SC&A's Review of NIOSH's SEC-00253 Petition Evaluation Report for the Reduction Pilot Plant, Huntington, WV

Ron Buchanan, PhD, CHP

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Reduction Pilot Plant overview

- The Reduction Pilot Plant (RPP) was also known as the Huntington Pilot Plant (HPP)
- Occupied a 3.67-acre fenced-in parcel adjacent to a larger nickel plant operated by the International Nickel Company
- RPP built by the Atomic Energy Commission in 1951 to supply nickel powder
- Nickel powder was used to make gaseous diffusion barriers for the gaseous diffusion plants in Paducah, KY, and Portsmouth, OH
- 20–25 employees during operations at RPP
- 1956: Facility began using contaminated feed material (nickel with low-enriched uranium and fuel reprocessing contaminants)

Reduction Pilot Plant photograph (April 1963)

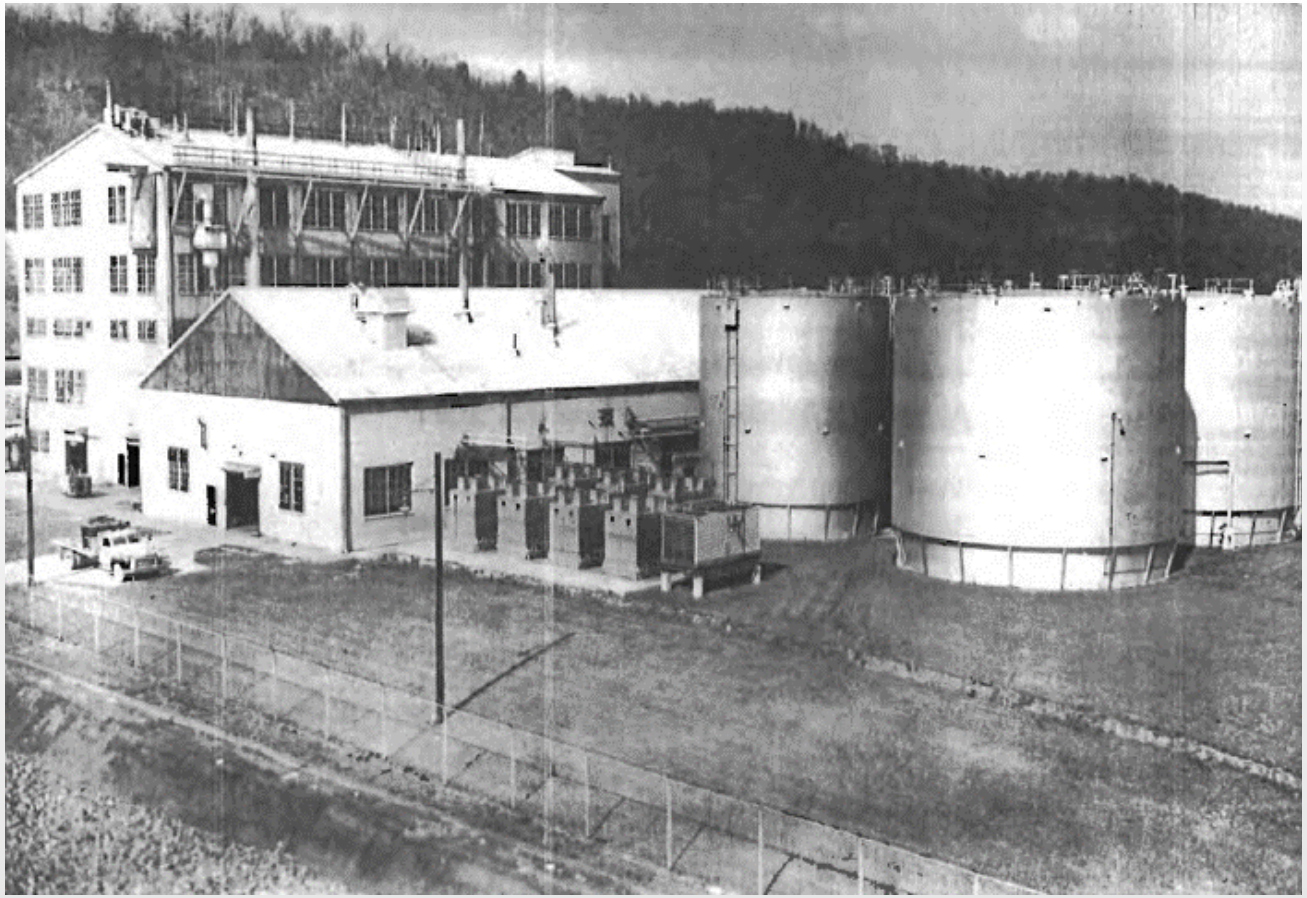

Photo credit: NIOSH. (2020). *SEC Petition Evaluation Report Petition SEC-00253*, p. 14.

