Savannah River Site Plutonium Construction Trade Worker Stratification Refinement

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SRS and SEC Issues Joint Workgroup Meeting

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Overview

- Background
- Evaluation
- Summary and Conclusion
- Questions

Background

Background

- Initial concern: NIOSH combining all workers into a single co-exposure model
  - NIOSH stratified *a priori* into Construction Trades Workers (CTWs) and all other workers (non-CTWs)
- Current concern:
  - Construction Trades Workers in co-exposure models are a combination of prime Construction Trades Workers and subcontractor Construction Trades Workers

Current Discussion / Concern

- *Should the subcontractor Construction Trades Workers (subCTWs) be combined with prime Construction Trades Workers into a single co-exposure model?*
- NIOSH's position
  - *If prime CTWs had similar exposure conditions to subcontractor CTWs, then bioassay data from prime CTWs, and thus intakes based on that data, may be used to assign intakes to unmonitored subcontractor CTWs. It is NIOSH's position that the exposure conditions and potential for intakes were similar among all CTWs.*

Timeline of Discussion

- August 16, 2017 Joint SRS and SEC Issues workgroup meeting https://www.cdc.gov/niosh/ocas/pdfs/abrwh/2017/wgtr081617-508.pdf
- August 29, 2017 NIOSH email/memo to Mr. Clawson and Dr. Melius
- **May 28, 2019 NIOSH white paper**
  - *SRS Plutonium Construction Trade Worker Stratification Refinement (SRDB 176875)*
- November 12, 2019 – SC&A Memo review of the white paper (SRDB 179224)
- March 4, 2020 – NIOSH response to the SC&A review (SRDB 179903)

NIOSH Evaluation

Evaluation Plan

- Compare subCTW and prime CTW bioassay for a commonly monitored radionuclide onsite over a period of time
- Possible candidates
  - Plutonium (selected)
  - Uranium
  - Mixed Fission Products
  - Tritium

Evaluation time period

- Do we look at all years (massive effort) or select years?
- Decided to evaluate 5 years through the period 1972 through 1988, basically every three years
  - 1974, 1977, 1980, 1983, 1986
- Can we evaluate more years? – yes, but we don't feel this is necessary

SRS CTW Plutonium co-exposure model

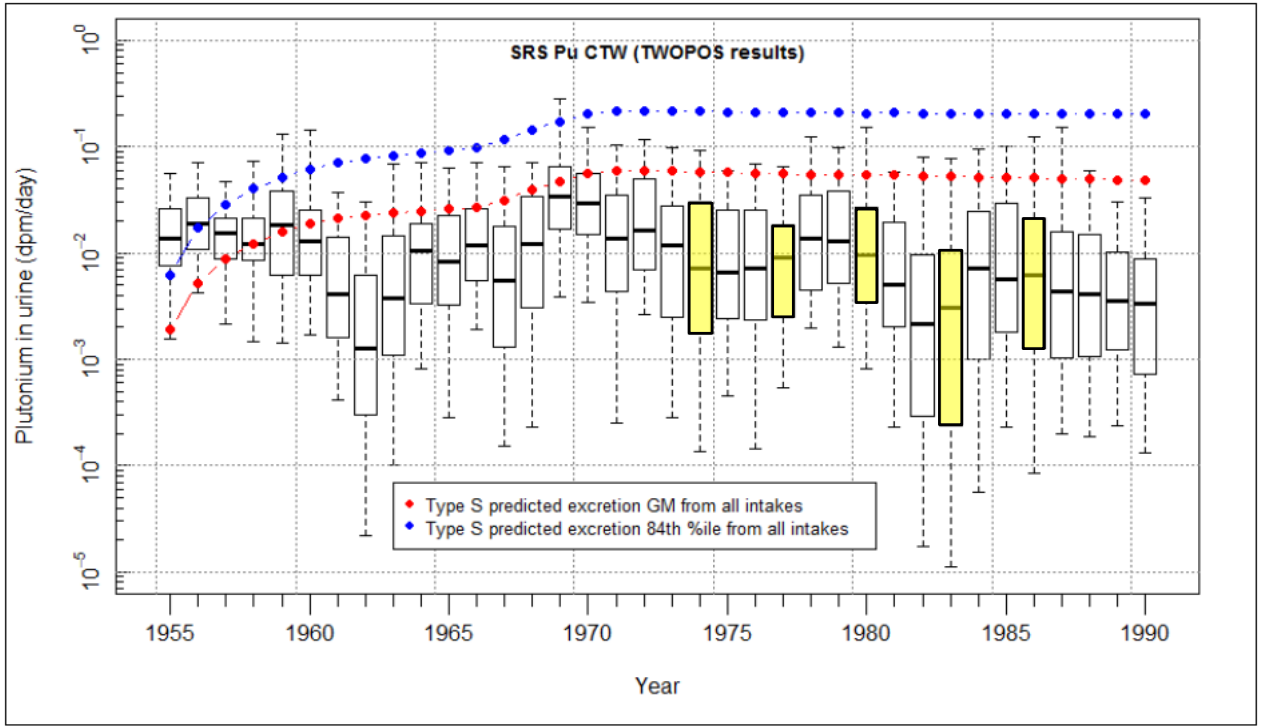


Figure 4-10. Plutonium type S CTW TWOPOS data box and whisker plot beginning in 1955.

