**SC&A**    **Memorandum**

To:    Idaho National Laboratory/Argonne National Laboratory-West Work Group
From:    SC&A, Inc.
Date:    June 25, 2020
Subject:   83.14 Verification and Validation of Temporary Badges at the Chemical
           Processing Plant (1975–1980)

## Introduction and Background

As part of its evaluation of Special Exposure Cohort (SEC) Petition 00238, the Idaho National Laboratory (INL)/Argonne National Laboratory-West (ANL-W) Work Group requested that SC&A investigate methods to verify and validate the proposed class definition for the Idaho Chemical Processing Plant (CCP) during the period from January 1, 1975, through December 31, 1980 (i.e., the 83.14 period). The SEC-00238 evaluation report proposes the following class definition for this period:

> All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Idaho National Laboratory (INL) in Scoville, Idaho, and who were monitored for external radiation at the Idaho Chemical Processing Plant (CPP) (e.g., at least one film badge or TLD dosimeter from CPP) between January 1, 1975 and December 31, 1980 for a number of work days aggregating at least 250 work days, occurring solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees in the Special Exposure Cohort. [NIOSH, 2017, p. 1]

This proposed class definition was presented to the Advisory Board on Radiation Worker Health (Board) at the August 23, 2017, meeting in Santa Fe, NM.

Preliminary investigations by the National Institute for Occupational Safety and Health (NIOSH) and SC&A discovered that nonroutine external badging (referred to as "temporary badges" in this memorandum) was not always historically entered into the INL dosimetry indexing system, and thus these dosimetry records were not being appropriately assigned to potential members of the SEC class. In response to this issue, the U.S. Department of Energy (DOE) began an extensive coding effort in 2016 to index the temporary badges so that they are appropriately assigned to the correct energy employee (EE). Once those badges had been correctly indexed, all appropriate external dosimetry should be available for individual SEC adjudication under the requirements of the proposed definition (shown above). However, the INL/ANL-W work group expressed concern that inherent difficulties in the coding effort, such as incorrect transcription, variation in the legibility and quality of handwritten records, and other human error, may

inadvertently result in the exclusion of a qualified claimant from the proposed SEC class. The decision about the acceptable level of effectiveness and completeness of the dosimetry index is of singular importance to the Board's ultimate recommendation on the SEC class.[1]

To evaluate these concerns in relation to Petition SEC-00238, the work group tasked SC&A to perform a verification and validation (V&V) study similar to the V&V tasking completed in support of the evaluation of SEC-00219 (SC&A, 2019a). SC&A concluded that temporary badges available in the Site Research Database (SRDB) for review were severely limited (SC&A, 2018, finding 2, p. 19). Thus, development of a V&V study of those badges would not likely result in any meaningful conclusions. As a result, the work group tasked NIOSH, in conjunction with SC&A, to perform an onsite data capture at the INL records facility in Idaho Falls, ID, to confirm that additional badges existed and to capture those badges so that a more comprehensive V&V proposal could be developed. The data capture occurred in September 2018 and was made available to SC&A in late November 2018. After reviewing the data, SC&A concluded the following in its V&V proposal memorandum dated February 25, 2019 (SC&A, 2019b, pp. 11–12):

- The overwhelming majority of the reviewed temporary badges for the 83.14 period (1975–1980) contain a unique security number for the worker. These unique identifiers provide another method to correctly identify the EE with the badge. Such identifiers were rarely observed for temporary badges during the previous SEC-00219 period V&V evaluation (January 1963–February 1970).

- SC&A's review and rough tally of recently captured temporary badges during the 83.14 period did not identify any temporal gaps that directly indicate a significant portion of badges may be missing or unavailable during a given time period.

- No documentation, in the form of dosimetry branch summary reports, is currently available that identifies how many temporary badges were issued during the 83.14 period. Therefore, a more definitive completeness analysis of the captured temporary badges is not currently feasible.

- SC&A identified 200 claimants that appear to have been temporarily badged at CPP based on a match in the name. This represents just under 50% of the claims that fit SC&A's V&V pool criteria.[2]

- SC&A recommends the 30 claims described in the previous section for updated dosimetry records requests from INL/DOE for the purpose of

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[1] The Board voted to accept the current class definition as written on August 27, 2017, as an interim measure while a verification and validation plan was developed and executed.

[2] The selection criteria as presented by SC&A (2019b) included claimants with covered employment during the 83.14 period, a probability of causation that is less than 50 percent, and at least one covered illness not included in the 22 presumptive SEC cancers.

V&V evaluation. A total of 639 temporary badges are associated with these 30 claims.

- An additional seven claims (representing 105 temporary badges) were identified during the 83.14 period that were part of the previous SEC-00219 V&V evaluation (SC&A [2019a]). These claims could be used to augment the 30 suggested claims for updated dosimetry requests and would not require any additional research from DOE/INL.

