Memorandum

To: Los Alamos National Laboratory Work Group
From: SC&A, Inc.
Date: June 10, 2019
Subject: SC&A Review of "NIOSH Response to NTS Report NC ID 484 (LANL)"

On April 4, 2019, SC&A was tasked with reviewing *NIOSH Response to NTS Report NC ID 484 (LANL)* (March 2019). That report (NIOSH 2019) responds to an SC&A finding about a 1999 Los Alamos National Laboratory (LANL) self-assessment (Bracket and LaBone 1999; reported and tracked by the U.S. Department of Energy (DOE) as NC ID 484) cited in its July 23, 2017, memorandum report (SC&A 2017a). The National Institute for Occupational Safety and Health (NIOSH) subsequently responded to this and other findings related to Special Exposure Cohort (SEC) Petition-00109 for LANL in a September 2018 report (NIOSH 2018). SC&A further amplified its response to these issues in its most recent (November 16, 2018) report (SC&A 2018).

NTS Report NC ID 484 (DOE 1999) resulted from a four-day assessment of the LANL internal dose evaluation program conducted March 22–25, 1999, by representatives from Savannah River Site (SRS), MJW Corporation, and LANL's Radiation Protection Services Group (ESH 12) and Quality Assurance Group (ESH-14) (Bracket and LaBone 1999). The assessment had 10 noncompliance findings (DOE 1999), the first three of which were found to impair LANL's ability to monitor individuals "likely to receive a committed effective dose equivalent of 0.1 rem (0.001 sievert) or more from all occupational radionuclide intakes in a year" (10 CFR 835.402(c)(1)).

These first three findings were as follows (DOE 1999)**:**

1. Some workers and their supervisors are not accurately completing the "health physics checklist" (utilized for enrolling workers into dosimetry programs) to the extent that these checklists may not identify those radionuclides actually handled by the worker. Thus, some workers are not being assigned to the appropriate routine bioassay program in accordance with site requirements. [835.402(c)(1)]

2. Some radiological workers are not complying with specific RWPs that require them to participate in a bioassay program. As an example, 2 out of 5 of workers [40%] who performed work under a specific RWP did not participate in the bioassay program in accordance with requirements of the RWP. [835.402(c)(1)]

3. Johnson Controls of Northern New Mexico (JCNNM), the principle [sic] subcontractor to Los Alamos National Laboratory, may not be enrolling all workers who are potentially exposed to radionuclides into the appropriate bioassay program in accordance with site requirements. [835.402(c)(1)]

Given the significance and scope of findings for all 10 noncompliances identified and reported to DOE's Office of Enforcement, LANL developed and accomplished a series of corrective actions that included:

- Establishment of a web-based Dosimetry Participation Verification Program to ensure better management of worker bioassay participation
- Development of LANL-wide dosimetry enrollment criteria, facility-specific dosimetry matrices, and implementation of a new dosimetry enrollment process
- New or revised procedures for the following:
  - Health physics checklist procedure
  - Bioassay enrollment procedure
  - Bioassay kit circuit procedure
  - Radiological dose assessment process and examples
  - Special internal dosimetry and bioassay process
  - Terminations
  - Annual report card to workers
  - Radiation Exposure Information and Reporting System

As noted in its July 27, 2017, review, SC&A found that "the above non-compliances and corrective actions are important to the LANL bioassay program, quite apart from 10 CFR Part 835 compliance, and evince likely longstanding implementation issues with that program."

Previous SC&A Position, Comments, and Recommendation

SC&A made clear its concerns in subsequent work group and full Board discussions regarding this self-assessment, its noncompliances, and its implications for dose reconstruction under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). One concern is that the 1999 review involved a very small Radiological Work Permit (RWP) sample size and found a relatively large (40%) nonparticipation rate for job-specific bioassays. There is no certainty of how extensive this nonparticipation may have been across the laboratory, nor how engrained it may have been in past practices. As SC&A has emphasized, this brings into question the completeness and accuracy of the bioassay database that is the basis for NIOSH's coworker approach, and SC&A expected that NIOSH, along with LANL, would go beyond the Bracket and LaBone (1999) sampling results to confirm the adequacy of the overall job-specific program in the 1996–2000 timeframe, as noted below in a statement by SC&A at the August 15, 2017, LANL work group meeting.

