

MEMO

TO: Subcommittee on Dose Reconstruction

FROM: Rose Gogliotti, SC&A

DATE: January 7, 2016

SUBJECT: Summary Statistics Representing Sets 6 through 13; Revision 3

At the Subcommittee on Dose Reconstruction (DRSC) meeting on June 24, 2015, the Subcommittee members directed SC&A to develop new summary statistics representing cases from Sets 6 through 13 (Tabs 101 through 334). This memo provides summary tables and figures for sets 6 through 13 equivalent to the information and figures included in the July 31, 2009, Advisory Board on Radiation Worker Health (ABRWH) letter to Department of Health and Human Services Secretary Kathleen Sebelius. SC&A also included several figures summarizing Sets 1 through 13. At the request of the DRSC Chair, Dr. Kotelchuck, and the DFO Ted Katz, the original memo dated July 17, 2015, was revised on September 16, 2015, to include additional tables, figures, and selection criteria. At the September 24th DRSC meeting, SC&A and NIOSH were tasked to re-evaluate the status of these findings to determine if any should be withdrawn or reduced to observations based on the outcomes of issues resolution. This memo revision updates the tables and figures to account for that re-evaluation and DRSC comments. If desired by the DRSC, SC&A is prepared to supply the supporting data files and can generate additional tables and figures.

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DOSE RECONSTRUCTION CASES 101 THROUGH 334 SUMMARY FIGURES

Included herein are four tables and eight figures that summarize the characteristics of the dose reconstruction cases audited by the Advisory Board with the assistance of the Board's technical support contractor, SC&A. These tables and figures are as follows:

- Table 1. Summary of DR Methodology Applied to Cases 101 through 334
- Table 2. Summary of Overall Case Rank
- Table 3. Summary of Findings and Observations from Cases 101 through 334
- Table 4. Finding Classification for Cases 101 through 334
- Figure 1. Breakdown of Cases 101 through 334 Reviewed by Employment Site
- Figure 2. Comparison of Cases 1 through 100 and 101 through 334 by Site
- Figure 3. Comparison of Claims Reviewed to Goal of 1% Total Claims
- Figure 4. Breakdown of Case Reviews 101 through 334 by Decade First Employed
- Figure 5. Breakdown of Case Reviews 101 through 334 by POC
- Figure 6. Breakdown of Case Reviews 101 through 334 by Years of Employment
- Figure 7. Breakdown of Case Reviews 101 through 334 by Risk Model
- Figure 8. Breakdown of Cases 1 through 334 by Risk Model

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Table 1. Summary of DR Methodology Applied to Cases 101 through 334

DR Methodology	Total	Percentage
Maximized	32	14%
Minimized	7	3%
Best Estimate	193	83%
Total ¹	232	100%

¹ Although there are 234 cases in this subset, 2 cases were not reviewed by the DRSC. This brings the total to 232.

Table 2. Summary of Overall Case Rank

	Total	C	umulative	Case Rank	
	Total	No Rank ¹	Low ²	Medium ³	High ⁴
Total Cases	232	46	122	47	17

¹ No Rank is assigned to cases without any deficiencies identified.

Table 3. Summary of Findings and Observations from Cases 101 through 334

	Total	Finding Rank		
	Total	Low ¹	Medium ²	High ³
Total Findings	626 ⁴	513	91	22
Total Observations 5	241	NA	NA	NA

¹ **Low** means that the deficiency has only a marginal impact on dose.

Table 4. Finding Classification for Cases 101 through 334

Classification	Meaning of Classification	Number of Findings
A.	Was the proper judgment made regarding placing a person physically at a work location?	13
B.	Were all exposure scenarios considered (i.e., neutron, thorium)?	28
C.	Were the correct external dose model and assumptions used?	253
D.	Were the correct internal dose model and assumptions used?	134
E.	Is it a quality concern?	95
F.	It does not meet either of the above criteria.	103
	Total	626

² Low means that the combined deficiency of all findings has only a marginal impact on dose.

³ **Medium** means that the combined deficiency of all findings moderately impacts the dose.

⁴ **High** means that the combined deficiency of all findings substantially impacts the dose.

² **Medium** means that the deficiency moderately impacts the dose.

³ **High** means that the deficiency substantially impacts the dose.

⁴ Four findings remain open and thus were assigned their original finding rank.

⁵ Observations began in the 8th set.