Based on this review, SC&A proposed a V&V evaluation of these 37 claims to the INL/ANL-W work group at the March 25, 2019, teleconference meeting (INL/ANL-W WG, 2019), which was approved for implementation. Based on this direction, INL/DOE provided NIOSH and SC&A the full dosimetry record for these 37 claimants.[3] This memorandum provides the results of SC&A's V&V evaluation of the INL/DOE-provided dosimetry files for these 37 claims.

In addition to the full dosimetry files provided directly by INL/DOE, NIOSH independently attributes personal dosimetry records identified in its captured SRDB records to individual claimants through a process commonly referred to as "hot-linking." As SC&A understands the hot-linking process, it is not intended to be a complete compilation of claimant dosimetry records available in the SRDB but rather a useful tool to augment the dosimetry files provided by the individual site/DOE. Furthermore, hot-linking is not performed for every claim but rather is used on an "as-needed" basis for more recent claims or claims that have been reopened since the process of hot-linking was established. Despite these limitations, SC&A examined the supplementary hot-linked records identified by NIOSH to establish the extent to which this method in combination with the INL/DOE-provided records effectively cover the individual claimant's temporary dosimetry records as identified in the V&V proposal.

## Evaluation of 37 Updated Claimant Dosimetry Files Received from INL/DOE

Table 1 provides a summary comparison of all of the temporary badges identified by SC&A in the V&V proposal against two sources:

1. temporary badges provided by INL/DOE based on NIOSH's recent request for complete dosimetry records that was made in support of this V&V effort

2. individual dosimetry records that are automatically identified by NIOSH in previously captured records and attributed to individual claimants (i.e., hot-linking)

It is important to note that, unlike the previous V&V evaluation performed in support of the SEC-00219 evaluation for the years 1963–1970, the majority of badges identified for 1975–1980 contained a unique employee number in addition to the name and employer. The inclusion of the employee number alleviated many of the previous SEC-00219 concerns about name misspellings or the potential for multiple workers with the same or similar names. Any name variations

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[3] Seven of the 37 claims had previously been researched by INL in 2018. For the remaining 30 of 37 claims, INL researched and provided full dosimetry files between December 2019 and February 2020, with the last records received on February 19, 2020.

observed in temporary badges were only considered in the V&V comparison if the badge also included the correct employee number.

*Table 1. Comparison of temporary badges identified by SC&A for V&V evaluation to INL submissions and badges independently identified by NIOSH*

| Category | Total number | Percent of SC&A total |
|---|---|---|
| Badges identified by SC&A for V&V evaluation | 736 [a] | N/A |
| V&V badges identified by INL/DOE via standard request process | 602 | 82% |
| Total V&V badges identified by NIOSH via the hot-linking process | 613 | 83% |
| Combination of INL- and NIOSH-identified V&V badges | 682 | 93% |

[a] Note: This total (736) is slightly lower than the originally proposed V&V total (744) because several of the original V&V badges were later discovered to be for different areas and/or likely from different people and were thus removed from the evaluation.

As noted in table 1, the overall results of the two methods (INL/DOE research and NIOSH hot-linking) for all V&V claims showed very similar "success rates," as defined by correctly identifying temporary badges with the EE that had been previously established in the V&V proposal. Success rates of approximately 83 percent and 82 percent were found for the NIOSH hot-linking and INL/DOE dosimetry compilations, respectively. By comparison, the previous V&V assessment in support of SEC-00219 (1963–1970) found that approximately 94.5 percent of the V&V badges identified by SC&A were correctly identified by INL/DOE (SC&A, 2019a). Therefore, the current V&V evaluation of the 83.14 period (1975–1980) showed a marked decrease in the effectiveness of the INL/DOE dosimetry request process.[4]

However, SC&A also found that if the temporary badges identified for the two methods are taken in combination (DOE/INL and NIOSH hotlinking combined), the total success rate increases to 93 percent. This combined percentage includes one claim (Case 21) for which no temporary badges were included via either the DOE/INL updated dosimetry record nor the NIOSH hot-linking process (this claim is further discussed in the next section). If this claim is removed from the combined statistics, then the total success rate would further increase to 97 percent.

Table 2 compares the temporary badges identified by SC&A and the updated dosimetry files provided by both NIOSH and INL on an individual claimant basis. As seen in column 3, the percentage of V&V badges per worker identified by the NIOSH hot-linking process ranged from 0 to 100 percent, with an arithmetic median value of 90 percent and an average per worker of 85 percent. Based on column 4 of table 2, the success rate for V&V badges identified through the standard dosimetry file requests to INL/DOE also ranged from 0 to 100 percent, with an arithmetic median value of 96 percent and an average per worker of 86 percent.