> So, in [the case of the LANL 1999 self-assessment], I think the team spent three days looking at a limited number of RWPs, and checklists, and what have you. And that was the basis for these findings.
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> But I think, you know, as we're looking at some considerations, we don't know the scope of this. I understand that NIOSH is exploring this with Los Alamos, trying to find out. But we may never know the scope, in the sense that the review team probably just did a limited, very limited sample over the few days they had.
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> But this raises some questions. And the same questions that we're raising, I think, as Savannah River. If you, you know, have a problem with your bioassay participation and your program enrollment, it's very clear that you have a question that rides on the completeness and accuracy of your database.
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> And the scale and scope of that incompleteness or inaccuracy is something that you're not going to be able to know without doing a fair amount of leg work. [ABRWH 2017, pp. 54–55]

SC&A further emphasized in its November 2018 report the need to ascertain if a broader programmatic deficiency in the LANL job-specific bioassay program existed, beyond the limited RWP sampling conducted during what was cited as a 3-day[1] self-assessment in 1999:

> It would seem that two central questions remain to be resolved. First, what is the adequacy and completeness of the LANL bioassay program in light of the 1999 findings? Second, can potential doses to unmonitored workers be bounded for exposures to exotic radionuclides?
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> For the first question, there is a need to follow up on the findings of the 1999 LANL self-assessment and ascertain whether those findings are indicative of a serious programmatic deficiency that would impair the completeness of bioassay results and records for workers through 2000 (when corrective actions were put into place). If there is evidence that a substantial number of workers were not enrolled in bioassay programs as required or that many workers did not provide required bioassays, NIOSH would need to consider whether that would render bioassay records inadequate and incomplete for purposes of dose reconstruction with sufficient accuracy. [SC&A 2018, p. 20]

SC&A made the following recommendation to the LANL Work Group in its November 16, 2018, review of NIOSH's September 2018 white paper:[2]

> SC&A recommends that the Work Group has NIOSH follow up on the 1999 LANL self-assessment results…and substantiate whether and how these reported program deficiencies impact the adequacy and completeness of bioassay results

[1] Subsequent review has established that the self-assessment was conducted over 4 days.

[2] While SC&A (2018) cites "1995" as starting point for this time period, the post-SEC period in question actually begins on January 1, 1996.

> for 1995–2000… A pertinent question is whether bioassay data are sufficiently complete, given evidence of incomplete worker bioassay program enrollments, inadequate use of checklists to identify radionuclides being handled, and nonparticipation of workers in required bioassays (particularly, transient CTWs). This question is particularly relevant given LANL's apparent reliance on engineering controls, PPE, and respiratory protection, backed up by RWP-driven surveillance of job contamination levels, to trigger an assessment for the need for bioassay. [SC&A 2018, pp. 9–10]

Finally, SC&A further underscored this point at the full Board meeting at Redondo Beach, CA, in December 2018:

> So, in any case -- so we were looking at the implementation part of it and our concern, essentially, was LANL performed a self-assessment in 1999, which turns out to probably be the most comprehensive look at whether or not the bioassay program was being implemented effectively or not. And it came up pretty short.
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> And the question that we're most concerned about is to what extent the rather quick sampling that they did in that particular review reflects some serious deficiencies in the completeness of the bioassay records that may undercut come of the assumptions that we have regarding that program. [ABRWH 2018, p. 88]

In summary, SC&A's position has been, and continues to be, that the 1999 self-assessment results substantiate significant program deficiencies in the management of the LANL bioassay program prior to 2000 and indicate potentially significant incompleteness in it by virtue of the limited sampling of job-specific bioassays, checklists, and subcontractor enrollments conducted by the assessment team over 4 days. However, that very limited sampling leaves unknown the extent of these deficiencies for the overall LANL job-specific bioassay and subcontractor bioassay enrollment programs, respectively. SC&A recommended to the work group that NIOSH follow up on the 1999 self-assessment to determine "whether and how these reported program deficiencies impact the adequacy and completeness of bioassay results for 1995–2000," specifically, January 1, 1996–December 31, 1999 (SC&A 2018, p. 9).

