



**ORAU TEAM  
Dose Reconstruction  
Project for NIOSH**

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Page 1 of 23

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<b>Analysis of Dosimeter Badges and Area Codes for Ten SRS Claimants for 1953 through 1972</b>		ORAUT-RPRT-0066	Rev. 00
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09/19/2014	00	New document initiated to analyze dosimeter badges and Health Physics area codes for 10 Savannah River Site claimants to identify potential issues that might affect the implementation of the proposed Special Exposure Cohort class for the Savannah River Site. Incorporates formal internal and NIOSH review comments. Training required: As determined by the Objective Manager. Initiated by James M. Mahathy.

## TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
	Acronyms and Abbreviations .....	4
1.0	Introduction .....	5
1.1	Purpose.....	5
2.0	Method of Analysis.....	5
3.0	Case Findings.....	7
3.1	Case 1.....	7
3.2	Case 2.....	8
3.3	Case 3.....	9
3.4	Case 4.....	10
3.5	Case 5.....	10
3.6	Case 6.....	11
3.7	Case 7.....	12
3.8	Case 8.....	12
3.9	Case 9.....	12
3.10	Case 10.....	12
4.0	Summary of Findings .....	12
	References .....	14
	ATTACHMENT A, SUMMARY OF FINDINGS FOR EACH REPORTED CASE GAP.....	17

## LIST OF TABLES

<u>TABLE</u>	<u>TITLE</u>	<u>PAGE</u>
1-1	List of Cases Reviewed by SC&A .....	5
2-1	Gaps, Illegible, or Inconclusive Results .....	6
4-1	Unresolved Issues.....	13
4-2	Numerical Summary of Issues by Year .....	13

**ACRONYMS AND ABBREVIATIONS**

CATI	computer-assisted telephone interview
DCAS	Division of Compensation Analysis and Support
DOE	U.S. Department of Energy
HPAREH	Health Protection Annual Radiation Exposure History (database)
mrem	millirem
NIOSH	National Institute for Occupational Safety and Health
NOCTS	NIOSH-OCAS Claims Tracking System
OCAS	Office of Compensation Analysis and Support
ORAU	Oak Ridge Associated Universities
SC&A	S. Cohen & Associates
SEC	Special Exposure Cohort
SRDB Ref ID	Site Research Database Reference Identification (number)
SRS	Savannah River Site

## 1.0 INTRODUCTION

### 1.1 PURPOSE

In *Draft White Paper, Review of Some SRS Claimant Cases to Examine Badge and Area Codes for Adequacy in Thorium SEC Implementation*, S. Cohen & Associates (SC&A 2011) reported a review of 10 claimant cases to identify potential issues that might affect the implementation of the proposed Special Exposure Cohort (SEC) class at the Savannah River Site (SRS) (NIOSH 2011). SC&A considered the completeness of data available for review and the usefulness of that data in identifying work locations. The 10 cases (Table 1-1) were provided by the petitioner or claimant representatives and do not represent a random sample.

Table 1-1. Cases reviewed by SC&A.

Case	Employment dates from claim
1	12/11/1951–05/28/1954 08/23/1954–04/17/1964
2	03/30/1953–04/30/1976
3	09/10/1951–12/10/1955 12/19/1955–05/31/1979
4	12/11/1951–01/05/1954 05/29/1975–06/18/1975
5	02/26/1953–01/16/1959
6	05/07/1952–08/30/1953 08/31/1953–06/30/1957 07/01/1957–12/31/1981
7	07/26/1954–12/31/1972
8	11/19/1951–12/31/1984
9	05/16/1961–05/31/1995
10	1961–1964

For these 10 cases, SC&A reviewed dosimeter badge data and dosimetry cards from the claimants' U.S. Department of Energy (DOE) files for January 1953 through September 1972 and the computer-assisted telephone interview (CATI) responses for each of the claimants. From their review, SC&A identified gaps in the available external dosimeter data in the claimant records by yearly quarter. SC&A also reported illegible and indeterminate records of work location. SC&A did not provide explanation or justification for the cases it reported to have gaps or to be incomplete.

SC&A described their analysis as preliminary without follow-up on the data gaps to determine if the gaps could be explained or justified. The Oak Ridge Associated Universities (ORAU) Team for the National Institute for Occupational Safety and Health (NIOSH) Dose Reconstruction Project analyzed each of the reported gaps, illegible results, and incomplete results to determine if each could be explained or justified. The results of that analysis are provided in this report.

## 2.0 METHOD OF ANALYSIS

The ORAU Team reviewed each instance of a gap, illegible, or incomplete data for each case (see Table 2-1). In this analysis, the Team made use, when available, of the DOE-supplied external monitoring and bioassay data for each claimant, the CATI data in the NIOSH-Office of Compensation and Analysis (OCAS) Claims Tracking System (NOCTS), SRS visitor cards, SRS quarterly dosimetry reports in the Site Research Database (SRDB), and SRS work history files. Where sources are not cited in this document, information in NOCTS was used. The Team assessed (1) whether monitoring data for a gap or an illegible or incomplete record are available in the SRDB, (2) whether gaps could be verified or resolved through comparison with bioassay data, or (3) if there is evidence or an indication of why a worker was not monitored in a particular period. This analysis sought to address