Reduction Pilot Plant history and evaluated SEC period

- Operational period: 1951–April 30, 1963
- Standby period: May 1, 1963–November 26, 1978
- The decontamination and demolition of classified and contaminated equipment at the facility took place between November 27, 1978, and May 18, 1979
- Special Exposure Cohort (SEC)-00253 period: June 7, 1976–November 26, 1978
  - SEC-00253 during the latter part of the standby period
  - Standby period not initially considered a covered period (added by the U.S. Department of Labor in November 2019)
  - No other SECs have been evaluated for RPP

Reduction Pilot Plant conditions during standby period (~1976–1978)

- Operational activities had ceased by 1962
- Buildings placed in standby condition:
  - Entrance by security guards once per shift (3 times daily) to check the process and compressor rooms
  - Maintenance checks to maintain operational capability ceased in 1975 when Oak Ridge Operations determined that nickel production would not continue in the future
  - Inspections may still have occurred on a biannual basis

RPP document history

- ORAUT-TKBS-0004, revision 00, October 31, 2003
- ORAUT-TKBS-0004, revision 01, January 16, 2004
- OCAS-PER-025, revision 0, September 28, 2007
- OCAS-TKBS-0004, revision 00, August 13, 2008
- DCAS-PER-033, revision 0, December 9, 2011
- SCA-TR-SP2013-0043, June 4, 2013, review of the revised HPP site profile
- DCAS-TKBS-0004, revision 01, December 12, 2013
- OCAS-PER-066, revision 0, November 30, 2015
- DCAS-TKBS-0004, revision 02, November 5, 2018
- RPP SEC-0253 petition qualified, December 13, 2019

Evaluation report for petition SEC-00253

- NIOSH issued the SEC petition evaluation report (ER) for petition SEC-00253 for RPP on April 24, 2020
- The class evaluated was all International Nickel Company security personnel who worked at any location within RPP during the period from June 7, 1976, through November 26, 1978
- NIOSH's ER concluded that all external and internal doses for security personnel could be adequately reconstructed during the SEC period

SEC-00253 internal exposure monitoring and sources of potential exposure

- No individual internal monitoring data during SEC period
- Process building surveyed in January 1975:
  - Very little removable contamination
  - Highest amounts of fixed contamination were found in the residue system
- Low-enriched uranium residual contamination (generally 1–4% enrichment)
- Reprocessed uranium fuel contaminants:
  - Pu-239, Pu-240, Pu-241, U-236, Th-232, Np-237, U-237
  - All measured alpha contamination assumed to be uranium
  - Contaminant ratios assumed for K-25 barrier materials used in RPP dose assessment

SEC-00253 external exposure monitoring and sources of potential exposure

- No individual external monitoring data during SEC period
- 1975 survey determined majority of dose rates were within normal background with a maximum of 250 µR/hr contact readings on equipment (assumed for beta dose reconstruction)
- 1980 survey taken post-demolition found a maximum of 35 µR/hr (at 3 feet, assumed for gamma dose reconstruction) and 45 µR/hr (contact reading)
- Site-specific medical x-ray information not identified, generic annual medical exams to be assumed

SC&A's review of the evaluation report

- On September 2, 2020, SC&A was tasked with a review of NIOSH's ER for SEC-00253 for this focused group of workers and time period
- SC&A issued its review as SCA-TR-2021-SEC003, rev. 0, on April 2, 2021
- NIOSH issued a memorandum on April 29, 2021, "Reduction Pilot Plant SEC Evaluation Report Review," responding to SC&A's review of the NIOSH ER for the RPP SEC