Yellow highlights denote the 5 evaluation years

Source Data

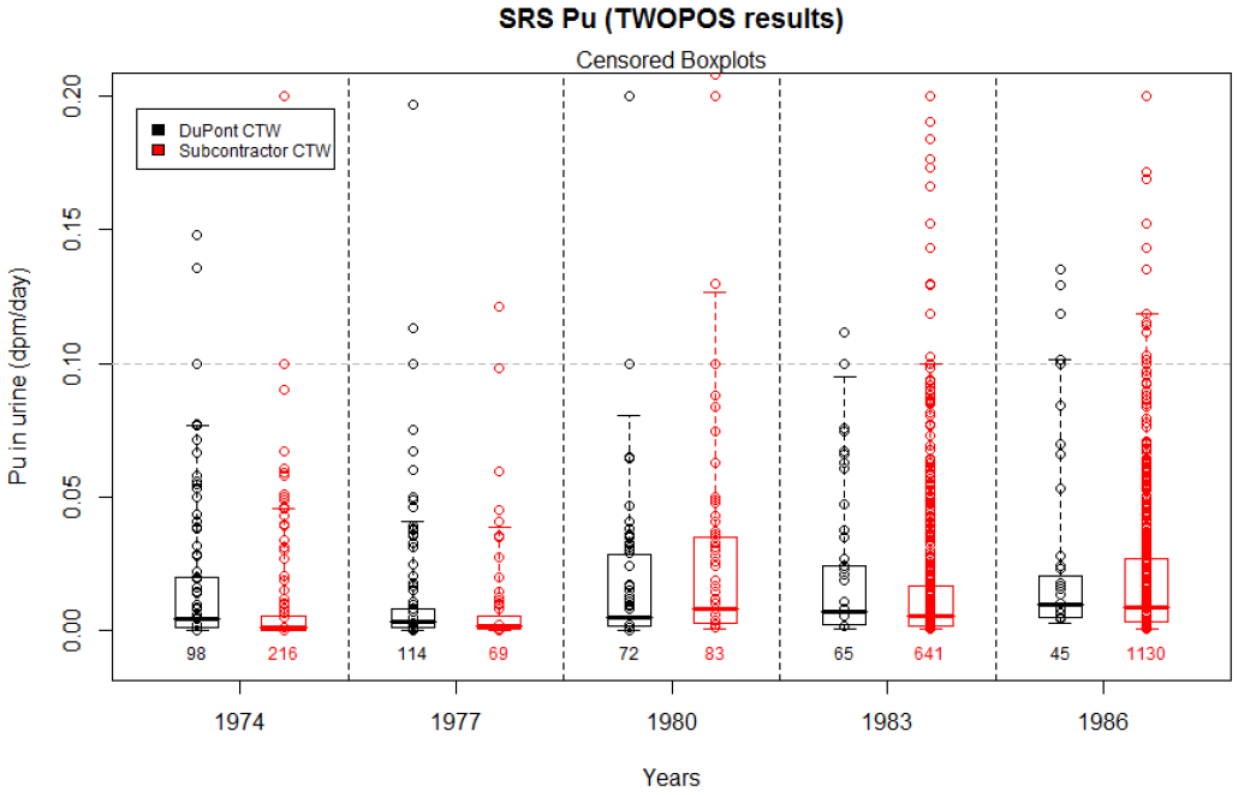
- Plutonium co-exposure models use data from claimant files (NOCTS data)
- NOCTS data was sufficient to perform the analysis however, the data was highly censored for most years, particularly for the subcontractor CTW population
- To increase the number of uncensored results, we considered an additional data source
  - plutonium bioassay logbooks (uncensored data)

TWOPOS Plutonium Results (Censoring level = 0.1 dpm/1.5L)