Table 2-1. Gaps, illegible, or indeterminate results.<sup>a</sup>

Case	Reported gap (year, quarters)	SC&A comment
1	1953	No records
	1954	Assigned areas illegible on cards
	1955	Assigned areas illegible on cards
	1956	Assigned areas illegible on cards
	1957	Assigned areas illegible on cards
2	1953, 2nd	No records
	1954	One assigned area scratched out and replaced
	1955	Several entries for assigned area, all scratched out
	1958, 1st, 2nd, 4th	No records
	1962, 2nd	No records
	1963, 2nd, 3rd, 4th	000 for HP area code
	1964, 1st, 2nd, 3rd, 4th	000 for HP area code
	1965, 1st, 2nd, 3rd, 4th	000 for HP area code
	1966, 1st, 2nd, 3rd, 4th	No records
	1968, 1st	000 for HP area code
	1970, 2nd, 4th	No records
	1971, 1st	No records
	1972, 3rd	No records
3	1953	No records
	1955	No records
	1958, 1st, 2nd, 3rd, 4th	No records
	1959, 1st, 2nd, 3rd, 4th	No records
	1960, 2nd, 3rd	No records
	1961, 3rd	No records
	1962, 1st, 2nd	No records
	1963, 2nd	No records
	1963, 4th	000 for HP area code
	1964, 1st	000 for HP area code
	1964, 4th	No records
	1965, 2nd, 3rd, 4th	No records
	1966, 1st, 2nd, 3rd, 4th	No records
	1969, 4th	No records
	1970, 1st, 2nd, 3rd, 4th	No records
1972, 3rd	No records	
4	1953-1954	No records
	1967-1969	Data during unverified employment
5	1953 1st, 2nd, 3rd	No records
	1954, 1st	Assigned area scratched out
	1957	No records
	1958, 1st, 2nd, 3rd	No records
6	1953	No records
	1954	Assigned area illegible
	1955	Assigned area illegible
	1956	Assigned area illegible
	1957	Assigned area illegible
	1959, 1st, 2nd, 3rd, 4th	No records
	1960, 1st, 3rd, 4th	No records
	1961, 1st, 2nd, 3rd, 4th	No records
	1962, 1st, 2nd, 3rd, 4th	No records
	1963, 1st	No records
	1963, 2nd, 3rd, 4th	000 for HP area code
	1964, 1st, 2nd, 3rd, 4th	000 for HP area code
	1965, 1st, 2nd	000 for HP area code

Case	Reported gap (year, quarters)	SC&A comment
	1966, 1st, 2nd, 3rd, 4th	No records
	1967, 1st, 2nd, 3rd, 4th	No records
	1970, 1st, 2nd, 4th	No records
	1971, 1st, 2nd, 3rd, 4th	No records
	1972, 1st, 3rd	No records
7	No issues	No issues
8	1954	3 areas scratched out both sides, replaced with D on 3rd/4th quarter side
	1955	1 area scratched out, not replaced, on 3rd/4th quarter side
	1956	1 area scratched out, not replaced, on 3rd/4th quarter side
	1957	2 areas scratched out, replaced
	1958	Card area D-2; printouts 5C = CMX/TNX
	1968, 3rd	Code 12 – letter is not legible on copy
9	1968, 1st, 2nd	Partially illegible
	1972, 1st, 2nd, 3rd, 4th	No records
10	1962, 1st, 2nd, 3rd, 4th	No records
	1963, 1st, 2nd, 3rd, 4th	No records
	1964, 3rd	000 for HP area code

a. SC&A (2011).

the reported issues for the 10 cases only; results are not statistically valid for all SRS workers for the analyzed period (i.e., 1953 to 1972).

### 3.0 CASE FINDINGS

The ORAU Team findings for each reported gap in SC&A (2011) are provided in the following discussion. Findings are also summarized in Attachment A.

#### 3.1 CASE 1

The gaps for Case 1 were that (1) there were no dosimeter results for 1953 through May 1954 when the worker was hired as an operator and (2) there were illegible (assigned) Health Physics (HP) area codes on the dosimeter cards for 1954, 1955, 1956, and 1957.

The Team searched for but did not find visitor dosimeter card records in the SRDB for any dosimeter assignments for the Case 1 worker. The Team examined the dosimeter cards from the U.S. Department of Labor for 1954, 1955, 1956, and 1957. The location code for 1954 is readable as L; a bioassay card for 1954 indicates that the Case 1 worker was assigned to L. The scanned copies of 1955, 1956, and 1957 cards are somewhat illegible. However, the HP area codes (HP area) would be readable on microfiche of the card from DOE. DOE-provided bioassay cards show that the Case 1 worker was assigned to 100P in 1955, 1956, and 1957. The Case 1 worker continued to work at SRS until April 17, 1964; no gaps were reported after 1957. The Team confirms a single gap for Case 1 from 1953 through May 1954. While it is possible the Case 1 worker did not work in areas with potential for radioactive exposure or, if so, the worker was monitored, the Team can determine only that dosimeter data and area codes have either not been reported, or have not been found, for 1953 through May 1954. Note that thorium was not introduced to Building 773A until July 1953 (NIOSH 2011).

In the CATI, the claimant's survivor did not mention Building 773A or CMX/TNX as work locations for the Case 1 worker.

### 3.2 CASE 2

The reported gaps for Case 2 were (1) missing dosimeter card and area code data for the second quarter 1953, (2) illegible area codes in 1954 and 1955, and (3) missing dosimeter card and area code data for all quarters of 1958, the second quarter of 1962, all quarters of 1966, the second and fourth quarters of 1970, the first quarter of 1971, and the third quarter of 1972. In addition, the code 000 was listed for HP area code for the second, third, and fourth quarters of 1963, all quarters of 1964 and 1965, and the first quarter of 1968.

Visitor cards available to the Team begin in 1954. Therefore, the Team confirms a gap for the second quarter of 1953. The Team notes that the Case 2 worker has a qualifying area code for the proposed SEC class (NIOSH 2011) on more than one of the 1953 cards.

No bioassay card was provided for 1954, but the area code would be readable on microfiche of the card available at DOE. The Team examined the 1955 cards; the area code is G2.