NIOSH Response

In its November 2018 response to SC&A's findings, NIOSH agreed that the "presumption of compliance" premise for applying a 100 mrem per year dose threshold for unmonitored workers at LANL may not be applicable, given the information that was provided in SC&A's review (p. 30):

> NIOSH agrees with many of the issues identified by SC&A in its review of the LANL ER Addendum. Specifically, NIOSH agrees that LANL may not have been in full compliance with all aspects of 10 CFR 835 during the entire period under evaluation (1996-2005). NIOSH further acknowledges the possibility that some workers who should have been monitored according to procedure, may not have been.

However, NIOSH disputed that the NC ID 484 findings and other SC&A technical findings undercut its evaluation report conclusion that unmonitored workers with exposures to the "primary" radionuclides—uranium, plutonium, and tritium—would have been unlikely to have received intakes that resulted in 100 mrem committed effective dose equivalent (CEDE), as provided in NIOSH's conclusion to its September 2018 report:

> The field monitoring and contamination control programs at LANL were well-established and formalized by January 1, 1996. These programs, which were intended to ensure that unmonitored individuals were unlikely to receive intakes of 100 mrem CEDE, were in place and being implemented during the period of this evaluation.
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> Based upon its review of existing bioassay results, NIOSH finds that workers who were monitored for the primary radionuclides (uranium, plutonium, and tritium) were unlikely to have received intakes exceeding 2% of the SALI (or intakes that would have resulted in 100 mrem CEDE). NIOSH also believes that intakes to the unmonitored population would have been lower than that of the monitored population. NIOSH therefore concludes that unmonitored workers were unlikely to have received intakes of 2% of the SALI, and the assignment of 2% SALI intakes for unmonitored workers with access to controlled areas is bounding. NIOSH further finds no reason to believe that intakes of exotic radionuclides by unmonitored workers would be substantially different. In summary, NIOSH concludes that the weight of the evidence supports assignment of 2% SALI intakes for unmonitored workers, as proposed in the ER Addendum, is sufficiently bounding and claimant favorable. [NIOSH 2018, pp. 30–31]

In its most recent (NIOSH 2019) report, NIOSH provides a specific discussion of its assessment of each deficiency noted in LANL's noncompliance report. For Deficiency 1 regarding inadequate health physics checklists (and by extension, Deficiencies 2 and 3 for gaps in job-specific bioassay participation and subcontractor bioassay enrollments), NIOSH addresses the broader question of dose reconstruction feasibility in the context of the availability and completeness of coworker data for the primary radionuclides. In that discussion, NIOSH observes that there are "extensive" such data available and lists the number of in vitro and in vivo records by radionuclide for 1996–2005. NIOSH concludes that despite "some workers" not participating in the appropriate bioassay program, there was "nevertheless sufficient overall worker participation in the various routine bioassay programs that statistically-valid co-worker models could be generated from the resulting data" (NIOSH 2019, p. 25). Finally, "Although NIOSH does not find this deficiency to impact its ability to bound unmonitored intakes to the primary radionuclides, it remains a concern with regard to bounding intakes of exotic radionuclides" (NIOSH 2019, p. 25).

NIOSH's conclusion for that report further emphasizes this position (NIOSH 2019, p. 28):

> As stated in the preceding section, NIOSH has not identified any dose reconstruction infeasibilities for the primary radionuclides at LANL. LANL has had effective routine bioassay programs in place for these radionuclides throughout the period under evaluation and sufficient bioassay data are available

> to NIOSH. The primary focus of the self-assessment was clearly the routine bioassay programs (i.e., Am, Pu, U, and tritium).
>
> Nevertheless, it is important to remember that the 1999 LANL self-assessment (which led to NC ID 484) was an evaluation of the IDEPs existing at LANL at that time. Significant flaws were highlighted in NC ID 484, which led to significant improvements to LANL's IDEPs. However, in its review of all of the available documentation associated with NC ID 484 and the corrective actions that followed, NIOSH did not find any reason to abandon the use of the ORAUT-OTIB-0062 co-worker models to bound unmonitored worker intakes for the primary radionuclides.

NIOSH also observed that the "issues and concerns identified in Nonconformance Report NC ID 484 were associated with the routine bioassay programs being implemented at that time, and these routine bioassay programs were for LANL's primary radionuclides of concern" (NIOSH 2019, p. 29).

