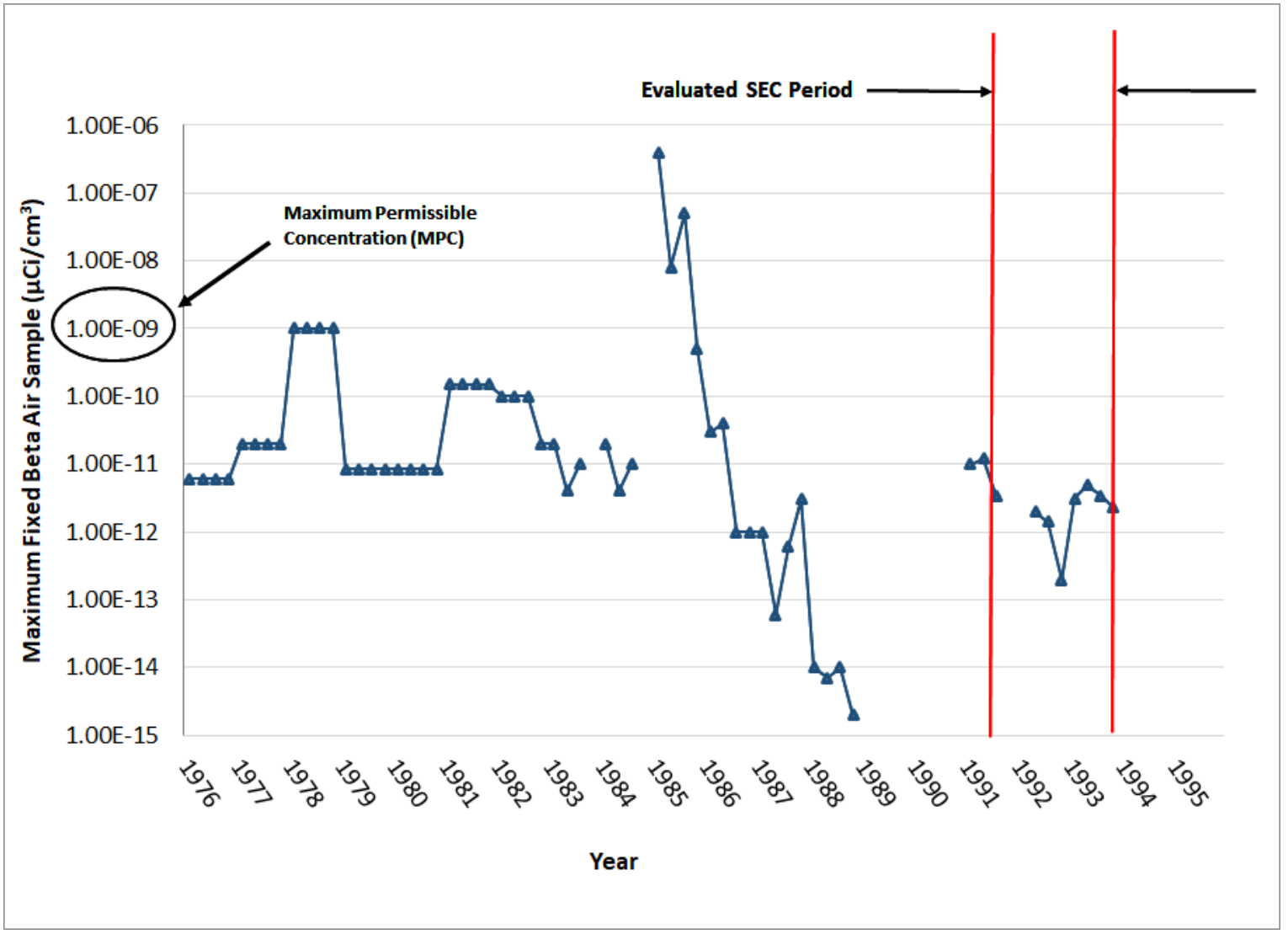
- No incidents involving thorium were identified.
- Single incident involving Am-241 (this incident has only been recently discovered as part of a separate review of SEC-00246 for the De Soto facility and was not identified in the recent 2019 SC&A report for SEC-00235):
  - Low-level contamination of the hands involving the cleaning of a smoke detector in the control room
  - Contamination on hands was “easily removed”
  - No contamination was detected in the immediate vicinity of the work
  - Nasal smears were negative for those involved
- Incidents reviewed did not indicate a significantly different internal exposure potential during the CEP period than during other D&D activities or the operational period for which coworker data are available.