No dosimeter assignment records were found for the Case 2 worker by SC&A for the first, third, and fourth quarters of 1958. The Team searched for but did not find dosimeter assignment or results records for these quarters in the quarterly dosimetry reports in the SRDB. The Team researched the worker's job history and found that the job accounting number prefix changed from G to GI in April 1958. The worker stayed on the GI prefix until October 1961. The prefix was again changed to GI in August 1962. There is a dosimeter assignment for the second quarter of 1958. Further, SRS reported the worker's total dose for 1958 to be 0 mrem. This indicates SRS considered the second quarter result to be the only period of monitoring [data from Health Protection Annual Radiation Exposure History (HPAREH) database]. NIOSH reported the following for 1958 forward (NIOSH 2008):

*...based on the availability of SRS documentation, and NIOSH's review of the hardcopy records in comparison to the HPAREH database, there does not appear to be any significant administrative practice or data issue that would affect the integrity of the recorded SRS doses. The results of NIOSH's evaluation on this matter demonstrate that the use of HPAREH data is bounding for construction worker external photon doses.*

By January 1956, SRS Radiation and Contamination Control procedure DPSOP 40 had the following requirement: "Film badge dosimeters are to be worn by all personnel entering regulated areas" (DuPont 1956). The external dosimetry assignments and results available in the SRDB and the claimant record represent a complete record for the worker. While the Team cannot say what the GI prefix means, the prefix does appear to have been assigned to workers that had periods when monitoring was not required. The worker's external dose data is considered complete for 1958 per the SRS data. However, for dose reconstruction purposes and in order to be claimant favorable, missed doses are assigned independent of this analysis on reported gaps.

SC&A reported a gap in dosimeter assignment for the second quarter of 1962. The Team examined the SRS quarterly dosimeter results for the second quarter of 1962 and found the assignment (DuPont 1962, p. 27). For all quarters of 1963, 1964, and 1965, SC&A reported the Case 2 worker's HP area code was 000. The Team confirmed those assignments. However, the HP area code of 000 was added to the proposed class description by NIOSH after SC&A performed the cases review. Therefore, the issues for 1963, 1964, 1965 are resolved; there are now no gaps or incomplete records. SC&A also reported 000 HP area code assignments for the first quarter of 1968; this assignment is resolved for the above reason. SC&A reported gaps for all four quarters of 1966. The Team found assignments for all four quarters in the SRS quarterly dosimeter results for 1966 (DuPont 1966a, p. 23; DuPont 1966c, p. 125; DuPont 1966d, p. 115). SC&A reported gaps for the second and

fourth quarter of 1970, the first quarter of 1971, and the third quarter of 1972. The Team found those dosimeter result and area assignments in SRS quarterly dosimeter results (DuPont 1970a, p. 113; DuPont 1971a, p. 122; DuPont 1972d, p. 123).

Based on the data available in the SRDB and the dosimeter data available on microfiche at SRS, the Team concludes that there is only one verified gap for the Case 2 worker: the second quarter of 1953. In the CATI, the claimant's survivor did state that the Case 2 worker worked in Building 773A or CMX/TNX.

### 3.3 CASE 3

The reported gaps for Case 3 were (1) missing dosimeter card and area code data for 1953; (2) illegible area codes in 1955; (3) missing dosimeter card and area code data for all quarters of 1958 and 1959, the second and third quarters of 1960, the third quarter of 1961, the first and second quarters of 1962, the second and fourth quarters of 1963, the fourth quarter of 1964, the second, third, and fourth quarters 1965, the first and second quarters of 1966, the fourth quarter of 1969, the first, second, and third quarters of 1970, the fourth quarter of 1970, and the third quarter of 1972. In addition, SC&A reported 000 was listed for HP area code for the fourth quarter of 1963 and the first quarter of 1964.

Visitor cards available to the Team begin in 1954. Therefore, the Team confirms a gap for 1953.

The Team examined the 1955 cards; the area code is A1, which is also a qualifying area code for the proposed SEC class (NIOSH 2011). The Team investigated SRS dosimetry quarterly reports and job history data for the Case 3 worker to search for explanations for the reported gaps in 1958 and 1959. The Case 3 worker was reassigned to clerical in 1956 and not monitored by film badge after July 1957 and until the first quarter of 1960. SRS reported the worker was not monitored in 1958 and 1959, although the worker was bioassayed in June 1959. Although the Team believes the Case 3 worker was not monitored for external dose based on work assignment, and although no dose was reported for 1958 and 1959, this worker was bioassayed in 1959. Therefore, the Team concludes there are possible gaps in area assignment for both years.

For the gaps in 1960, 1961, and 1962, SRS reported the worker's total dose for each of those years. This indicates SRS considered those quarterly results to be the only periods of monitoring during those years. Health Physics evaluated the potential for exposure. Workers were assigned dosimeters when working in a Regulated or Radiation Danger Zone, or when there was the potential for external exposure (SRDB Ref ID: 52805). The worker was monitored when going into regulated or radiation danger zones to perform material inventories. As an E&I control clerk the worker was tracking electronics and instruments in 1960-1961 timeframe with little potential for exposure and was not monitored for external exposure. The Case 3 worker's external dose data is considered complete for 1960, 1961, and 1962 per the SRS data. For the fourth quarter of 1963 and the first quarter of 1964, SC&A reported the Case 3 worker's HP area code was 000. The Team confirmed those assignments so the area code is no longer considered an issue.

The Team examined the SRS quarterly dosimeter results for the fourth quarter of 1964, second, third, and fourth quarters of 1965, first and second quarters of 1966, fourth quarter of 1969, all four quarters of 1970, and third quarter of 1972 and found the assignments for each (DuPont 1964, p. 151; DuPont 1965a, p. 146; DuPont 1965b, p. 149; DuPont 1965c, p. 150; DuPont 1966a, p. 157; DuPont 1966b, p. 154; DuPont 1969, p. 163; DuPont 1970b, p. 175; DuPont 1971a, p. 154; DuPont 1971b, p. 153; DuPont 1971c, p. 150; DuPont 1972d, p. 158).

Based on the data available in SRDB and dosimeter data available on microfiche at SRS, the Team concludes that there are verified gaps for the Case 3 worker: 1953 and all quarters of 1958 and 1959. In the CATI, the claimant did mention that some work in Building 773A.

