# NIOSH's Response to SC&A's Review of NIOSH's Response to SC&A's Focused Review of ORAUT-RPRT-0092, 1991-2007

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**Advisory Board on Radiation Worker Health**
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# Overview

- Four SC&A Conclusions and NIOSH Responses
  - Intent of ORAUT-RPRT-0092
  - Purpose of Job-Specific Sampling during the 1990s
    - Corroboration of LaBone interview response
  - Job-Specific SRS Self-Assessments in 1997.
  - Purpose and Use of the TRACK Database
- Conclusions

# Intent of ORAUT-RPRT-0092 Report

# Intent of ORAUT-RRPT-0092

- SC&A stated that *"The purpose of RPRT-0092 was to assess the **compliance** of bioassay monitoring for subCTWs…"* and *"…it was clear that the sampling exercise perform by NIOSH in RPRT-0092 was to provide an indication of data **completeness**…"*
- Neither statements are accurate. The original intent of RPRT-0092 was not to determine compliance or completeness, but ***representativeness***. (Did unmonitored workers work in the same environment as monitored workers?)
  - RPRT-0092 demonstrated that subCTWs worked alongside monitored subCTWs.
  - NIOSH concluded there is sufficient data to reconstruct doses using a coexposure model.

# Completeness in Co-Exposure Models

- SRDB 196229: A Discussion of Completeness in Co-Exposure Models
- 2 of 7 Conclusions
  - Bounding co-exposure models do not require all the data, just a significant portion of the data from the most highly exposed workers.
  - Regulatory compliance with a monitoring program or lack thereof cannot be used by itself to decide if a dataset is complete enough to construct an acceptable co-exposure model.

# Evaluation criteria of data for coexposure models

*"In general, three types of monitoring programs have been employed at sites covered under EEOICPA. These programs, listed in hierarchical order of preference for use in coworker modeling are: 1) routine, representative sampling of the workers; 2) routine measurement of workers with the highest exposure potential; and 3) the collection of samples after the identification of an incident. Because they are not representative of the overall distribution of exposures, programs that rely on measurement of the highest exposed workers or are incident-based require more careful consideration."*

*- Criteria for the evaluation and use of coworker datasets, DCAS-IG-006, Rev 00*

# Purpose of Job-Specific Sampling:

## Corroborating Documents and Communications

# SRS Radiological Control – Defense-in-Depth Approach

- SRS used a Defense-in-Depth approach to Radiological control with the intention to prevent non-tritium intakes (SRDB# 167851)
  1. Policy (zero intake policy, except for tritium)
  2. Engineering Controls
  3. Procedural Controls
  4. Personnel Protective Equipment (PPE)
  5. Surveillance used to verify Engineering, Procedural, and PPE
     - Air Monitoring
     - Facility Contamination Surveys
     - Personnel Contamination Surveys
     - *Routine and Job-Specific Bioassay*

# SRS Bioassay Program Description

- "Communication" SRDB 167756: Status of SRS Bioassay Program Relative to DOE Moratorium PDF p. 8 (dtd December 14, 1998)
- **Routine & Job-Specific**
  - Designed to assess adequacy of facility controls and personnel protective measures
  - Prospective: Pre-scheduled samples based on routine work
  - Retrospective: Job-Specific samples for efficiency purposes
- **Special**
  - Invoked when the Radiological Control Organization concludes the worker is likely to have had an intake. A failure somewhere in the Defense-in-Depth approach.