SC&A's review approach

- Verification of survey information (1975 and 1979–1980 Oak Ridge Operations surveys)
- Claim file review:
  - SC&A reviewed the 77 claimant records in the NIOSH DCAS Claims Tracking System (NOCTS) files associated with RPP to identify any information relevant to dose reconstruction (DR) feasibility for security personnel during the period from June 7, 1976, to November 26, 1978
  - SC&A found that a total of 44 claimants worked a portion or all of 1976 through 1978 at RPP

SC&A's review results

- SC&A did not identify any information that would impact the feasibility of DR during the SEC-00253 period for security guards
- Key facet of the proposed DR process includes the exposure time
  - "Exposure time" = time spent inside the facility where residual contamination was present
  - Estimates of time spent during relevant activities are properly characterized and bounded for affected workers

Observation 1: Suggest further refinement of exposure time

- Computer-assisted telephone interview information indicated that exposure time may be longer:
  - Original estimate was 15 minutes per day
  - Claimant A had to check all 7 floors and the perimeter
  - Claimant B estimated it took 30 minutes per day
- SC&A recommended NIOSH attempt to contact and interview security guards or other workers with specific knowledge of the surveillance activities to assure an accurate or bounding estimate of the time required to walk through the facility
- Assumptions about exposure time should not preclude DR feasibility and can be considered site profile issues

NIOSH's 2021 response to observation 1: Exposure time

- NIOSH's April 2021 revised estimate of time spent in the facility was 52 minutes per day, 6 days per week, for 250 days per year (260 hours per year)
  - Estimated 5 minutes per floor (based on original ER assumptions of time spent walking the building floor footprint with stops) multiplied by 7 floors
  - Accounted for the physical dimensions of the lot at a walking rate of 4.4 feet per second for the perimeter check
- Increases the exposure time by a factor of approximately 3

NIOSH's response to observation 1: Assumed dose rate modification

- NIOSH used a maximum dose rate of 0.035 mrem/hour to complete the ER in a timely manner.
- NIOSH will reevaluate all dose rate data to obtain a more realistic estimate
- DCAS-TKBS-0004, rev. 02 (2018), to be revised:
  - Consider various dose rates
  - Add the standby period: May 1, 1963, through November 26, 1978

NIOSH's response to observation 1: Overall annual dose

- The overall annual doses may be lower even when using the increased exposure time because of the lower dose rates obtained by considering all the available dose data

SC&A's evaluation of NIOSH's response to observation 1

- SC&A concurs with NIOSH's reevaluation of the potential exposure time and finds it reasonable
- SC&A concurs with NIOSH's original use of the maximum dose rate to facilitate completion of the ER
- SC&A finds it is appropriate to consider all applicable dose rate data in the revised site profile
- SC&A recommends observation 1 be designated in abeyance pending review of the revised site profile

Observation 2: Ingestion intake not addressed for SEC period

- Tables 3 and 4 of the site profile give ingestion intake values for production workers and administrative personnel during the operational period and decontamination and decommissioning period
- However, the ER does not address potential ingestion intakes for the SEC period (resulting doses likely to be small)

NIOSH's response to observation 2

- Ingestion dose for the security guards can be estimated based on contamination levels
- The ER used the bounding alpha contamination value of 19 dpm/100 cm^2 to estimate inhalation intakes
- That value is applied to a 10E-4 m^2/hour ingestion coefficient from NUREG/CR-5512 (1992) to derive a 0.19-disintegrations-per-hour alpha ingestion rate for the security guards
- Details for assigning ingestion intakes will be included in the revised site profile

SC&A's evaluation of NIOSH's response to observation 2

- SC&A concurs with NIOSH's recommendations to address ingestion intakes
- SC&A recommends observation 2 be designated in abeyance pending review of the revised site profile

Summary of SEC ER review issues (likely site profile issues)

Observation 1: Exposure time

- SC&A concurs with NIOSH's reevaluation of the potential exposure time and all applicable dose rate data.
- SC&A recommends this observation remain in abeyance pending review of the revised site profile.

Observation 2: Ingestion intake

- SC&A concurs with NIOSH's recommendations to address ingestion intakes.
- SC&A recommends this observation be designated in abeyance pending review of the revised site profile.

Conclusions

- SC&A concurs with NIOSH that upper bounds can be established for internal intakes and external exposures.
- SC&A concurs that DR is feasible for security personnel during the SEC-00253 period.
- The URAWE work group discussed the issues on February 17, 2022, and concurred that DR is feasible for security personnel during the SEC-00253 period.

Questions?