### 3.4 CASE 4

For the Case 4 worker, SC&A reported missing dosimeter card and area code data for January 1, 1953, through January 5, 1954, and the receipt of data for the worker that appeared to be from a period outside the verified employment time frame (1967 to 1969).

Visitor cards available to the Team begin in 1954. Therefore, the Team confirms a gap for 1953. The Team searched visitor cards for 1954 but found no data for January 1 through January 5, 1954, for the Case 4 worker. The Team notes that the worker's employment from December 11, 1951, through January 5, 1954, was verified by affidavit from a coworker. As SRS did not have a record of employment or record of monitoring in the visitor cards, it is most likely the worker was not monitored for radiation exposure during the early employment period.

The Team reviewed the data from outside the verified employment period. These data are single page copies of quarterly dosimetry reports for the first quarter of 1967, the third quarter of 1967, and the third quarter of 1968. These are supplemental reports uploaded by the Team but are not reports sent by DOE for the specific claim. In examining the complete claim file for the Case 4 worker, it is noted the last name of the worker contained a Sr. suffix in records sent by DOE, but there is no suffix on the supplemental dosimetry reports for 1967 and 1968. Furthermore, the payroll identification number for the worker in the 1967 and 1968 reports differs from the payroll identification number in 1980-era dosimetry reports. The Team does acknowledge that a worker could have differing payroll identification numbers over time. However, SRS reported annual external dose for workers by social security number. For the Case 4 worker, SRS did not report any dose before 1983. Furthermore, in a DOE response in the claim file, SRS reported the first occupational medical X-ray for the worker to have occurred on July 14, 1983, (the date of hire in 1983). The Team proffers that the subject dose reports do not belong to the Case 4 worker because the employment was not verified and there is no evidence that the worker in the 1967 and 1968 reports is the same as the Case 4 worker.

Based on the data available in the SRDB and dosimeter data available on microfiche at SRS, the Team concludes that there are verified gaps for the Case 4 worker: all of 1953 and January 1 through January 5, 1954.

### 3.5 CASE 5

The reported issues for the Case 5 worker were (1) missing dosimeter card and area code data for 1953, 1957, and the first three quarters of 1958; and (2) illegible area codes in the first quarter of 1954.

Visitor cards available to the Team begin in 1954; therefore, the Team confirms a gap for 1953. However, quarterly dosimetry reports included with the DOE response for the Case 5 worker show that employment began in November 1953. The Team reviewed the scanned copy of the film badge card for the first quarter of 1954 in the claimant file. The Team read the area code as D8 though it has been scratched out. The area code for 1953 was U and the area code for the third quarter of 1954 was F. Bioassay for 1955 shows that the Case 5 worker worked in F area, which is consistent with the codes shown for 1953 and 1954. The area code may be readable on the microfiche copy of the first quarter of 1954 card at SRS. Because the area code can be determined to not be one of the area codes for 1954 in NIOSH 2011, the Team considers this issue to be resolved.

The Team found no record of the Case 5 worker being monitored in 1957 and for the first three quarters of 1958. The Team researched the worker's job history and found that the job accounting number prefix changed from G to GI in July 1956; the prefix remained GI through 1958. The GI prefix was handwritten next to the job accounting code. SRS reported the worker's total dose for 1958 in the DOE response, so the 1958 data are complete. On that same report, SRS showed no monitoring during 1957. Although the worker's job accounting number contained the GI prefix, the Team does not have enough information to determine if the worker should not have been monitored. Therefore, the Team verifies the gap for 1957 along with the gap for 1953. In the CATI, the claimant did not mention work in Building 773A or CMS/TNX, but did report working all over the site, which could imply 773A or CMX/TNX.

### 3.6 CASE 6

The reported issues for the Case 6 worker were (1) missing dosimeter card and area code data for 1953, 1959, the first, second, and the third quarters of 1960, the first, third, and fourth quarters of 1961, the first, second, and the third quarters of 1962, the first quarter of 1963, all of 1966 and 1967, the second, third, and fourth quarters of 1970, all of 1971, and the first and second quarters of 1972; and (2) illegible area codes for 1954 through 1957. In addition, the code 000 was listed for HP area code for the second, third, and fourth quarters of 1963, all quarters of 1964, and the first and second quarters of 1965. This worker was in the Power department; as such, he was not likely exposed to radiation on a routine basis. Work would not have been routinely monitored (SRDB Ref ID: 52805).

Visitor cards available to the Team begin in 1954. Therefore, the Team confirms a gap for 1953. The Team attempted to read the area codes on film badge cards for 1954 through 1957 and agrees that the area codes on the scanned copies in the DOE response are not readable. However, the area codes (HP Area) would be readable on microfiche of the card available at DOE. Therefore, the Team believes these issues of illegibility can be resolved.

The Team looked for external dosimeter results and area code data for 1959 in SRS quarterly dosimeter reports for that year. The Team found dosimeter records with area codes for the first, second, and fourth quarters (DuPont 1959c, p. 569). The Team researched the worker's job history and found that the worker's job accounting number prefix changed from G to GI in April 1959; the GI prefix remained until October 1962. Although the worker's job accounting number contained the GI prefix, the Team does not have enough information to say the worker should not have been monitored in the third quarter of 1959 or that the worker was not on the site. Therefore, the Team verifies the gap for the third quarter of 1959. SRS reported total external dose for 1960, 1961, 1962, and 1963, so the Team contends the quarterly reports in the file are the only reports for the worker for those years. Based on the SRS report and the GI accounting prefix, the Team considers 1960 through 1963 complete.

In terms of the area code values of 000 for HP area code for the second, third, and fourth quarters of 1963, all quarters of 1964, and the first and second quarters of 1965, the Team confirmed those assignments. However, the HP area code of 000 was added to the proposed class description by NIOSH after SC&A performed the cases review. Those issues are considered resolved.