# Response to DOE Office of Enforcement and Investigation

**SRDB 175516: Response to Data Request SRS-FY19-001 Internal Assessment of SRS Internal Dose Evaluation Program (IDEP)**

- "Document" WSRC JOB-SPECIFIC BIOASSAY TASK TEAM ' FINAL REPORT September 9, 1998 PDF Pg. 30
- "A confirmatory bioassay program involves limited surveillance of workers to *provide verification that routine bioassay (which includes job-specific bioassays) is not required.* A confirmatory bioassay program for a work group having low potential for significant intake may involve sampling a small fraction (e.g., 10%) of the group at a relatively constant rate over a 1-year period."
- "Conclusion: *The regulatory requirements of 10 CFR 835 do not specifically require job specific bioassays.* WSRC has a no deliberate intake policy for nuclides other than tritium. SRS has a proven history of preventing intakes through rigorous application of engineering and administrative controls. WSRC has a bioassay program which includes requirements for special bioassays and routinely samples 100% of its radiation workers. *Therefore, the WSRC implementation of job-specific bioassays for actinides EXCEEDS regulatory requirements."*

# Purpose of Job-Specific Bioassay Sampling (1/2)

- "Document" SRDB 167757: Corrective Action Report (CAR) 97-CAR-07-001 (U) PDF p.15

  *"The purpose of the job-specific bioassay sampling program is to collect bioassay samples from workers whose routine bioassay program does not include some or all of the radionuclides present at the work site or who are not on a routine program. For example, a mechanic who may be routinely sampled for plutonium and enriched uranium may be assigned to work on a neptunium system. A job-specific bioassay sample for neptunium would be required to be submitted at the end of the task."*

- Therefore a "non-routine" sample in this context, is a "job-specific" sample. These samples were used to supplement the routine requirements, as illustrated above.

# Purpose of Job-Specific Bioassay Sampling (2/2)

- "Document" SRDB 167757: Corrective Action Report (CAR) 97-CAR-07-001 (U) p. 32

  *"Job-specific sampling has been implemented because currently there is not a way of modifying the prospective bioassay program and RQB* [radiological qualification badge] *in the field. A worker must come to the IVC* [in vivo counting] *Facility to have the bioassay program and RQB modified. This is an inefficient use of time and thus the current job-specific sampling program was created."*

  *"A routine bioassay program can be established after the fact based on where the individual actually worked and what he/she actually did. This is referred to as retrospective scheduling."*

# Prospective vs. Retrospective Sampling (1991 – 1997)

- ***Prospective Sampling ("routine")***

Work area known in advance → RQB → Work Performed **normal ops** → ROUTINE bioassay → 95%

- ***Retrospective Sampling ("non-routine")***

Not on RQB → Work Performed **normal ops** →  → JOB-SPECIFIC bioassay → 5%



Image: Stockio.com

# Procedure 5Q1: Job-Specific Section

| Rev | Date | Section Designation | Under Section Header |
|---|---|---|---|
| 0 | 12/1992 | 5.1.2.1 *Non-routine, Job-Specific Sampling* | 5.1.2 Non-Routine Sampling |
| 1 | Unknown | N/A | N/A |
| 2 | Unknown | N/A | N/A |
| 3 | Unknown | 5.1.1.4 *Non-routine, Job-Specific Sampling* | 5.1.1 Routine Bioassay |
| 4 | 07/1995 | 5.1.2.1 *Non-routine, Job-Specific Sampling* | 5.1.2 Non-Routine Sampling |
| 5 | 04/1996 | 5.1.2.1 *Job-Specific Sampling* | 5.1.2 Non-Routine Sampling |
| 6 | 10/1996 | 5.1.2 *Job-Specific Urine Samples* | 5.1.1 Routine Bioassay |
| 7 | 07/1997 | 5.1.2 *Job-Specific Urine Samples* | 5.1.1 Routine Bioassay |

# SRS Subject Matter Experts (1/3)
## Interview Q & A regarding the Routine Bioassay Program

*Primary SRS Subject Matter Expert (SRDB 168231)*

QUESTION: In the Enforcement Conference Summary [NTS-SR-WSRC-ESH-1997-0001], WSRC states that it "did not believe that any job specific dose had been "missed or unassigned." What is the basis for this belief, given DOE's NOV finding and given the WSRC acknowledgement that its past corrective actions were ineffective and a large proportion of job-specific bioassays were not submitted?