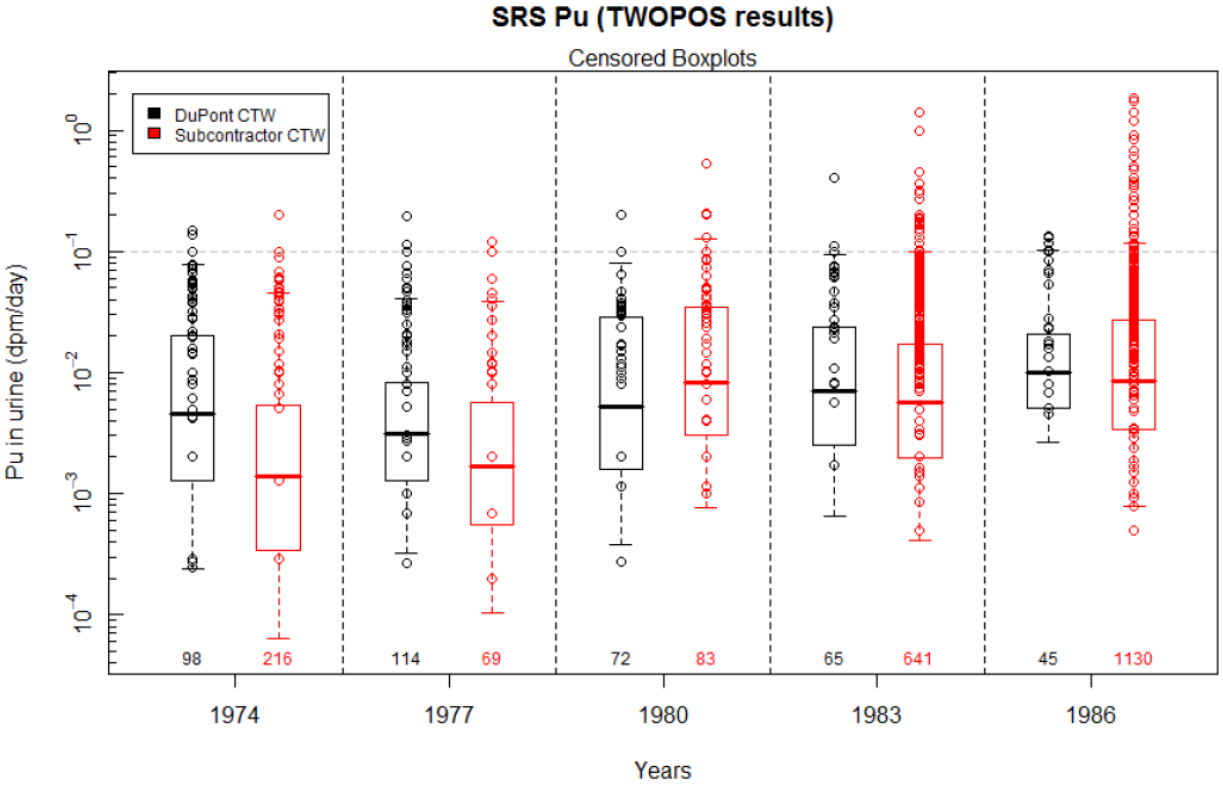
Year	prime-CTW 50th % (dpm/1.5L)	prime-CTW 84th % (dpm/1.5L)	prime-CTW # of individuals	subCTW 50th % (dpm/1.5L)	subCTW 84th % (dpm/1.5L)	subCTW # of individuals
1974	**0.0047**(a)	0.0340(b)	98	0.0014	0.0107	216(c)
1977	**0.0034**	0.0168	114	0.0017	0.0119	69
1980	0.0056	0.0343	72	**0.0093**	0.0535	83
1983	**0.0075**	0.0400	65	0.0059	0.0317	641(c)
1986	**0.0114**	0.0402	45	0.0092	0.0439	1130(c)

a) Bold values denote higher 50th % TWOPOS
b) Underline values denote higher 84th % TWOPOS
c) Subcontractor data supplemented using plutonium logbooks

TWOPOS Plutonium Results (1 of 2)



TWOPOS Plutonium Results (2 of 2)



TWOPOS values used to develop Intakes (1 of 2)