The Team searched SRS quarterly dosimetry reports to determine if results were available for all quarters of 1966, 1967, the second, third, and fourth quarters of 1970, all of 1971, and the first and second quarters of 1972. The Team found dosimeter assignment and area code data for each of those quarters in the dosimetry reports for each respective quarter (DuPont 1966a, p. 80; DuPont 1966b, p. 77; DuPont 1966c, p. 83; DuPont 1966d, p. 77; DuPont 1967a, p. 77; DuPont 1967b, p. 72; DuPont 1967c, p. 80; DuPont 1967d, p. 90; DuPont 1970a, p. 76; DuPont 1970b, p. 105; DuPont 1970c, p. 86; DuPont 1970d, p. 82; DuPont 1971a; DuPont 1971b, p. 82; DuPont 1971c, p. 79; DuPont 1972a, p. 75; DuPont 1972e, p. 47).

Based on the data available in the SRDB, the DOE claimant information, and the dosimeter data available on microfiche at SRS, the Team concludes that there are verified gaps for the Case 6 worker: all of 1953 and the third quarter of 1959. In the CATI, the claimant's survivor did mention Building 773A as one of the work locations for the Case 6 worker.

### **3.7 CASE 7**

No issues were reported for the Case 7 worker's records.

### **3.8 CASE 8**

The reported issue for the Case 8 worker was illegible dosimeter card and area code data for 1954 through 1958 and third quarter 1968. The Team reviewed the copies of the cards in the DOE response for the claimant. The Team concludes the area code is D; the 1 marking was marked out to denote just D. For the 1956 film badge card, the area code was changed to A9. For the 1957 film badge card, the area code was changed to D2, which refers to CMX/TNX. The film badge card for 1958 refers to CMX/TNX as well. For the third quarter of 1968 in which the area code is not legible, the SRS dosimetry report for the third quarter of 1968 in the SRDB area contains a legible code (i.e., 12G) (DuPont 1968c, p. 95). The Team considers all reported issues for Case 8 to be resolved.

### **3.9 CASE 9**

The reported issues for the Case 9 worker were (1) illegible dosimeter card and area code data for the first and second quarters of 1968 and (2) missing results for all four quarters of 1972. The Team was able to clearly read the area code values for both the first and second quarter of reports for 1968; in both cases, the area code is 01B (DuPont 1968a, p. 96; DuPont 1968b, p. 89). The Team found dosimeter assignment and area code data for each quarter in 1972 in the dosimetry report for each respective quarter (DuPont 1972b, p. 53; DuPont 1972c, p. 87; DuPont 1972e, p. 55; DuPont 1972f, p. 56).

The Team finds that all reported issues for Case 9 have been resolved.

### **3.10 CASE 10**

The reported issues for the Case 10 worker were (1) missing dosimeter card and area code data for all quarters of 1962 and 1963, and (2) the code 000 for HP area code for the third and fourth quarter of 1964.

The Team checked the work history information for the Case 10 worker. The Human Resources card for the worker shows termination for military service and reinstatement on December 5, 1963. The Team searched the dosimetry report for the fourth quarter of 1963 and found a dosimeter assignment for that period with area code 000 (DuPont 1963, p. 103). The Team verified the area code assignment of 000 for the third quarter of 1964. The HP area code of 000 was added to the proposed class description by NIOSH after SC&A performed the cases review. A review of job history cards for two other workers that had military leave in the same time-frame also showed breaks in external monitoring.

The Team considers all reported issues for Case 10 to be resolved.

## **4.0 SUMMARY OF FINDINGS**

SC&A (2011) identified 136 issues across 10 cases. The Team analyzed each case and examined the corresponding claimant CATI data, dosimetry reports, and work history information. As a result of

this effort, the Team believes that 120 (88%) of the issues are resolved. Of the 16 unresolved issues (12%) (see Table 4-1), five are from 1953, one from 1954, one from 1957, four from 1958, and five from 1959. The Team has resolved all gaps existing from January 1, 1960 forward or explained why monitoring was not performed. The unresolved issues affect 6 of the 10 cases; 9 of those issues pertain to Case 3. A numerical summary of the number of issues by year is provided in Table 4-2.

Table 4-1, Unresolved issues.

Case	Period (year, quarters)	Issue	ORAU Team comments
1	1953	No records	None
2	1953, 2nd	No records	None
3	1953	No records	None
	1958, 1st	No records	Reassigned to clerical (2/23/1956); not monitored after 7/1957.
	1958, 2nd	No records	Reassigned to clerical (2/23/1956); not monitored after 7/1957.
	1958, 3rd	No records	Reassigned to clerical (2/23/1956); not monitored after 7/1957.
	1958, 4q	No records	Reassigned to clerical (2/23/1956); not monitored after 7/1957.
	1959, 1st	No records	Reassigned to clerical (2/23/1956); not monitored after 7/1957.
	1959, 2nd	No records	Reassigned to clerical (2/23/1956); not monitored after 7/1957. However, worker has bioassay data for 6/1959, so 1959 data should be considered not found.
	1959, 3rd	No records	Reassigned to clerical (2/23/1956); not monitored after 7/1957.
	1959, 4q	No records	Reassigned to clerical (2/23/1956); not monitored after 7/1957.
4	1953-1954	No records	Employment during this period was verified by affidavit.
5	1953 1st, 2nd, 3rd	No records	Dosimetry report shows initial company date as 11/1953.
	1957	No records	1957 is included in DOE records but illegible. Will need to look at fiche for HP area code.
6	1953	No records	None
	1959, 3rd	No records	Job History card suggests possible leave or assignment [GI prefix] in job number.

Table 4-2: Numerical summary of issues by year.

Year	Number of issues	Number unresolved
1953	5	5
1954	6	1
1955	5	0
1956	3	0
1957	7	1
1958	8	4
1959	8	5
1960	5	0
1961	4	0
1962	10	0
1963	14	0
1964	14	0
1965	5	0
1966	10	0
1967	5	0
1968	4	0
1969	1	0
1970	9	0
1971	5	0
1972	8	0
<b>Totals</b>	<b>136</b>	<b>16 (12%)</b>

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**ATTACHMENT A  
SUMMARY OF FINDINGS FOR EACH REPORTED CASE GAP**

Table A-1. Summary of findings for each reported case gap (*italics indicates an unresolved issue*).