> *ANSWER: I have discussed the meaning of the "no deliberate intake" policy and how it defines the purpose of the routine and job specific bioassay programs for the actinides. The fact that no special bioassay was requested means that no intakes occurred that would result in "missed dose".*

# SRS Subject Matter Experts (2/3)
## Interview Q & A regarding the Routine Bioassay Program

*Primary SRS Subject Matter Expert (SRDB 168231)*

QUESTION: Is there any way to know whether non-negligible radionuclide intakes were missed due to the lack of worker participation in job-specific bioassays (up to 79%, as found by one WSRC self assessment) during the WSRC era (beginning in 1989, up through corrective actions in 1997-1998)?

> *ANSWER: Routine and job-specific bioassay for the actinides are prescribed only for those workers who we "know" have not had an intake.*

# SRS Subject Matter Experts (3/3)
## Interview Q & A regarding the Routine Bioassay Program)

*QUESTION: Were job-specific samples special samples?*

*Second SRS Subject Matter Expert (SRDB 197258)*

- *ANSWER: No. Again, special samples needed contamination event specific isotopic identification and collection of samples by time interval because an intake of radioactive material is suspected. These were not done for job-specific samples. Job-specific bioassay was really an unusual application of the typical routine bioassay at SRS.*

*Third SRS Subject Matter Expert (SRDB 197945)*

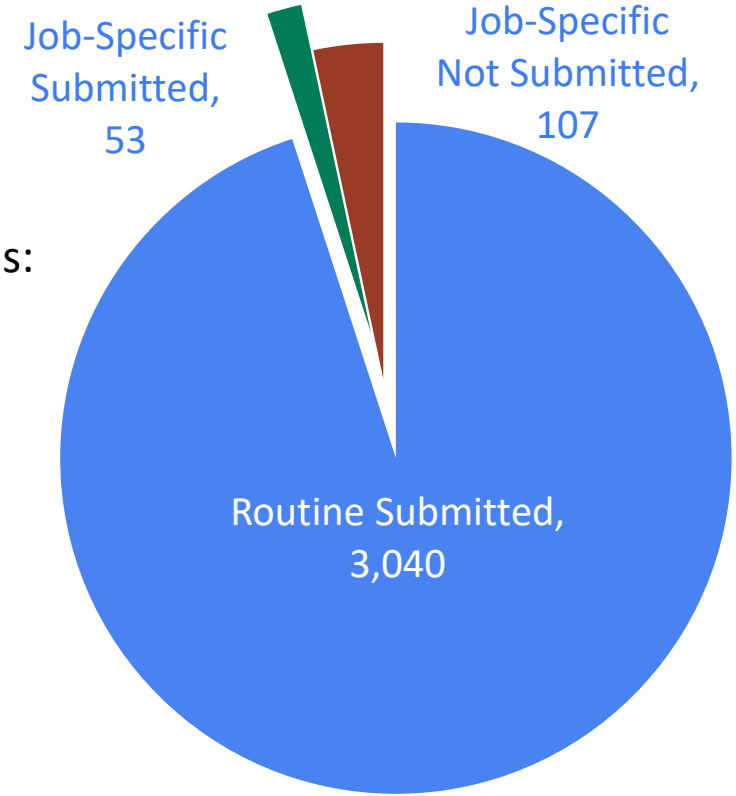
- *ANSWER: There is a job-specific program for tritium that has been in place long before I arrived at SRS and continues today. These samples are assigned based on the task being performed. The worker submits the samples and the bioassay laboratory currently analyzes the samples on a weekly basis. These are not special/for-cause samples.*

# Job-Specific SRS Self-Assessments in 1997

# 1997 Q1 SRS Self-Assessment of Job-Specific Bioassay Program

Each section contains:

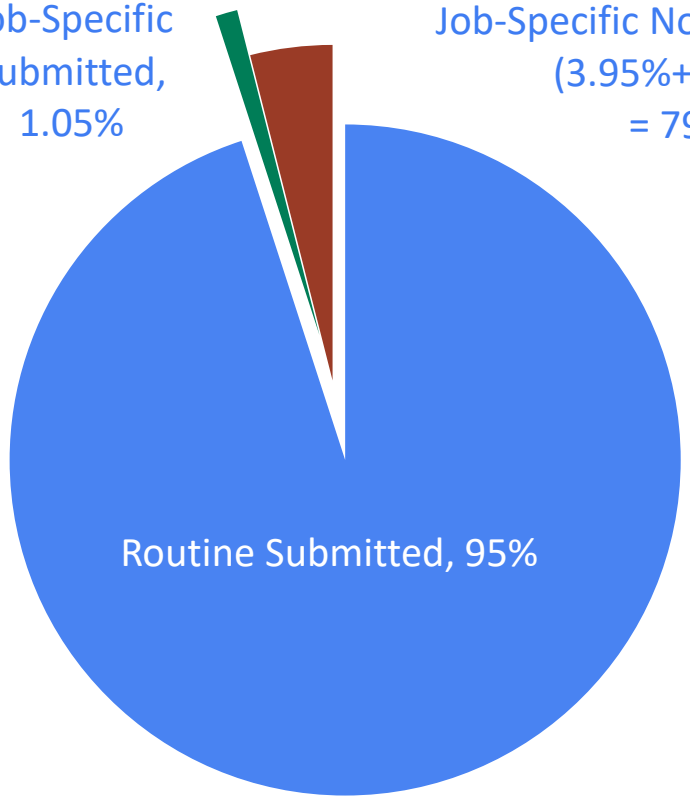
1. subCTWs,
2. CTWs,
3. Others.




Total Submitted = 3,093

Total Not Submitted = 107

# 1997 Q2 SRS Self-Assessment of Job-Specific Bioassay Program




Each section contains:

1. subCTWs,
2. CTWs,
3. Others.

Total Submitted = 96.05%

Total Not Submitted = 3.95%

# Full Calendar Year Assessment 1997

- Approximately 10,889 samples were requested in 1997. [SRDB 167851]
- By the end of 1997, WSRC had compared all 1997 RWPs and sign-in sheets to the bioassay laboratory sample database and determined that 256 individuals did not comply with job-specific bioassay requirements. WSRC subsequently directed those individuals still employed at the Site to submit bioassay samples. [SRDB 196226]
- None of these workers had an identifiable uptake of radioactive material. [SRDB 167497]

# Purpose and Use of the TRACK Database

# Purpose of the TRACK Database

- The TRACK database was created to track samples related to an abnormal situation that may cause a ***potential uptake*** (e.g., special samples).
  - Includes any incidents that warrant a ***special*** sample
  - Contains workers with the highest ***potential*** for exposure