Evaluation of Air Sampling Data

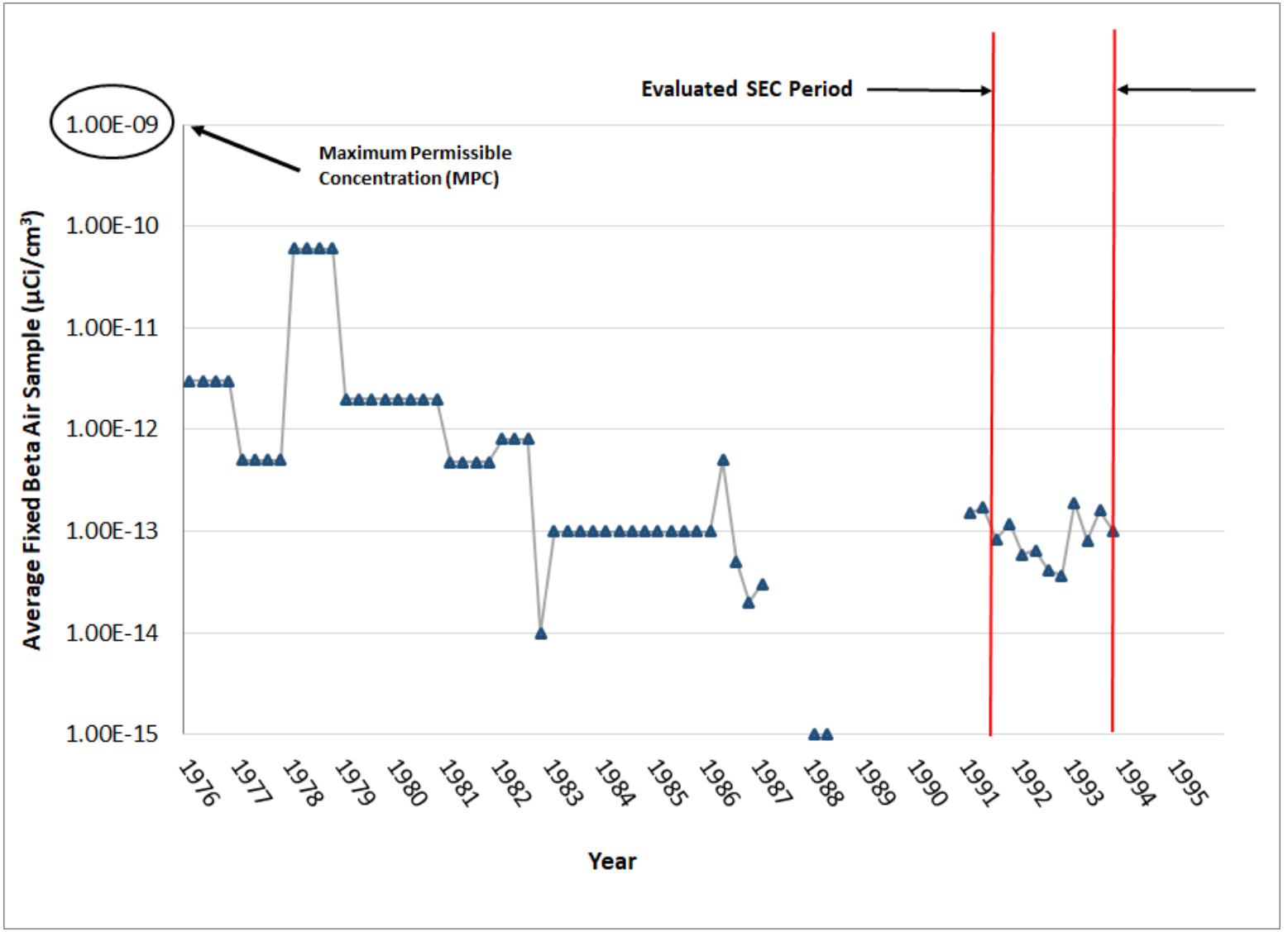
Purpose:

- Evaluate available GA air samples for gross beta and gross alpha taken during the operational period and SEC/CEP period.
- Compare the general airborne contamination levels to help corroborate whether operationally-derived coworker intakes are sufficiently representative and/or bound conditions during the SEC/CEP period.
- Allows for the use of available coworker intake values (ORAUT-OTIB-0080) to reconstruct doses during the period when in vitro sampling has been invalidated.