Case	Reported gap (year, quarters)	SC&A comment	Found or resolved	ORAU Team comment	Document	SRDB page	Year
1	1953	<i>No records</i>	<i>No</i>				1953
1	1954	Assigned areas illegible on cards	Yes	Clearly readable as L. Bioassay card show that claimant assigned to L.	NOCTS	42	1954
1	1955	Assigned areas illegible on cards	Yes	HP area likely readable on fiche of other cards. Bioassay card show that claimant assigned to P.	NOCTS	41	1955
1	1956	Assigned areas illegible on cards	Yes	Readable as P. Could be more readable on fiche. Bioassay card show that claimant assigned to P.	NOCTS	39	1956
1	1957	Assigned areas illegible on cards	Yes	HP area likely readable on fiche of other cards. Bioassay card show that claimant assigned to P.	NOCTS	37	1957
2	1954	One assigned area scratched out and replaced	Yes	No bioassay card for timeframe. HP area likely readable on fiche of other cards. Claimant has qualifying area code for SEC in 1953.	NOCTS	65	1954
2	1955	Several entries for assigned area, all scratched out	Yes	HP area appears to be G2. No bioassay card for timeframe. HP area likely readable on fiche of other cards. Claimant has qualifying area code for SEC in 1953.	NOCTS	64	1955
2	1953, 2nd	<i>No records</i>	<i>No</i>				1953
2	1958, 1st	No records	Yes	No bioassay card for period. Job history card and NOCTS claim file p. 61 suggest worker was not working in rad areas in the first quarter of 1958. Job History card suggests possible leave (such as GI) or assignment [GI prefix] in job number.			1958
2	1958, 3rd	No records	Yes	No bioassay card for period. Job History card suggests possible leave (such as GI) or assignment [GI prefix] in job number.			1958
2	1958, 4th	No records	Yes	No bioassay card for period. Job History card suggests possible leave (such as GI) or assignment [GI prefix] in job number.			1958
2	1962, 2nd	No records	Yes	HP area assignment on report	DuPont 1962	27	1962
2	1963, 2nd	000 for HP area code	Yes	Verified	NOCTS	41	1963
2	1963, 3rd	000 for HP area code	Yes	Verified	NOCTS	40	1963
2	1963, 4th	000 for HP area code	Yes	Verified	NOCTS	35	1963

**ATTACHMENT A  
SUMMARY OF FINDINGS FOR EACH REPORTED CASE GAP (continued)**

Case	Reported gap (year, quarters)	SC&A comment	Found or resolved	ORAU Team comment	Document	SRDB page	Year
2	1963, 4th	000 for HP area code	Yes	Verified	NOCTS	39	1963
2	1964, 1st	000 for HP area code	Yes	Verified	NOCTS	38	1964
2	1964, 1st	000 for HP area code	Yes	Verified	NOCTS	34	1964
2	1964, 2nd	000 for HP area code	Yes	Verified	NOCTS	37	1964
2	1964, 2nd	000 for HP area code	Yes	Verified	NOCTS	33	1964
2	1964, 3rd	000 for HP area code	Yes	Verified	NOCTS	36	1964
2	1964, 3rd	000 for HP area code	Yes	Verified	NOCTS	32	1964
2	1964, 4th	000 for HP area code	Yes	Verified	NOCTS	31	1964
2	1966, 1st	No records	Yes	HP area code on dosimetry report.	DuPont 1966a	123	1966
2	1966, 2nd	No records	Yes	HP area code on dosimetry report.	DuPont 1966b	120	1966
2	1966, 3rd	No records	Yes	HP area code on dosimetry report.	DuPont 1966c	125	1966
2	1966, 4th	No records	Yes	HP area code on dosimetry report.	DuPont 1966d	115	1966
2	1968, 1st	000 for HP area code	Yes	Verified	NOCTS	29	1968
2	1970, 2nd	No records	Yes	HP area code on dosimetry report.	DuPont 1970a	113	1970
2	1970, 4th	No records	Yes	HP area code on dosimetry report.	DuPont 1970d	120	1970
2	1971, 1st	No records	Yes	HP area code on dosimetry report.	DuPont 1971a	122	1971
2	1972, 3rd	No records	Yes	HP area code on dosimetry report.	DuPont 1972d	123	1972
3	1953	No records	No				1953
3	1955	Assigned areas illegible on cards	Yes	A1 clearly indicated on readings. Would be member of proposed class.	NOCTS	54	1955
3	1958, 1st	No records	No	Reassigned to clerical (2/23/1956); not monitored after 7/1957.			1958
3	1958, 2nd	No records	No	Reassigned to clerical (2/23/1956); not monitored after 7/1957.			1958
3	1958, 3rd	No records	No	Reassigned to clerical (2/23/1956); not monitored after 7/1957.			1958
3	1958, 4th	No records	No	Reassigned to clerical (2/23/1956); not monitored after 7/1957.			1958
3	1959, 1st	No records	No	Reassigned to clerical (2/23/1956); not monitored after 7/1957.			1959
3	1959, 2nd	No records	No	Reassigned to clerical (2/23/1956); not monitored after 7/1957. However, worker has bioassay data for 6/1959, so 1959 data should be considered not found.			1959
3	1959, 3rd	No records	No	Reassigned to clerical (2/23/1956); not monitored after 7/1957.			1959