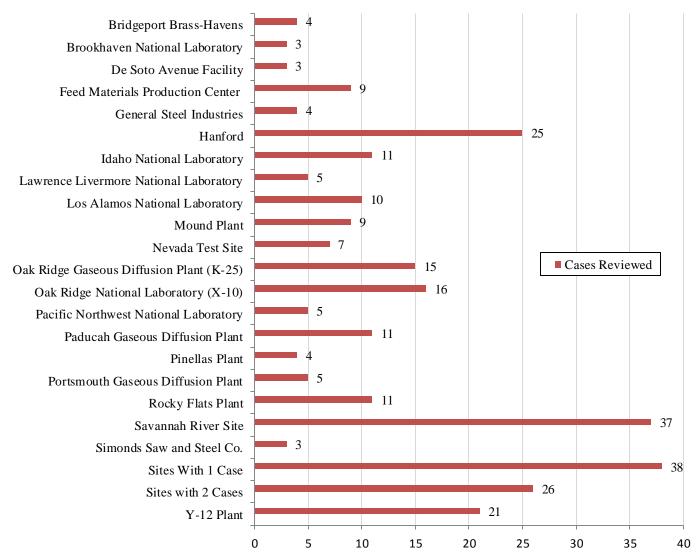


Figure 1. Breakdown of Cases 101 through 334 by Employment Site

Cases with multiple employment sites are counted in Figure 1 for each employment site. Therefore, the sum of all bars is greater than the number of cases reviewed.

Argonne National Laboratory-East Bethlehem Steel Bridgeport Brass-Havens **Brookhaven National Laboratory** De Soto Avenue Facility Feed Materials Production Center (FMPC) General Steel Industries 9%, 25 Hanford 12%. 12 Cases 101-334 Idaho National Laboratory 3%, 3 2%, 5 3%, 3 Lawrence Livermore National Laboratory 1%, 2 1%, 1 Linde Ceramics Plant Cases 1-100 Los Alamos National Laboratory 2%, 2 **Mound Plant** 1%, 1 Nevada Test Site 4%, 4 5%. 15 Oak Ridge Gaseous Diffusion Plant (K-25) 4%, 4 Oak Ridge National Laboratory (X-10) 4%, 4 2%, 5 2%, 2 Pacific Northwest National Laboratory Paducah Gaseous Diffusion Plant 2%, 2 0.4%, 1 2%, 2 Pantex Plant Pinellas Plant 1%, 1 Portsmouth Gaseous Diffusion Plant **Reduction Pilot Plant Rocky Flats Plant** 6%, 6 13%, 37 Savannah River Site 17%, 18 Simonds Saw and Steel Co. 20%. 57 Sites with One or Two Cases 12%, 12 Y-12 Plant 0 10 20 30 40 50 60

Figure 2. Comparison of Cases 1 through 100 and 101 through 334 by Site

Cases with multiple employment sites are counted in Figure 2 for each employment site. Therefore, the sum of all bars is greater than the number of cases reviewed.

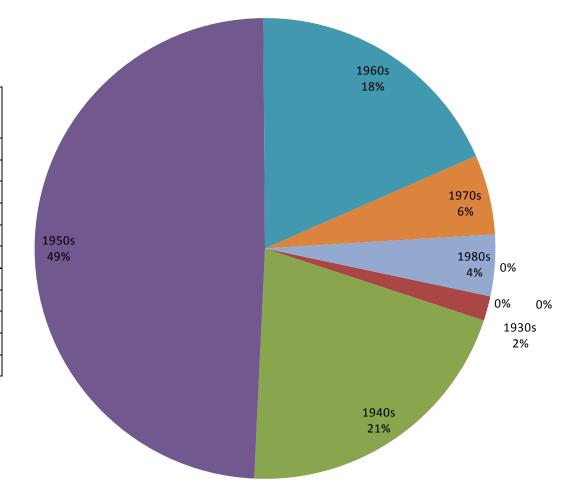
Area IV of the Santa Susana Field Laboratory Argonne National Laboratory - East Cases 1-100 Bethlehem Steel Feed Materials Production Center (FMPC) Cases 101-334 General Steel Industries ■ Goal: 1% of Total Claims Hanford 25 Idaho National Laboratory Iowa Ordnance Plant Kansas City Plant Cases with multiple employment sites are counted in Figure 3 for each employment site. Lawrence Livermore National Laboratory Therefore, the sum of all bars is greater than the Los Alamos National Laboratory number of cases reviewed. Additionally, findings from cases with multiple employment Mallinckrodt Chemical Co., Destrehan St. sites are counted for each site. Mound Plant The selection goal claim statistics were provided Nevada Test Site by NIOSH and were used by the DRSC to select Oak Ridge Gaseous Diffusion Plant (K-25) cases 305-334. Oak Ridge National Laboratory (X-10) Pacific Northwest National Laboratory 2 5 Paducah Gaseous Diffusion Plant 1110 Pantex Plant Pinellas Plant Portsmouth Gaseous Diffusion Plant Rocky Flats Plant Sandia National Laboratory (1 Savannah River Site Weldon Spring Plant Y-12 Plant Remaining 1% 66 0 20 30 40 90 10 50 60 70 80 Memo: Summary Statistics 6 SC&A - January 7, 2016

