General Atomics Special Exposure Cohort Evaluation Report

LaVon B. Rutherford, CHP
NIOSH
Division of Compensation Analysis and Support

July 29, 2014
Idaho Falls, Idaho

Background

- NIOSH issued Evaluation Report (ER) in September 2006 for SEC-00064 (84.14[1])
- Presented ER to the Advisory Board on Radiation and Worker Health (Board) December 11, 2006
- Board agreed with NIOSH recommendation to add a class to the Special Exposure Cohort (SEC)

[1] §83.14 petition is a petition submitted to NIOSH by a petitioner whose dose could not be reconstructed by NIOSH

Background (cont.)

- In June 2010 NIOSH completed a review of the SEC class definitions (consistency, applicability, and whether NIOSH needed to act to correct an existing class definition)
- We recognized a need to adjust the existing class definition from workers in specific buildings to include “All employees…”
- Waited for “Litmus case” to serve as the petitioner for an 83.14 ER

Background (cont.)

- Sanford Cohen & Associates (SC&A) completed a review of the General Atomics Site profile in October 2013
- In June 2014, NIOSH received a potential "Litmus claim"
- June 17, 2014: NIOSH informed a General Atomics claimant that we were unable to reconstruct the radiation dose for the claim
- July 1, 2014: NIOSH received an 83.14 SEC petition
- July 17, 2014: NIOSH approved and issued the evaluation report

Site Information

- Location: La Jolla, California
- Private contractor for the Atomic Energy Commission (AEC) from 1960 – 1969
- Operated under licenses first issued by the AEC and later by the state of California
- Performed an array of radiological research and production activities involving various radionuclides
  - Uranium (Enriched, Normal, Depleted and Recycled)
  - Plutonium
  - Thorium
  - Fission and activation products
  - Tritium

Radiological Operations

- Developed and fabricated reactor fuels
- Operated three on-site Training Research Isotopes General Atomics (TRIGA) reactors
- Fusion research
- Experimental criticality test facilities
- Experimental operations with radioactive materials
- Special nuclear material and radioactive tracers in laboratories
- Operated four linear accelerators (LINACs)

Internal Monitoring Data

- **Bioassay monitoring are available from the start of AEC operations**
  - Samples analyzed for gross alpha or uranium activity
  - Appears to be random sampling based on perceived potential for internal exposure
- **No routine personal or area monitoring for internal exposures to thorium, plutonium during the AEC period**
  - Whole body counting started 1966. However, they're not useable.
  - Twelve experimental whole body counts for thorium 1966
  - One whole body count for thorium 1969

Internal Monitoring Data (cont.)

- Bioassay monitoring for fission products beginning in the early 1960s
  - Incident based until 1963
- Bioassay for tritium started in 1965
- No thoron measurements although routine reference to thoron contamination on air samples

External Monitoring Data

- External monitoring data are available from the start of AEC operations
- Film badges sensitive to beta, gamma, and neutron were issued for individuals working in areas with potential for neutron exposure

First Petition Evaluation Infeasibilities

- Since this was an 83.14, NIOSH did not address feasibility for each radionuclide. Once NIOSH identifies an exposure that cannot be reconstructed NIOSH moves forward with an 83.14 petition
- NIOSH identified an infeasibility in reconstructing thorium exposures and tritium prior to 1965
  - No personal or area monitoring data specific to Thorium
  - Diverse operations with thorium and no correlation with other radionuclides
  - No tritium data prior to 1965

First Petition Class

- Early in the program, NIOSH did not ask DOL if they could administer a class as defined
  - Can DOL identify the locations people worked?
- Early in the program, NIOSH did not recognize the potential of worker movements through various facilities
  - Were there maintenance workers that supported all the bldgs?
  - Were there access controls for each of the facilities that would control movement of workers?

First Petition Class (cont.)

- Because of this a number of classes were defined based on the buildings where the exposures may have occurred
- General Atomics class was defined by buildings where work with thorium may have occurred
  - Class Definition: All AWE Employees who were monitored or should have been monitored for exposure to ionizing radiation while working at the following General Atomics locations: Science Laboratories A,B, and C (Bldg. 2)…..

Site Profile Review

- October 2013 SC&A reviewed the site profile
- SC&A identified a number of issues associated with our dose reconstruction approach for the SEC period and the residual period
- NIOSH reviewed: the issues identified by SC&A; the site profile; and supporting documentation
- From the review NIOSH identified additional infeasibilities that are included in this evaluation

Additional Infeasibilities

Uranium, Plutonium, Thorium (Fuel Fabrication)

- No personal or area monitoring data specific to these radionuclides during 1960-1964 period
- No routine personal or area monitoring data specific to radionuclides other than uranium during the entire AEC period
  - Whole body counts starting in 1966 were not useable
- Isotopic ratios of airborne activity and gross alpha bioassay cannot be established
- The site profile currently uses a back extrapolation method from 1965-1968 period to address exposures in the 1960-1964 period and data outside the operational period for plutonium

Additional Infeasibilities (cont.)