**ATTACHMENT A  
SUMMARY OF FINDINGS FOR EACH REPORTED CASE GAP (continued)**

Case	Reported gap (year, quarters)	SC&A comment	Found or resolved	ORAU Team comment	Document	SRDB page	Year
3	1959, 4th	No records	No	Reassigned to clerical (2/23/1956); not monitored after 7/1957.			1959
3	1960, 2nd	No records	Yes	Still assigned as clerical. Was monitored in the first quarter. However, worker has bioassay data for 6/1960 (assigned to F). Appears to be an annual follow-up sample possibly not depending on current work assignment.			1960
3	1960, 3rd	No records	Yes	Still assigned as clerical in E&I. Was monitored in the first quarter but not in the second or third due to very low potential for exposure.			1960
3	1961, 3rd	No records	Yes	Continued work as clerical in E&I. Was monitored in the first quarter but not in the second or third due to very low potential for exposure.			1961
3	1962, 1st	No records	Yes	Continued work as clerical in E&I. Was monitored in the first quarter but not in the second or third due to very low potential for exposure.			1962
3	1962, 2nd	No records	Yes	Continued work as clerical in E&I. Was monitored in the first quarter but not in the second or third due to very low potential for exposure.			1962
3	1963, 2nd	No records	Yes	HP area assignment on report	DuPont 1963	191	1963
3	1963, 4th	000 for HP area code	Yes	Verified	NOCTS	41	1963
3	1964, 1st	000 for HP area code	Yes	Verified	NOCTS	40	1964
3	1964, 4th	No records	Yes	HP area assignment on report	DuPont 1964	151	1964
3	1965, 2nd	No records	Yes	HP area assignment on report	DuPont 1965a	146	1965
3	1965, 3rd	No records	Yes	HP area assignment on report	DuPont 1965b	149	1965
3	1965, 4th	No records	Yes	HP area assignment on report	DuPont 1965c	150	1965
3	1966, 1st	No records	Yes	HP area assignment on report	DuPont 1966a	157	1966
3	1966, 2nd	No records	Yes	HP area assignment on report	DuPont 1966b	154	1966
3	1969, 4th	No records	Yes	HP area assignment on report	DuPont 1969	163	1969
3	1970, 1st	No records	Yes	HP area assignment on report	DuPont 1971a	154	1970
3	1970, 2nd	No records	Yes	HP area assignment on report	DuPont 1971b	153	1970

Document No. ORAUT-RPRT-0066

Revision No. 00

Effective Date: 09/19/2014

Page 19 of 4

**ATTACHMENT A  
SUMMARY OF FINDINGS FOR EACH REPORTED CASE GAP (continued)**

Case	Reported gap (year, quarters)	SC&A comment	Found or resolved	ORAU Team comment	Document	SRDB page	Year
3	1970, 3rd	No records	Yes	HP area assignment on report	DuPont 1970b	175	1970
3	1970, 4th	No records	Yes	HP area assignment on report	DuPont 1971c	150	1970
3	1972, 3rd	No records	Yes	HP area assignment on report	DuPont 1972d	158	1972
4	1953-1954	No records	No	<i>Employment during this period was verified by affidavit.</i>			1954
4	1967-1969	Unverified employment	Yes	The additional data was supplied by The Team, not directly by DOE. The worker had a different payroll identification number than that listed in these 1967-1969 reports. One of the four reports does not include data for anyone with same last name. Cannot establish this is the same person as worker with DOE verification.			1967
5	1957	No records	No	<i>1957 is included in DOE records but illegible. Will need to look at fiche for HP area code.</i>	NOCTS	8	1957
5	1953, 1st, 2nd, 3rd	No records	No	<i>Dosimetry report shows initial company date as 11/1953.</i>			1953
5	1954, 1st	Assigned area scratched out	Yes	HP area has a strike-through, may be accidental mark though. Should be able to examine fiche. Job history shows that worker was an operator in 1954. Can be determined to not be area in proposed SEC class.			1954
5	1958, 1st	No records	Yes	DOE report lists total dose for 1958	NOCTS	4	1957
5	1958, 2nd	No records	Yes	DOE report lists total dose for 1958	NOCTS	4	1957
5	1958, 3rd	No records	Yes	DOE report lists total dose for 1958	NOCTS	4	1957
6	1953	No records	No				1953
6	1954	Assigned area illegible	Yes	HP area likely readable on fiche of other cards.			1954
6	1955	Assigned area illegible	Yes	HP area likely readable on fiche of other cards.			1955
6	1956	Assigned area illegible	Yes	HP area likely readable on fiche of other cards.			1956
6	1957	Assigned area illegible	Yes	HP area likely readable on fiche of other cards.			1957
6	1959, 1st	No records	Yes	HP area assignment on report	DuPont 1959a	359	1959
6	1959, 2nd	No records	Yes	HP area assignment on report	DuPont 1959b	388	1959
6	1959, 3rd	No records	No	<i>Job History card suggests possible leave or assignment [GI prefix] in job number.</i>			1959
6	1959, 4th	No records	Yes	HP area assignment on report	DuPont 1959c	369	1959