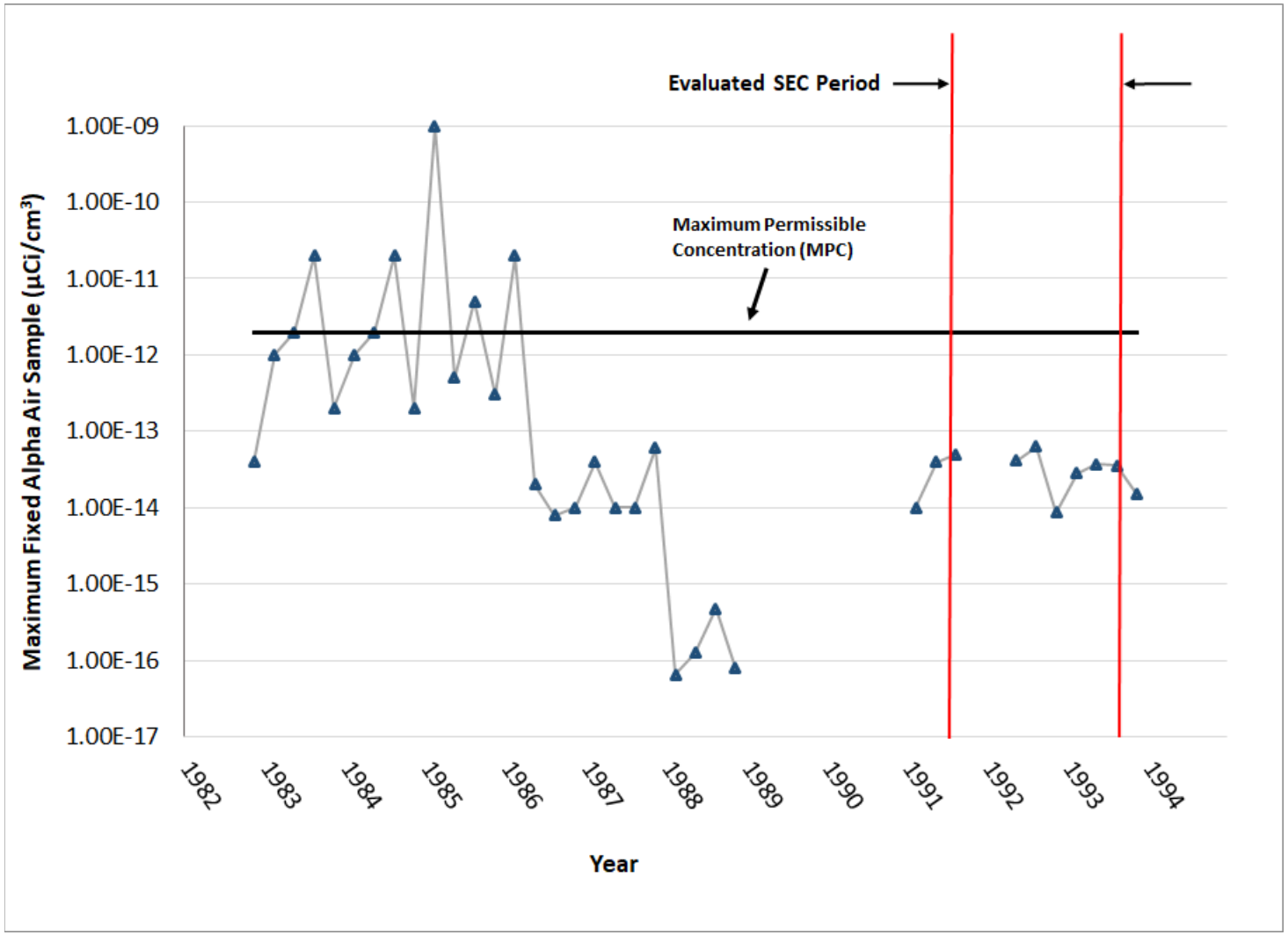
Evaluation of Air Sampling Data (cont.) – Maximum Gross Beta