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[4] NIOSH hot-linking was not evaluated during the previous V&V evaluation in support of SEC-00219.

*Table 2. Overview of V&V evaluation of the 37 claimants*

| Claim # (Case ID*) | Total SC&A V&V badges | Total SC&A V&V badges identified by NIOSH (% SC&A of total) | Total SC&A V&V badges identified by INL (% of SC&A total) | Combination of NIOSH and INL methods (% of SC&A total) | Case notes and comments |
|---|---|---|---|---|---|
| [redacted] | 43 | 38 (88%) | 21 (49%) | 42 (98%) | [redacted] |
| [redacted] | 18 | 6 (33%) | 17 (94%) | 17 (94%) | [redacted] |
| [redacted] | 9 | 7 (78%) | 9 (100%) | 9 (100%) | [redacted] |
| [redacted] | 22 | 19 (86%) | 22 (100%) | 22 (100%) | [redacted] |
| [redacted] | 23 | 22 (96%) | 23 (100%) | 23 (100%) | [redacted] |
| [redacted] | 77 | 69 (90%) | 74 (96%) | 76 (99%) | [redacted] |
| [redacted] | 4 | 4 (100%) | 3 (75%) | 4 (100%) | [redacted] |
| [redacted] | 28 | 23 (82%) | 26 (93%) | 27 (96%) | [redacted] |

| Claim # (Case ID*) | Total SC&A V&V badges | Total SC&A V&V badges identified by NIOSH (% SC&A of total) | Total SC&A V&V badges identified by INL (% of SC&A total) | Combination of NIOSH and INL methods (% of SC&A total) | Case notes and comments |
|---|---|---|---|---|---|
| [redacted] | 13 | 9 (69%) | 12 (92%) | 12 (92%) | [redacted] |
| [redacted] | 19 | 18 (95%) | 19 (100%) | 19 (100%) | [redacted] |
| [redacted] | 13 | 12 (92%) | 12 (92%) | 12 (92%) | [redacted] |
| [redacted] | 11 | 9 (82%) | 11 (100%) | 11 (100%) | [redacted] |
| [redacted] | 37 | 36 (97%) | 37 (100%) | 37 (100%) | [redacted] |
| [redacted] | 13 | 10 (77%) | 12 (92%) | 13 (100%) | [redacted] |
| [redacted] | 26 | 24 (92%) | 23 (88%) | 25 (96%) | [redacted] |
| [redacted] | 7 | 6 (86%) | 7 (100%) | 7 (100%) | [redacted] |
| [redacted] | 23 | 21 (91%) | 21 (91%) | 2 (96%) | [redacted] |

| Claim # (Case ID*) | Total SC&A V&V badges | Total SC&A V&V badges identified by NIOSH (% SC&A of total) | Total SC&A V&V badges identified by INL (% of SC&A total) | Combination of NIOSH and INL methods (% of SC&A total) | Case notes and comments |
|---|---|---|---|---|---|
| [redacted] | 22 | 18 (82%) | 21 (95%) | 21 (95%) | [redacted] |
| [redacted] | 18 | 11 (61%) | 17 (94%) | 17 (94%) | [redacted] |
| [redacted] | 24 | 23 (96%) | 21 (88%) | 23 (96%) | [redacted] |
| [redacted] | 34 | 0 (0%) | 0 (0%) | 0 (0%) | [redacted] |
| [redacted] | 18 | 15 (83%) | 18 (100%) | 18 (100%) | [redacted] |
| [redacted] | 4 | 4 (100%) | 4 (100%) | 4 (100%) | [redacted] |
| [redacted] | 59 | 57 (97%) | 57 (97%) | 58 (98%) | [redacted] |
| [redacted] | 16 | 13 (76%) | 14 (82%) | 15 (88%) | [redacted] |

| Claim # (Case ID*) | Total SC&A V&V badges | Total SC&A V&V badges identified by NIOSH (% SC&A of total) | Total SC&A V&V badges identified by INL (% of SC&A total) | Combination of NIOSH and INL methods (% of SC&A total) | Case notes and comments |
|---|---|---|---|---|---|
| [redacted] | 10 | 8 (80%) | 9 (90%) | 9 (90%) | [redacted] |
| [redacted] | 17 | 13 (76%) | 14 (82%) | 15 (88%) | [redacted] |
| [redacted] | 9 | 9 (100%) | 9 (100%) | 9 (100%) | [redacted] |
| [redacted] | 14 | 12 (86%) | 13 (93%) | 13 (93%) | [redacted] |
| [redacted] | 3 | 2 (67%) | 3 (100%) | 3 (100%) | [redacted] |
| [redacted] | 2 | 2 (100%) | 2 (100%) | 2 (100%) | [redacted] |
| [redacted] | 1 | 1 (100%) | 1 (100%) | 1 (100%) | [redacted] |
| [redacted] | 46 | 43 (93%) | 44 (96%) | 46 (100%) | [redacted] |