SC&A Response

SC&A recommended to the work group that NIOSH needed to follow up on the 1999 self-assessment to determine "whether and how these reported program deficiencies impact the adequacy and completeness of bioassay results for 1995–2000" (SC&A 2018, p. 9). Based on a recent NIOSH-led interview with LANL [redacted] managers who were present at the time, it is now clear that LANL, itself, had not conducted such a retrospective followup review (Interview 2019).[3] With a very limited sampling by LANL showing two out of five workers not participating in required job-specific bioassays under the reviewed RWP (addressed as "Deficiency 2" in NIOSH's review), it remains unclear whether a corresponding gap likewise existed in sitewide, RWP-required, job-specific bioassays over this time period.

This is not a question of the effectiveness of the routine bioassay program for the primary radionuclides at LANL, nor is it a concern over the amount of routine bioassay data available for these radionuclides. Rather, the NC ID 484 finding regarding lack of LANL worker participation in job-specific bioassays raises the question, unanswered in our view, of the adequacy and completeness of that program in 1996–2000. If the missing bioassays in this small sample reflect a circumstance where almost half of RWP-required bioassays site wide may be missing, this could compromise the existing coworker models—given that RWPs often involve unique radiological source terms, work activities, and exposure circumstances—leading to missing doses that could adversely affect the dose distribution upon which the coworker models are based. There needs to be an objective basis for judging whether or not those missing bioassay results translate into missing doses that make a difference in that coworker distribution.

NIOSH claims there are "no dose reconstruction infeasibilities for the primary radionuclides at LANL" and points to the number of radionuclide-specific in vitro and in vivo records cited in Tables 1 and 2 of its report (NIOSH 2019, p. 21). NIOSH concludes that despite bioassay program shortcomings, such as inadequate checklists, enrollments, and nonparticipation in RWP

[3] This interview was held on May 21, 2019, during the final drafting of this memorandum report, by NIOSH with SC&A present. The summary of this interview will be available pending internal agency review.

job-specific monitoring, "there was nevertheless sufficient overall worker participation in the various routine bioassay programs that statistically-valid co-worker models could be generated from the resulting data" (NIOSH 2019, p. 25).

SC&A disagrees with this conclusion because the uncertain gap in what may be the upper end of potential radiation intakes due to missing RWP job-specific bioassays and enrollments draws into question the database's representativeness and completeness.[4] There has been no validation of the adequacy and completeness of sitewide job-specific bioassay data for 1996–2000 by either LANL or NIOSH in terms of a followup on this question. The disclosure of potential bioassay incompleteness provided in 1999 by NC ID 484 makes invalid a conclusion regarding the "statistical" validity of the LANL coworker model without such a review, as recommended by SC&A last year.

SC&A's concerns for LANL are analogous to those that it has raised about a similar gap in job-specific bioassays at SRS that were the subject of a Notice of Violation and civil penalty in 1998. Self-assessments conducted by the SRS contractor found nonparticipation rates for job-specific bioassays at SRS of 67% (limited survey) and 79% (complete survey) (SC&A 2017b). Given the lack of RWP-required, job-specific bioassays submitted, Westinghouse Savannah River Company conducted a resurvey of all workers on job-specific bioassays for 1997 and found none had positive intakes for the period in question. However, with this resurvey limited to one year (1997) and with incomplete RWPs for prior years, NIOSH has since undertaken an expanded sampling of newly identified RWPs for those years to validate that corresponding worker job-specific bioassay results compare favorably with sitewide construction trade worker (CTW) data, and can be bounded by existing coworker models. While the RWP and enrollment sampling scope was very limited at LANL, the findings of NC ID 484 are no less significant and deserve further review.

While NIOSH (2019, p. 28) notes that "the primary focus of the self-assessment was clearly the routine bioassay programs (i.e., Am, Pu, U, and tritium)," this does not necessarily appear to be the case for NC ID 484, which also reviewed *nonroutine* RWP-driven job-specific bioassays. This LANL self-assessment was conducted in response to a DOE headquarters enforcement program 120-day moratorium, entailing contractor actions to self-assess their respective internal dose evaluation programs (IDEPs) and report violations. This moratorium came on the heels of major notices of violations at SRS and Mound involving nonparticipation of workers in RWP-required, job-specific bioassays, among other IDEP issues. The outside health physics reviewers for the LANL self-assessment team came from Mound and SRS. Findings of bioassay nonparticipation and the proportion of workers not submitting job-specific bioassays were comparable to those made at those two sites. While the radionuclides involved may have been the *primary* ones, as observed by NIOSH, the LANL self-assessment clearly focused on the implementation of the nonroutine job-specific bioassay program.