- ***Prospective Sampling***

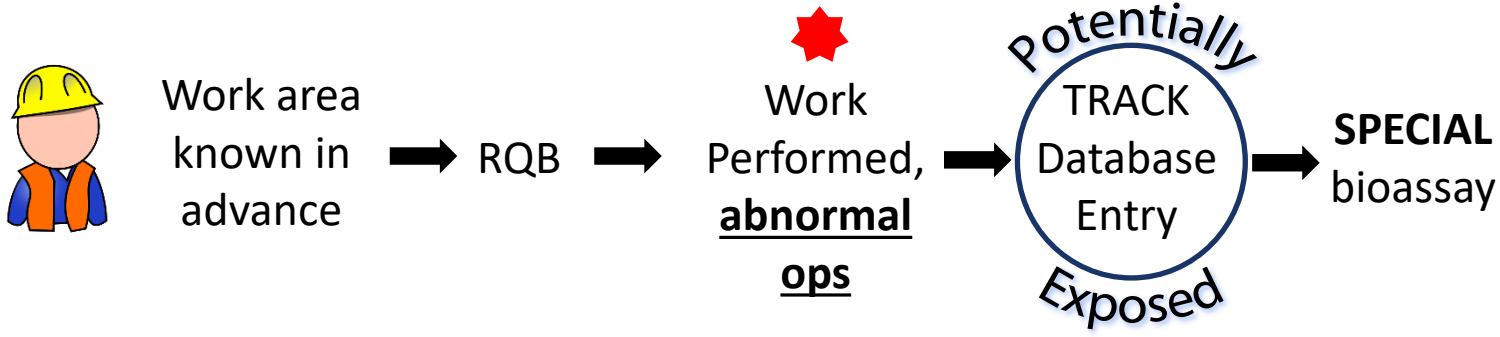





Image: Stockio.com

# What data are included in the TRACK Database?

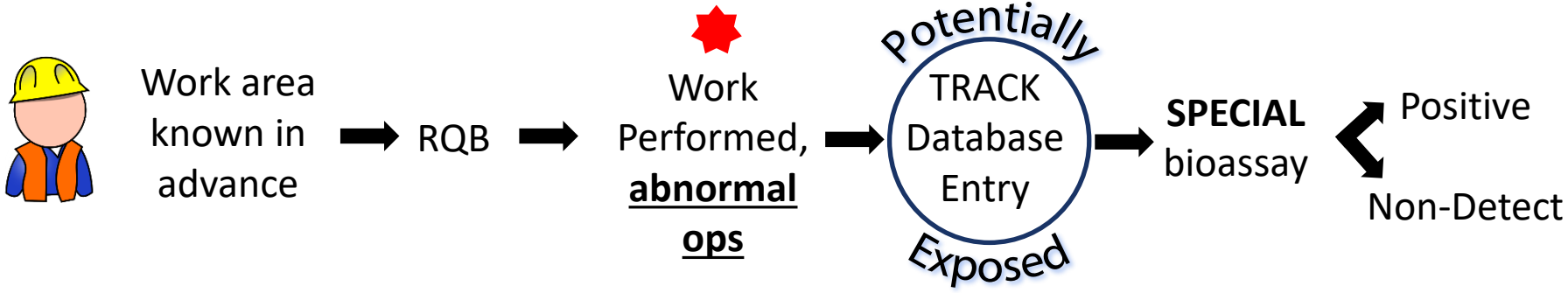
Work area known in advance → RQB → Work Performed, **normal ops** → ROUTINE bioassay → Positive / Non-Detect → **No Entry** to the TRACK Database

Work area known in advance → RQB → Work Performed, **abnormal ops** → Potentially Exposed TRACK Database Entry → **SPECIAL** bioassay → Positive / Non-Detect



Image: Stockio.com

# Workers with the highest potential for exposure




- Workers who experienced some abnormal operation during the work shift that called for a special bioassay sample are ***potentially*** exposed.
- Workers with ***positive bioassay results*** (e.g., routine, job-specific, or specials) represent the ***highest exposed*** workforce.


Image: Stockio.com

# Conclusions

# Conclusions (1/2)

- RPRT-0092 demonstrated that unmonitored workers worked alongside monitored workers meeting the original intent to determine ***representativeness***. A key criteria necessary to develop co-exposure models.
- Job-specific samples served the same purpose as routine samples and were implemented as part of routine bioassay sampling program. This has been corroborated in
  - SRS communications
  - SRS procedures (confusing language clarified in 1997)
  - Interviews with former SRS Subject Matter Experts

# Conclusions (2/2)

- Unreturned job-specific samples from 1997 represented a very small percentage of the overall bioassay samples requested. All 256 workers with unreturned job-specific bioassays were followed-up on and none had positive results.
- The purpose of the TRACK analysis was to determine whether special samples included in the TRACK database were included in the co-exposure files. The NIOSH analysis concluded that 97% of TRACK entries have a corresponding entry in the co-exposure dataset. Additionally, in response to SC&A's review of the TRACK database, NIOSH noted that any attempt to perform a retrospective analysis of the TRACK database was not appropriate given its purpose as a prospective tracking system.

# References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- WSRC [1997–1999]. Corrective action report inadequate participation in the job specific bioassay program and closure activities associated with bioassay program report 97-CAR-07-0001. Collection or related documents. Savannah River Site, Aiken, SC: Westinghouse Savannah River Company. [SRDB Ref ID: 167757]

# Questions?

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

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