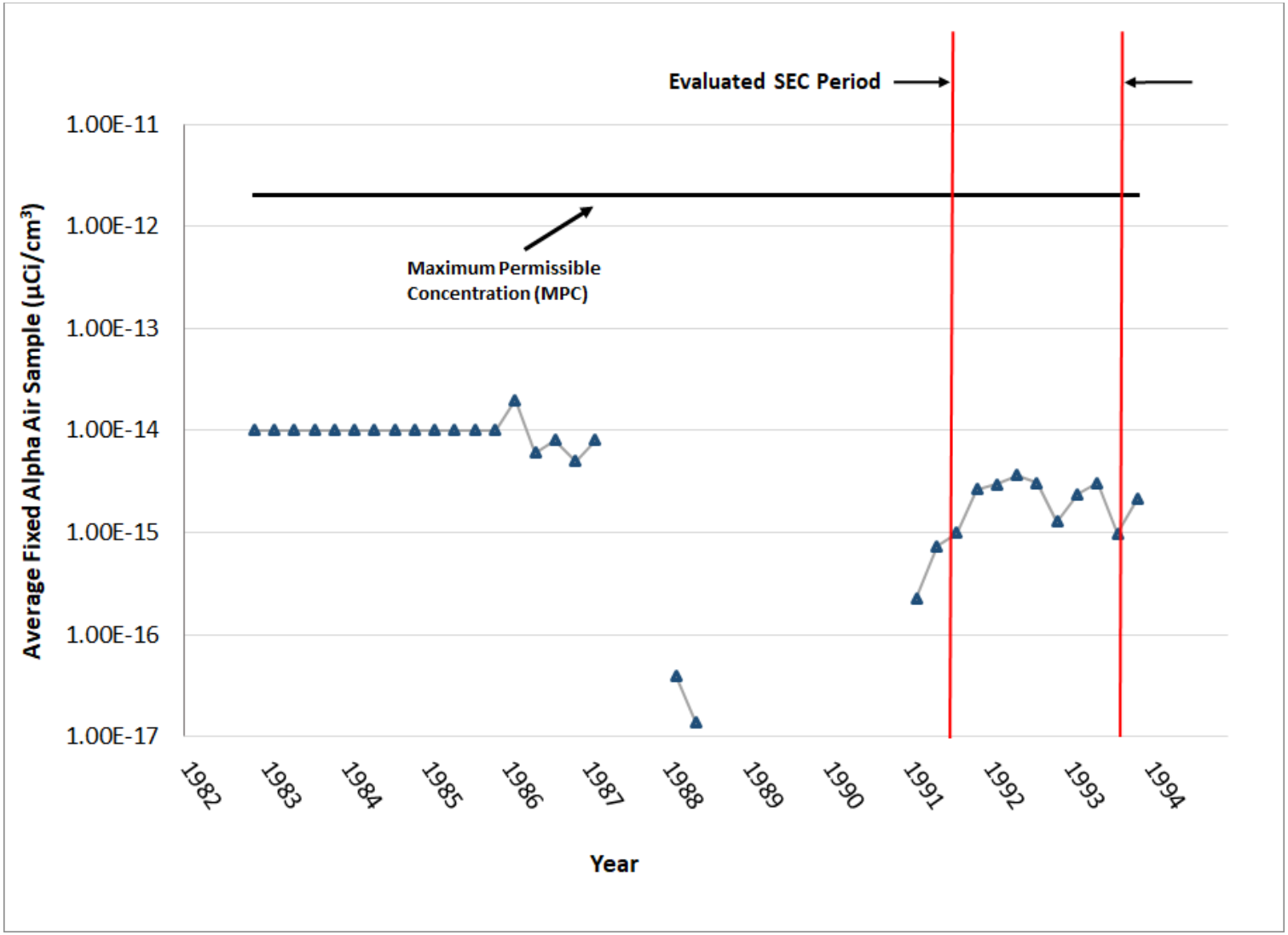
Evaluation of Air Sampling Data (cont.) – Average Gross Beta



Evaluation of Air Sampling Data (cont.) – Maximum Gross Alpha



Evaluation of Air Sampling Data (cont.) – Average Gross Alpha



Evaluation of Air Sampling Summary Data (cont.)

- Average of the Average Quarterly Air Samples ($\mu Ci/cm^3$):
  - Gross Beta
    - Maximum Permissible Concentration (MPC): 1×10^{-9}
    - Operational Period: 5.88×10^{-12}
    - CEP/SEC Period: 8.44×10^{-14}
  - Gross Alpha
    - MPC: 2×10^{-12}
    - Operational Period: 8.85×10^{-15}
    - CEP/SEC Period: 2.51×10^{-15}

Evaluation of Air Sampling Summary Data (cont.)