[4] RWPs can be required for nonroutine, specialized radiation work involving unique sources or exposure circumstances that require preplanning for protective equipment (such as respirators), air sampling, job-specific bioassays, and health physics surveillance. The lack of bioassays for a significant portion of workers on such RWPs may skew the overall bioassay database unless it can be shown either that job-specific bioassay results at LANL during this time period were not sufficiently different than routine bioassay results, or that the proportion of missing bioassays in the 1999 RWP sampling is not reflective of overall LANL-wide performance.

In its 2019 white paper, NIOSH emphasizes four points (derived from its earlier 2018 report) that justify its ability to dose reconstruct internal dose at LANL after 1995 with sufficient accuracy (NIOSH 2019). These are listed below with a corresponding SC&A response.

1. NIOSH 2019, p. 28: "LANL is under a legal requirement to monitor workers likely to receive intakes of 100 mrem CEDE."

   SC&A Response: Yes, but as NC ID 484 illustrates, and as SC&A pointed out in its earlier reviews, the actual implementation of field programs to satisfy this legal requirement often took time following the 1995 enactment of 10 CFR Part 835, and compliant monitoring was not necessarily in practice in the years immediately following enactment.

2. NIOSH 2019, p. 28: "NIOSH has accumulated a large quantity of bioassay records for the period under evaluation that clearly indicate that monitored workers were unlikely to receive intakes greater than 100 mrem CEDE (ORAUT-OTIB-0062 and ORAUT-OTIB-0063)."

   SC&A Response: Yes, but those records may not be complete, and the coworker models are potentially invalid in light of NC ID 484's finding of incomplete RWP-required, job-specific bioassays. The question that remains is whether the self-assessment's very limited sampling reflects the broader circumstance of LANL's overall job-specific bioassay completeness for 1996–2000.

3. NIOSH 2019, p. 28: "LANL has robust field-monitoring programs designed and implemented to ensure that unmonitored individuals are unlikely to receive intakes of 100 mrem CEDE."

   SC&A Response: SC&A agrees that LANL had sound monitoring programs, except for the 10 implementation deficiencies cited in NC ID 484, including three that directly impaired "field-monitoring program designed and implemented to ensure that unmonitored individuals are unlikely to receive intakes of 100 mrem CEDE." It can be argued that these field-monitoring programs did not become sufficiently "robust," from an implementation standpoint, until corrective actions were taken by the end of 1999. Further, even that program characterization may be questionable, given evidence of persistent and systemic deficiencies in the overall LANL nuclear safety and radiological control programs being implemented in the 2000s, as described in a succession of DOE enforcement actions (e.g., NNSA 2003, DOE 2003, and NNSA 2007).

4. NIOSH 2019, p. 28: "Because it is evident from the available bioassay data that monitored workers were unlikely to receive intakes greater than 100 mrem CEDE, NIOSH concluded…that unmonitored workers were also unlikely to receive intakes greater than 100 mrem CEDE."

   SC&A Response: This is only true if the available bioassay data are sufficiently complete to support a bounding coworker model. As noted above, there is the possibility that substantial job-specific bioassay data are lacking, with uncertain implications for the

validity of the coworker model. If unmonitored job-specific bioassay data can be demonstrated as comparable and bounded by *routine* bioassay data for monitored workers, or by bioassay data for monitored coworkers on the same RWPs (e.g., for a representative sample of LANL radiological work activities), then this claim would have merit.

In terms of the followup that SC&A recommended to the work group in 2018 (SC&A 2018, pp. 9–10), one option was to make an inquiry to LANL regarding any further or expanded reviews the laboratory may have conducted following NC ID 484 to identify, enumerate, and resurvey workers who did not submit required bioassays. Was the very limited RWP sample of two out of five nonparticipants reflective of sitewide implementation? If LANL performed no followup, how did the laboratory address these potential gaps in its internal dose evaluations for affected workers prior to corrective actions? How is it "likely" that unmonitored workers performing radiological work under various RWPs in 1996–2000 did not exceed 100 mrem CEDE if there are no dose data for them and the coworker model may be based on a dose distribution that may exclude as much as 40% or more of RWP job-specific exposures? How can NIOSH conclude that the dose distribution for all monitored workers would be bounding for unmonitored workers if an appreciable, but still unconfirmed, proportion of those workers lack required job-specific bioassay results?

