



# NIOSH Update on LBNL Efforts

**Megan Lobaugh, PhD, CHP**

**Research Health Physicist**

Teleconference of the Lawrence Berkeley National Laboratory  
Work Group

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# Overview

- Summary of LBNL Site Profile Issues
  - Review of “In Progress” Site Profile Issues
- Overview of Current DCAS Work Underway
- Current Responses to SC&A Review of the NIOSH White Paper: “Method to Assess Internal Dose Using Gross Alpha, Beta, and Gamma Bioassay and Air Sampling at the Lawrence Berkeley National Laboratory”

# Summary of LBNL Site Profile Issues

- **13 Findings**

- 3 Closed
- 2 Addressed in Finding
- 8 In Progress

- **8 Observations**

- 3 Addressed in Finding
- 5 In Progress

Next we will review the “In Progress” Issues

# Finding 1: Inadequate documentation of historical operations and sources of radiological exposures

- Facility Information
- **Related Issue**
  - Observation 5: Lack of information on isotopes, facilities, and handling methods (additional facility information)
- **Action Items**
  - NIOSH update Site Profile with additional information that has been captured since the last revision

# Finding 2: Insufficient Information for Internal Dose Reconstruction, especially during the Early Years

- Internal Dose
- Related Issues
  - Finding 4: Bioassay Data Completeness and Adequacy have not been Verified
  - Finding 11: Inadequacy of Bioassay Analyses Presentation
- Action Items
  - NIOSH respond to the SC&A February 2014 Memo with specific references to where we have provided this information in the past, as well as how the recent Internal Dose Methodology would affect answers to the questions put forward in the memo.
    - Interviews and data capture

# Finding 5: Insufficient Justification for Selection of IREP Energy Range Fractions for Photo Exposures

- External Dose
- Related Issue
  - Observation 8: Overuse of Generalizations and Assumptions (IREP photon energy fractions)
- Action Items
  - NIOSH update Table 6-5 for all years and all major accelerator operations
    - Interviews and data capture

# Finding 6: Insufficiency of Neutron Dosimetry Treatment

- External Dose
- Related Issue
  - Observation 8: Overuse of Generalizations and Assumptions (neutron-to-gamma dose ratios)
- Action Items
  - NIOSH revise the external dose discussion to direct use of the N:P ratio, determine if NTA correction factors (energy response, angular dependence, and fading) are required, clarify low energy NTA correction factor discussion, and clarify the uncertainties listed in Table 6-11.
    - Interviews and data capture

# Finding 7: Failure to Justify the Shallow Dose to Deep Dose Assumption

- External Dose
- Related Issues
  - Observation 5: Lack of Information on Isotopes, Facilities, and Handling Methods (additional information specific to shallow and extremity doses)
  - Observation 6: Extremity Dosimetry needs Revisiting
  - Observation 8: Overuse of Generalizations and Assumptions (shallow-to-deep dose ratios)

# Finding 7: Failure to Justify the Shallow Dose to Deep Dose Assumption *(continued)*

## ■ Action Items

- NIOSH review NOCTS claim data to determine if it supports the shallow to deep dose ratios and extremity dose ratios.
- NIOSH compile list of pure beta emitters in use.
- NIOSH research whether there is area monitoring available for pure beta emitters in use
- NIOSH determine if unmonitored approach is needed for pure beta emitters
- NIOSH review extremity dose ratio and provide specific response to SC&A comment of 3 vs 5 times.
- Interviews and data capture

# Finding 8: Uncertainty in Beta-Gamma Dosimeter Response to Radiation Types and Energies

- External Dose
- Action Items
  - NIOSH update external dose discussion in Site Profile with specific direction regarding not using the electroscope data after 1948 because there is film and other dosimetry data available
  - NIOSH review Attachment A of Site Profile and provide summary of what is included to address the specific information requested in SC&A review

# Finding 12: Failure to Provide Sufficient Guidance for Unmonitored Workers

- Internal Dose
- Action Items
  - NIOSH respond to the SC&A February 2014 Memo with specific references to where we have provided this information in the past, as well as how the recent Internal Dose Methodology would affect answers to the questions put forward in the memo.
    - Interviews and data capture

# Finding 13: Inadequate Coverage of Occupational Environmental Dose

- Environmental Dose
- Action Items
  - NIOSH add information to Site Profile about the Co-60 accelerator, flesh out accelerator background (environmental) exposures, and change guidance for radionuclide assignment for internal dose from beta contributors.

# Observation 1: The site profile does not address LBNL Staff assigned to the Nevada Test Site or the Significance of its Employees Working at Other DOE/AWE Sites

- At April 5, 2019 WG meeting, NIOSH explained the LBNL Site Profile would not have information about assigning dose from exposures at other sites. During the dose reconstruction process, when an EE has been identified as visiting or working at other sites, the records would be requested from the other sites and those Site Profiles be used to assess the dose.
- **Action Item**
  - WG/SC&A response

# Observation 2: More information needed for Internal Dose Assignment for Short-lived Radionuclides

- Internal Dose
- The NIOSH white paper entitled "Method to Assess Internal Dose using Gross Alpha, Beta, and Gamma Bioassay and Air Sampling at the Lawrence Berkeley National Laboratory" provides a method for assigning internal dose from short-lived radionuclides.
- **Action Item**
  - NIOSH and WG/SC&A continue to work to resolve the issues on the Methodology

# Observation 3: Lack of Discussion of Radiological Incidents

- **Action Items**
  - NIOSH will identify and research major radiological incidents at LBNL, then revise the Site Profile to incorporate a summary of these incidents

## Observation 4: Need to provide information on Metallurgical Laboratory [dosimetry services]

- External Dose
- Action Items
  - NIOSH will perform additional research for information on the MetLab Dosimetry services and include any additional information in the Site Profile.