- Average of the Maximum Quarterly Air Samples ($\mu Ci/cm^3$):
  - Gross Beta:
    - MPC: 1×10^{-9}
    - Operational Period: 9.27×10^{-9}
    - CEP/SEC Period: 2.49×10^{-12}
  - Gross Alpha:
    - MPC: 2×10^{-12}
    - Operational Period: 4.66×10^{-11}
    - CEP/SEC Period: 3.83×10^{-14}

Evaluation of Air Sampling Data Conclusion

- General Area air samples at both the maximum and average quarterly levels help corroborate that the measured values for controlled areas during the CEP period were bounded by the operational period for both gross beta and gross alpha measurements.
- Quarterly GA air samples during the CEP period were all several orders of magnitude below the MPC for both alpha and beta airborne contamination.
- SC&A did not identify any evidence in the available air sampling data to suggest that internal exposure potential to the radionuclides of concern at SSFL would not be bounded by the operational bioassay data.

Summary of SC&A Review

- Thorium and Americium Post-1988
  - Current Exposure Assessment in an SEC Context: Current SRDB documentation does not indicate a source of exposure to thorium or americium that cannot be feasibly reconstructed with sufficiently bounding methods and assumptions.
  - What about Dose Reconstructions?
    - Current methods assign “ambient” or “environmental” intake based on stack emissions.
    - SC&A Suggestion: Development of an occupational model (breathing zone data, general area monitoring, administrative limits)
    - NIOSH to investigate potential occupational exposure model.
- SEC/CEP Period (August 1991–June 1993): SC&A did not find evidence in the evaluation of air sampling data, SRDB documentation, or the Boeing Database to suggest that internal dose reconstruction was infeasible using operational coworker analysis.

Work Group Recommendations and/or Path Forward

- SSFL/De Soto Work Group Teleconference held on March 25, 2019.
- Work Group determined at that time that the Advisory Board should accept NIOSH's evaluation and recommendation not to designate an additional class for SSFL under SEC-00235:

  "All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at Area IV of the Santa Susana Field Laboratory in Ventura County, California, from August 1, 1991 through June 30, 1993."

- Additional developments since the SC&A Report and Work Group meeting

Additional Developments

- Core Advocacy for Nuclear and Aerospace Workers (petitioner for SEC-00235 and SEC-00246) provided two additional documents to the Work Group for the March 25, 2019, teleconference.
- Core Advocacy Document 1: Listing of Buildings at SSFL associated with thorium, americium, and other nuclides that are not reflected in the site profile
  - Underlying references are Historical Site Assessments.
  - Study was done to help identify locations and contamination types for future soil sampling.
  - Dose reconstructions are not building specific for SSFL.
  - Site profile should be updated to reflect this historical information (assure TBD is comprehensive and accurate).

Additional Developments

- CORE Advocacy Document 2: Historical Site Assessment performed in 2011 indicates potential TRUMP-S operations at SSFL beginning in 1989 (potential exposures to plutonium, americium, uranium, and neptunium).
- SC&A Evaluation of CORE Advocacy Document 2:
  - Underlying and supporting documentation indicate pre-operational planning activities in late 1989
  - Application for License Modification for TRUMP-S program was still in process in February 1990
  - May 1990 newspaper article noted the operation was moved to the University of Missouri due to the *"heat of public challenges to the company getting the project licensed by* [NRC]"
  - TRUMP-S material shipped from storage location at SSFL to University of Missouri on September 7, 1990
  - SC&A did not find documentation to affirm that the TRUMP-S project was actually implemented during brief window at SSFL

Additional Developments

- Petitioner notified NIOSH on January 28, 2019, that approximately 1,463 boxes of DOE records potentially relevant to SSFL have been identified.
- The exact contents and relevancy of the boxes are not currently known.
- Per information supplied by Core Advocacy, these boxes are scheduled to be made available no later than fall 2019 (recent discussion between Petitioner and DOE indicates those boxes may be currently available at the DOE facility in Cincinnati).

Additional Developments

- What about the boxes of records?
  - NIOSH is routinely notified of any new and relevant information made available and will evaluate it accordingly (standard process).
  - Petitioner can also separately request the records via a Freedom of Information Act request.
  - SEC evaluation and discussion could potentially be reopened via either the 83.14 process (NIOSH generated) or submission and qualification of a new 83.13 petition (Petitioner generated).

Questions?