- Recall the 50th % and 84th % TWOPOS values are used to develop intakes

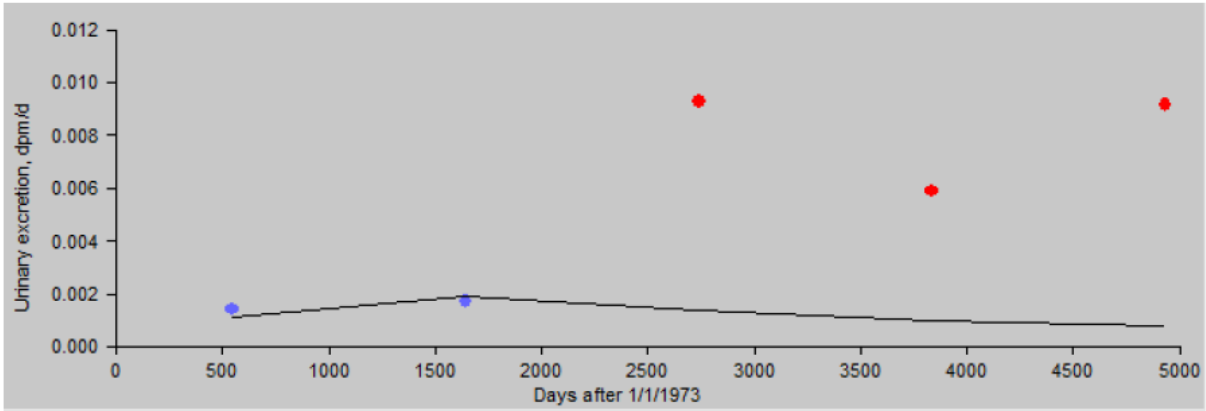


Figure D9. Subcontractor CTW predicted plutonium bioassay results calculated using IMBA-derived plutonium intake rates (line) compared with measured bioassay results (dots), 50th percentile, 1973 to 1978, type M.

TWOPOS values used to develop Intakes (2 of 2)

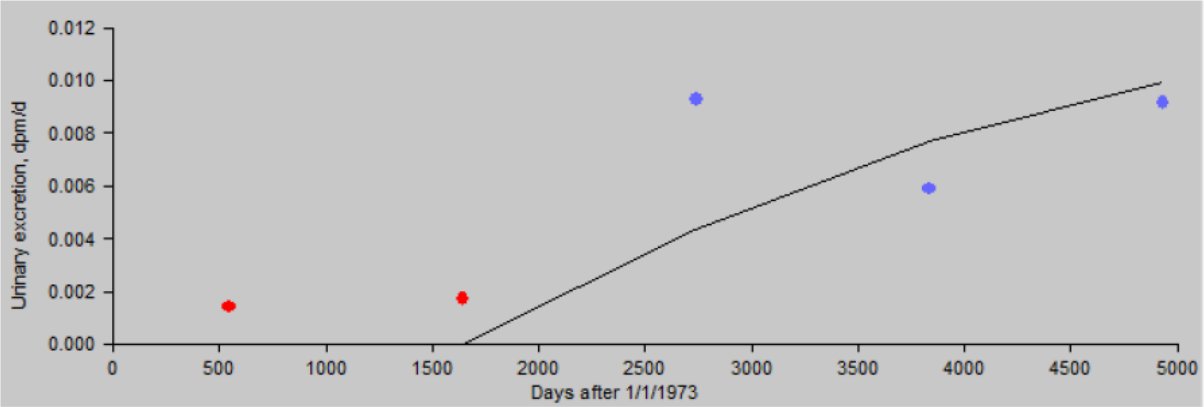


Figure D10. Subcontractor CTW predicted plutonium bioassay results calculated using IMBA-derived plutonium intake rates (line) compared with measured bioassay results (dots), 50th percentile, 1979 to 1987, type M.

Type-M Plutonium Intake Results

Year	prime-CTW 50th % (dpm/d)	prime-CTW 84th % (dpm/d)	prime-CTW 95th % (dpm/d)	subCTW 50th % (dpm/d)	subCTW 84th % (dpm/d)	subCTW 95th % (dpm/d)
1973-1978	**0.773**	4.565	14.349	0.325	2.277	8.00
1979-1987	**1.426**	6.251	16.215	1.293	6.660	19.17

Bold denote higher 50th% Intakes
Underline denote higher 95th% Intakes

Type-S Plutonium Intake Results

Year	prime-CTW 50th % (dpm/d)	prime-CTW 84th % (dpm/d)	prime-CTW 95th % (dpm/d)	subCTW 50th % (dpm/d)	subCTW 84th % (dpm/d)	subCTW 95th % (dpm/d)
1973-1978	**15.71**	88.27	268.7	6.97	48.5	169.4
1979-1987	**26.38**	110.7	279.2	22.65	114.6	326.1

Bold denote higher 50th% Intakes
Underline denote higher 95th% Intakes

Summary and Conclusion

Summary

- Over 95% of the TWOPOS bioassay results are less than the reporting level of 0.1 dpm/1.5L during most of the strata evaluated years (1974-1986)
- No apparent difference between prime CTWs and subcontractor CTWs with regards to TWOPOS results
- No practical difference between prime CTWs and subcontractor CTWs when intakes are modeled
- No evidence of a difference between prime CTWs and subcontractor CTWs

Conclusion

- *NIOSH's position is that the exposure conditions and the potential for intakes were similar among all CTWs (prime and subcontractor), therefore a combined strata is appropriate.*

Questions?

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.