**ATTACHMENT A  
SUMMARY OF FINDINGS FOR EACH REPORTED CASE GAP (continued)**

Case	Reported gap (year, quarters)	SC&A comment	Found or resolved	ORAU Team comment	Document	SRDB page	Year
6	1960, 1st	No records	Yes	Job History card suggests possible GI leave. Special code for job during period. Complete due to DOE dose report.			1960
6	1960, 3rd	No records	Yes	Job History card suggests possible GI leave. Special code for job during period. Complete due to DOE dose report.			1960
6	1960, 4th	No records	Yes	Job History card suggests possible GI leave. Special code for job during period. Complete due to DOE dose report.			1960
6	1961, 1st	No records	Yes	Job History card suggests possible GI leave. Special code for job during period. Complete due to DOE dose report.			1961
6	1961, 3rd	No records	Yes	Job History card suggests possible GI leave. Special code for job during period. Complete due to DOE dose report.			1961
6	1961, 4th	No records	Yes	Job History card suggests possible GI leave. Special code for job during period. Complete due to DOE dose report.			1961
6	1962, 1st	No records	Yes	Job History card suggests possible GI leave. Special code for job during period. Complete due to DOE dose report.			1962
6	1962, 2nd	No records	Yes	Job History card suggests possible GI leave. Special code for job during period. Complete due to DOE dose report.			1962
6	1962, 3rd	No records	Yes	Job History card suggests possible GI leave. Special code for job during period. Complete due to DOE dose report.			1962
6	1963, 1st	No records	Yes	Complete due to DOE dose report.			1963
6	1963, 2nd	000 for HP area code	Yes	Verified	NOCTS	30	1963
6	1963, 3rd	000 for HP area code	Yes	Verified	NOCTS	29	1963
6	1963, 4th	000 for HP area code	Yes	Verified	NOCTS	28	1963
6	1964, 1st	000 for HP area code	Yes	Verified	NOCTS	27	1964
6	1964, 2nd	000 for HP area code	Yes	Verified	NOCTS	26	1964
6	1964, 3rd	000 for HP area code	Yes	Verified	NOCTS	25	1964
6	1964, 4th	000 for HP area code	Yes	Verified	NOCTS	24	1964
6	1965, 1st	000 for HP area code	Yes	Verified	NOCTS	23	1965
6	1965, 2nd	000 for HP area code	Yes	Verified	NOCTS	22	1965

**ATTACHMENT A  
SUMMARY OF FINDINGS FOR EACH REPORTED CASE GAP (continued)**

Case	Reported gap (year, quarters)	SC&A comment	Found or resolved	ORAU Team comment	Document	SRDB page	Year
6	1966, 1st	No records	Yes	HP area assignment on report	DuPont 1966a	80	1966
6	1966, 2nd	No records	Yes	HP area assignment on report	DuPont 1966b	77	1966
6	1966, 3rd	No records	Yes	HP area assignment on report	DuPont 1966c	83	1966
6	1966, 4th	No records	Yes	HP area assignment on report	DuPont 1966d	77	1966
6	1967, 1st	No records	Yes	HP area assignment on report	DuPont 1967a	72	1967
6	1967, 2nd	No records	Yes	HP area assignment on report	DuPont 1967b	77	1967
6	1967, 3rd	No records	Yes	HP area assignment on report	DuPont 1967c	80	1967
6	1967, 4th	No records	Yes	HP area assignment on report	DuPont 1967d	90	1967
6	1970, 2nd	No records	Yes	HP area assignment on report	DuPont 1970a	76	1970
6	1970, 3rd	No records	Yes	HP area assignment on report	DuPont 1970c	86	1970
6	1970, 4th	No records	Yes	HP area assignment on report	DuPont 1970d	82	1970
6	1971, 1st	No records	Yes	HP area assignment on report	DuPont 1971a	83	1971
6	1971, 2nd	No records	Yes	HP area assignment on report	DuPont 1971b	82	1971
6	1971, 3rd	No records	Yes	HP area assignment on report	DuPont 1970b	105	1971
6	1971, 4th	No records	Yes	HP area assignment on report	DuPont 1971c	79	1971
6	1972, 1st	No records	Yes	HP area assignment on report	DuPont 1972a	75	1972
6	1972, 3rd	No records	Yes	HP area assignment on report	DuPont 1972e	47	1972
7		No reported issues.					
8	1954	3 areas scratched out both sides, replaced with D on the third and fourth quarter side	Yes	The HP area is D. The 1 was marked out to denote D.	NOCTS	93	1954
8	1955	1 area scratched out, not replaced, on the third and fourth quarter side	Yes	The HP area is D. The 1 was marked out to denote D.	NOCTS	92	1955
8	1956	1 area scratched out, not replaced, on the third and fourth quarter side	Yes	The HP area was changed to A9.	NOCTS	90	1956
8	1957	2 areas scratched out, replaced	Yes	The HP area was changed to D2.	NOCTS	89	1957
8	1958	Card area D-2; printouts 5C = CMX/TNX	Yes	D2 was phased out in 1958. Both codes refer to CMX/TNX.	NOCTS	87	1958
8	1968, 3rd	Code 12 – letter is not legible on copy	Yes	12G is legible on the SRDB dosimetry report for the third quarter of 1968.	DuPont 1968c	95	1968
9	1968, 1st	Partially illegible	Yes	01B is legible on the SRDB dosimetry report for the first quarter of 1968.	DuPont 1968a	96	1968
9	1968, 2nd	Partially illegible	Yes	01B is legible on the SRDB dosimetry report for the second quarter of 1968.	DuPont 1968b	89	1968

**ATTACHMENT A  
SUMMARY OF FINDINGS FOR EACH REPORTED CASE GAP (continued)**

<b>Case</b>	<b>Reported gap (year, quarters)</b>	<b>SC&amp;A comment</b>	<b>Found or resolved</b>	<b>ORAU Team comment</b>	<b>Document</b>	<b>SRDB page</b>	<b>Year</b>
9	1972, 1st	No records	Yes	HP area assignment on report	DuPont 1972b	53	1972
9	1972, 2nd	No records	Yes	HP area assignment on report	DuPont 1972c	87	1972
9	1972, 3rd	No records	Yes	HP area assignment on report	DuPont 1972e	55	1972
9	1972, 4th	No records	Yes	HP area assignment on report	DuPont 1972f	56	1972
10	1962, 1st	No records	Yes	Was on military leave			1962
10	1962, 2nd	No records	Yes	Was on military leave			1962
10	1962, 3rd	No records	Yes	Was on military leave			1962
10	1962, 4th	No records	Yes	Was on military leave			1962
10	1963, 1st	No records	Yes	Was on military leave			1963
10	1963, 2nd	No records	Yes	Was on military leave			1963
10	1963, 3rd	No records	Yes	Was on military leave			1963
10	1963, 4th	No records	Yes	Was on military leave; returned to site in 12/1963. Worker was monitored in the fourth quarter of 1963 (DuPont 1963, p. 103).			1963
10	1964, 3rd	000 for HP area code	Yes	Verified	NOCTS	6	1964