| Claim # (Case ID*) | Total SC&A V&V badges | Total SC&A V&V badges identified by NIOSH (% SC&A of total) | Total SC&A V&V badges identified by INL (% of SC&A total) | Combination of NIOSH and INL methods (% of SC&A total) | Case notes and comments |
|---|---|---|---|---|---|
| [redacted] | 2 | 2 (100%) | 2 (100%) | 2 (100%) | [redacted] |
| [redacted] | 42 | 38 (90%) | 0 (0%) | 38 (90%) | [redacted] |
| [redacted] | 2 | 2 (100%) | 2 (100%) | 2 (100%) | [redacted] |
| [redacted] | 7 | 7 (100%) | 0 (0%) | 7 (100%) | [redacted] |

* Case ID is an arbitrary designation assigned by SC&A that does not have any direct connection to the claimant.
** Claimants were identified from previous V&V efforts in support of the SEC-00219 evaluation. Records were not resubmitted a second time for the current evaluation.

## Discussion of Three Claimants with No Temporary Badges Identified by INL

As seen in table 2, three of the cases in which records were requested from INL/DOE did not return any of the identified V&V temporary badges (Cases 21, 35, and 37). For Case 21, no additional hot-linked files were identified and included by NIOSH. However, this is potentially because the claim was adjudicated before the process of hot-linking was an ordinary function of NIOSH operations. Therefore, augmenting the claim's dosimetry file would not likely have occurred unless the claim had been reopened since the inception of the hot-linking process.

The more troubling aspect for Case 21 is that recent dosimetry records requests made to INL/DOE did not identify any of the V&V badges identified by SC&A. The request for dosimetry records for this claim was made on December 17, 2019, and dosimetry records were returned by INL on February 11, 2020. Upon closer examination, it appears that while the correct claim information was transmitted by NIOSH to INL (including name, social security number, gender, date of birth, and approximate dates of employment), this information does not appear to have been used to search and compile the dosimetry file that was returned by INL/DOE. Specifically, INL/DOE returned dosimetry records for someone of the same name but a different Social Security number.

For Cases 35 and 37, SC&A was unable to determine the reason that none of the identified V&V badges had been included in the updated dosimetry files provided by INL/DOE. However, for these cases, the process of NIOSH hot-linking identified 90 percent of the temporary badges (38 of 42) for Case 35 and 100 percent of the temporary badges (7 of 7) for Case 37 identified by SC&A as part of the V&V evaluation.

## Summary Conclusions

SC&A's V&V review of 37 claims covering 736 temporary badges resulted in the following conclusions:

- Overall, 83 percent of the total temporary badges identified by SC&A were correctly identified by the NIOSH hot-linking process (hot-linking was not performed in one of the V&V cases, as noted below).

- Overall, 82 percent of the temporary badges identified by SC&A were included in the updated dosimetry files provided by DOE/INL. By comparison, nearly 95 percent of the identified V&V temporary badges for the 1963–1970 period evaluated as part of SEC-00219 were previously correctly identified by DOE/INL (SC&A, 2019a).

- When considering the DOE/INL-supplied dosimetry records and the NIOSH hot-linking process in combination, 93 percent of the identified V&V badges (682/736) have been correctly attributed to the EE and included in their individual dosimetry file.

- Eight of the 37 reviewed claims contained 100 percent of the temporary badges identified by SC&A in the NIOSH hot-linked files.

- Fifteen of the 37 reviewed claims contained 100 percent of the temporary badges identified by SC&A in the INL/DOE-provided dosimetry record.

- Nineteen of the 37 reviewed claims contained 100 percent of the temporary badges identified by SC&A when the NIOSH hot-linking process and INL/DOE-provided dosimetry records are taken in combination.

- For Cases 35 and 37, none of the INL-provided dosimetry records contained the V&V badges identified by SC&A. SC&A was unable to determine the root cause of the omission. However, the NIOSH process of hot-linking successfully identified 90 percent and 100 percent of the badges identified by SC&A for these cases, respectively.

- For Case 21, INL provided dosimetry records for a different individual than the one requested by NIOSH. No incidental hot-linking was performed by NIOSH for this claim. Therefore, *none* of the V&V badges identified by SC&A were included in the claim's available dosimetry records.

## References

Idaho National Laboratory/Argonne National Laboratory-West Work Group (INL/ANL-W WG). (2019). *Advisory Board on Radiation and Worker Health, Idaho National Laboratory/Argonne West Work Group Monday, March 25, 2019* [Transcript of teleconference meeting]. https://www.cdc.gov/niosh/ocas/pdfs/abrwh/2019/wgtr032519_1-508.pdf

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