From document review and the recent interview conducted with LANL senior radiological control managers (May 21, 2019; Interview 2019), NIOSH and SC&A have both confirmed that no apparent followup or assessment by LANL along these lines of inquiry had occurred following the issuance of NC ID 484. Therefore, the answers to these questions remain unknown or problematic.

SC&A also questions NIOSH's response to "Deficiency 3" regarding deficient bioassay enrollments by the primary subcontractor, Johnson Controls. Apart from acknowledging the LANL corrective actions, NIOSH cites statements by subcontractor management that its workers were unlikely to receive any dose from radionuclide intakes and that if subcontractor workers were in violation of required 10 CFR Part 835 monitoring enrollment requirements, it was a response to their "being placed on bioassay programs when there is little or no potential for intakes" (NIOSH 2019, p. 26). While NIOSH is careful to state it does not accept these management statements because they had not corroborated them, they are cited as illustrative of the [redacted] manager's thinking at the time of the 1999 self-assessment.

SC&A finds NIOSH's use of management's thinking in this regard somewhat contradictory of its previous conclusions. If LANL's monitoring program was "well-established and formalized" by 1996, as concluded by NIOSH (2018, p. 18), the apparent liberties taken by this manager would not have occurred in the first place or would have been corrected by management. From this account, it is clear that as late as 1999, past practice and personal professional judgment may have driven the bioassay program (at least for enrollments), not necessarily 10 CFR Part 835 requirements as reflected in LANL procedures. How many subcontractor workers were inappropriately excluded from bioassay monitoring for the work they were assigned? Over what length of time? Has LANL, or anyone, investigated the accuracy of this manager's claim that it would have been unlikely for any Johnson Controls workers under their supervision to have received an intake during the late 1990s? A cursory review of NIOSH/OCAS Claims Tracking

System (NOCTS) claim information for crafts and trade workers at LANL in 1996–2000 (e.g., electricians, pipefitters, custodians, plumbers, and welders), who would typify Johnson Controls workers in that time period,[5] shows a number of confirmed intakes of primary radionuclides such as plutonium and uranium.

For "Deficiency 1," regarding workers and their supervisors inaccurately completing "health physics checklists" used to identify radionuclides of concern for bioassay enrollment, NIOSH concludes that this would bear only on the primary radionuclides and that there are sufficient routine bioassay data to support coworker model development. SC&A's concern over this issue and response is the same as noted for Deficiency 2.

The other seven deficiencies do not bear on 10 CFR 835.402(c)(1) as it pertains to LANL's ability to monitor individuals "likely to receive a committed effective dose equivalent of 0.1 rem (0.001 sievert) or more from all occupational radionuclide intakes in a year," and SC&A has no issue with NIOSH's response.

Conclusion

SC&A agrees that the issues surrounding NC ID 484 pertain mostly to the primary radionuclides and relate to the statistical validity of the database underpinning the current coworker model for them. However, SC&A disagrees with NIOSH's assessment that the amount of routine bioassay data available obviates the need to confirm its completeness in the face of NC ID 484 findings of potential data gaps for bioassay enrollments and RWP job-specific bioassay participation. SC&A stands by its original recommendation to the work group that NIOSH follow up with LANL to ascertain whether the bioassay incompleteness identified in this limited sampling in 1999 reflects a broader incompleteness in LANL's bioassay database for 1996–2000. Such an indication would bring into question the statistical validity of the current coworker model for assigning unmonitored doses for LANL workers. The central concern stemming from NC ID 484 was not only related to the need for an improved and compliant LANL bioassay program going forward, but also to all of the LANL workers who were inappropriately not bioassayed prior to the self-assessment team confirming these deficiencies in 1999. Has anyone looked at the significance of these potential monitoring gaps for the workers involved and their impact on LANL's internal dose records upon which NIOSH's dose reconstruction relies? The recent interview with LANL settles the first question, regarding whether any retrospective followup had occurred (it had not), but does not settle the second, as to the implications for adequate dose reconstruction after 1995.

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[5] NOCTS does not distinguish between LANL employees and Johnson Controls employees.

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