Fission and Activation Products

- Incident based bioassay program starting in the early 1960s
- Some routine operations involving potential for exposure to mixed fission and activation products
  - Work with irradiated fuels
  - Y-90 production
  - Experimental facility work
- During a portion of the AEC period the incident based monitoring would not support a co-worker model and it's not clear based on the number of activities involving the potential exposure to fission and activation products that the routine bioassay program covered all of the activities

Additional Infeasibilities (cont.)

Tritium/Metal Tritides

- General Atomics began monitoring for Tritium in 1965
  - NIOSH has identified 194 bioassay samples from 1965 through 1969
- Metal tritides were present during the operational period with no indication of any analysis performed to determine the type of tritide
- NIOSH has determined that, without the knowledge of the type of metal tritide present at General Atomics, sufficiently accurate dose assessment cannot be made

Additional Infeasibilities (cont.)

Thoron

- No personal or area monitoring data for thoron are available for the entire AEC period
- Routine reference to thoron interference on air samples
- Site profile uses thoron data from 1975 for the operational period
- NIOSH has determined that the approach in the site profile does not provide a reasonable assessment of the potential exposures to thoron during the operational period

Additional Infeasibilities (cont.)

External Exposures

- External exposure issues were identified during site profile review that questioned the ability to reconstruct external exposures to unmonitored workers
- NIOSH has determined that it is unable to define individual worker exposure scenarios for those workers that were not monitored for external exposure
- NIOSH has determined that it cannot estimate unmonitored external beta, gamma, and neutron exposures for the AEC period

Infeasibilities Summary

- NIOSH does not have access to sufficient personnel monitoring, workplace monitoring, or source term data to estimate potential internal exposures to unmonitored radionuclides, including unmonitored uranium, thorium and progeny, plutonium, tritium, and fission and activation products and resulting doses for the class of employees covered by this evaluation
- NIOSH does not have access to sufficient personnel monitoring, workplace monitoring, or source term data to estimate unmonitored external beta, gamma, and neutron exposures for the class of employees covered by this evaluation

Health Endangerment

- The evidence reviewed in this evaluation indicates that some workers in the class may have accumulated chronic radiation exposures through intakes of radionuclides and direct exposure to radioactive materials.
- Consequently, NIOSH is specifying that health may have been endangered for those workers covered by this evaluation who were employed for a number of work days aggregating at least 250 work days within the parameters established for this class or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

Dose Reconstructions

- NIOSH intends to use any internal and external monitoring data available for individual claims to support partial dose reconstruction for claims not qualifying for inclusion in the SEC
- In addition, NIOSH's position on occupational medical dose did not change. NIOSH will continue to reconstructed this dose.
- A number of the issues identified by SC&A with the site profile will be resolved with this petition evaluation. NIOSH will work with the Advisory Board's work group and SC&A to resolve the remaining issues
- Once all issues are resolved NIOSH will revise the site profile to include the findings of this petition evaluation and the resolution from the findings of the site profile review

Current Class

All AWE Employees who were monitored or should have been monitored for exposure to ionizing radiation while working at the following General Atomics locations: Science Laboratories A,B, and C (Bldg. 2); Experimental Building (Bldg. 9); Maintenance (Bldg. 10); Service Bldg. (Bldg. 11); Bldgs. 21 and 22; Hot Cell Facility (Bldg. 23); Waste Yard (Bldg. 25 and 26); Experimental Area (Bldg. 27 and 27-1); LINAC Complex (Bldg. 30); HTGR-TCF (Bldg. 31); Fusion Bldg. (Bldg. 33); Fusion Doublet III (Bldg. 34); SV-A (Bldg. 37); SV-B (Bldg. 39); SV-D (no building number) for a number of work days aggregating at least 250 work days from January 1, 1960 through December 31, 1969, or in combination with work days within the parameters established for one or more other classes of employees included in the SEC

Recommended SEC Class

All Atomic Weapons Employees who worked for General Atomics at its facility in La Jolla, California, during the period from January 1, 1960 through December 31, 1969, 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 by one or more other classes of employees included in the Special Exposure Cohort

Recommendation

- For the period January 1, 1960 – December 31, 1969, NIOSH finds that radiation dose estimates cannot be reconstructed for compensation purposes

Class	Feasibility	Health Endangerment
January 1, 1960 – December 31, 1969	No	Yes