# Observation 7: Lack of Sufficient Information for External Dose Evaluation

- External Dose
- Action Items
  - NIOSH commits to improving the discussion of the post-1947 External Dosimetry program, including historical dosimeter information

# Overview of Current DCAS Work Underway

Agenda Item 3

# Interviews and Data Capture Timeline

- June 11, 2019- NIOSH sends Data Request (LBNL-FY19-001)
- July 2, 2019- NIOSH requests interviews through LBNL Point of Contact
- August 15, 2019- NIOSH began reaching out to potential interviewees
- September 3, 2019- Interview #1 (SRDB Ref ID 178601)
  - Interviewee provided several additional names
  - Sent 4 requests for additional interviews
- September 6, 2019- Interview #2 (SRDB Ref ID 178602)
- November 15, 2019- LBNL provided NIOSH with selected UCRL and numbered technical documents
- January 13, 2020- Data Capture Tentatively Scheduled

# Data Request (LBNL-FY19-001): Information Specific to Site Profile Issues

- Whole Body Counter peak searches and calibration (Findings 2, 4, and 11)
- Neutron and other radiation energy spectra from cyclotrons/accelerators (Finding 1, 5, 6, and 8)
- Extremity dosimetry (Finding 7; Observations 5, 6, and 8)
- Neutron Exposures measured by NTA film (Finding 6 and 8)
- Shallow/Beta Dose (Finding 7; Observations 5, 6, and 8)

# Data Request (LBNL-FY19-001): Information Specific to Internal Dose Methodology Issues

*Note: Internal Dose Methodology was written in response to Site Profile Findings 2, 4, 11, and 12 & Observation 2*

- Gross alpha, gross beta, gross gamma bioassay in-house detector systems (Finding 2)
- Breathing zone alpha and beta/gamma in-house detector systems (Finding 2)
- Air sampling policies and procedures, including specific information about Breathing Zone samples (Finding 1)

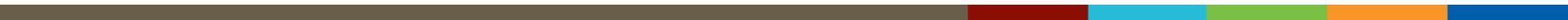
**Current Responses to SC&A Review of the  
NIOSH White Paper: “Method to Assess  
Internal Dose Using Gross Alpha, Beta, and  
Gamma Bioassay and Air Sampling at the  
Lawrence Berkeley National Laboratory”**

Agenda Item 4

# Summary of Issues from Method to Assess Internal Dose Using Gross Alpha, Beta, and Gamma Bioassay and Air Sampling at Lawrence Berkeley National Laboratory

- **2 Findings**

- **3 Observations**



# Finding 1: Air Samples May Not Represent Concentrations Breathed by Workers

- Interviews (SRDB Ref ID 178601 and 178602) and data capture request regarding additional air sampling program policies and procedures

## Finding 2: Technical Issues and Uncertainties with Gross Counting Data Conversion to Concentration/Intake for Use in Dose Reconstruction

- Interviews (SRDB Ref ID 178601 and 178602) and data capture request for specific information on in-house detector systems used to measure these samples

# Observation 1: Potentially Missed Radionuclides

- Radioiodines- not included, measured on separate charcoal samples
- Erbium-165- not included, below short half-life cutoff
- Erbium-169- will be added in final DR Methodology Implementation
- Fermium-237
  - Typo in SC&A Methodology Review, intent likely was Fm-257, which is in the Site Profile and not included in the Methodology
  - Fm-257 will be added in the final DR Methodology Implementation

# Observation 1: Potentially Missed Radionuclides

*(continued)*

- Rhodium-102- will be added in final DR Methodology Implementation
- Scandium-93
  - Typo carried over from the Site Environmental reports
  - Interviewees provided additional contacts who prepared the environmental reports, NIOSH continuing to investigate and will report back

## Observation 2: Bioassays in Claimant DOE Files May Not Be Indicative of Exposure Potential

- 2010 NIOSH began receiving the entire medical file
- NIOSH made a mass re-request of the complete medical file for LBNL claims received prior to 2010
- 168 claims
  - 53 no medical records
  - 1 claim submitted that had a PoC over 50%
  - 109 claims no new bioassay information
  - 3 claims with new bioassay information from DOE, but NIOSH had information via other documents
  - 2 claims with new bioassay information

## Observation 2: Bioassays in Claimant DOE Files May Not Be Indicative of Exposure Potential *(continued)*

- 5 claims with new bioassay information were reviewed for impact

# of Claims	Bioassay Results Available at Time of DR	New Bioassay Results Available after Mass Re-request	Potential Effect on the Application of Internal Dose Methodology
2	No	Yes	Yes
2	Yes	Yes	Yes
1	Yes	No	No

## Observation 2: Bioassays in Claimant DOE Files May Not Be Indicative of Exposure Potential *(continued)*

- *Note: Unmonitored approach using air sampling results doesn't necessarily rely on existence of bioassay data*
- **Conclusion:**
  - 4 of the 168 claims (~2.4%) potentially affected by existence of bioassay

# Observation 3: Bioassays in Claimant DOE Files May Not Be Complete Compared to LBNL Documents

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- 168 claims
  - 53 no medical records
  - 1 claim submitted that had a PoC over 50%
  - 109 claims no new bioassay information
  - 3 claims with new bioassay information from DOE, but NIOSH had information via other documents
  - 2 claims (~1.2%) with new bioassay information

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