Figure 3. Comparison of Claims Reviewed to Goal of 1% Total Claims

Figure 4. Breakdown of Cases Reviews 101 through 334 by Decade First Employed

NIOSH Case Statistics for Population of all Cases

Cases			
First Employment Period	Percent of Cases		
1910s	<0.1%		
1920s	0.2%		
1930s	1.2%		
1940s	14.7%		
1950s	33.9%		
1960s	17.6%		
1970s	15.6%		
1980s	11.5%		
1990s	4.1%		
2000s	1.0%		
2010s	0.1%		

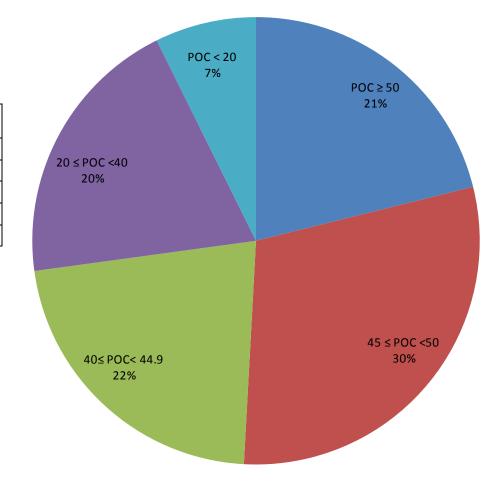


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Figure 5. Breakdown of Case Reviews 101 through 334 by POC

NIOSH Case Statistics for Population of all Cases

POC	Percent
Range	of Cases
< 20%	44.00%
20% - 39.9%	20.51%
40% - 44.9%	6.13%
45% - 49.9%	0.99%
50% <	28.37%

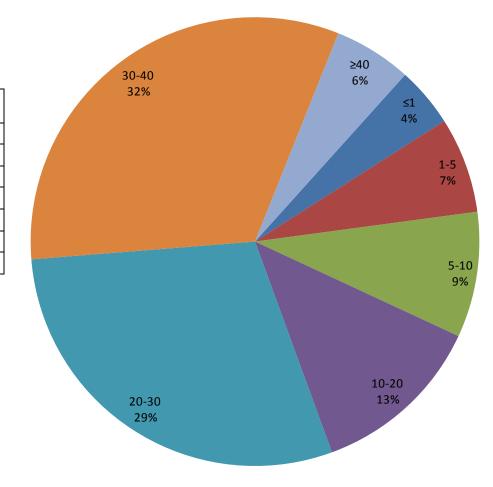


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Figure 6. Breakdown of Case Reviews 101-334 by Years of Employment

NIOSH Case Statistics for Population of all Cases

Years of	Percent		
Employment	of Cases		
< 1	8.46		
1-5	16.83		
5-10	10.92		
10 - 20	17.87		
20 - 30	19.51		
30 - 40	21.2		
>40	5.2		



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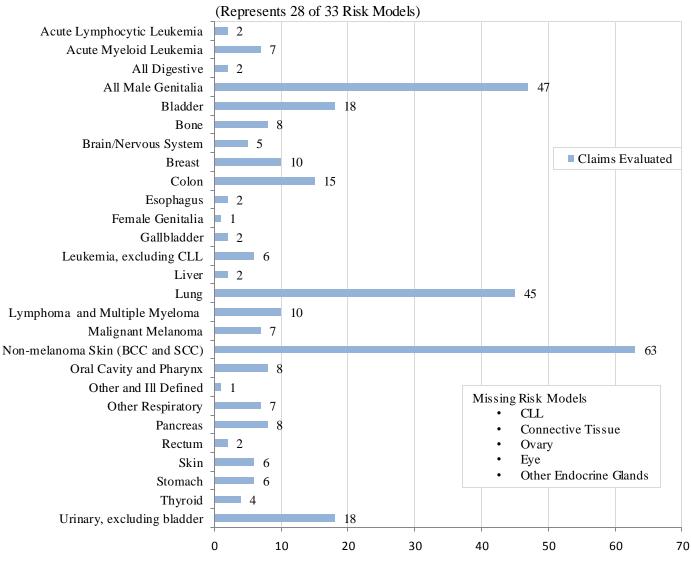


Figure 7. Breakdown of Cases 101 through 334 by Risk Model

Cases with multiple cancer sites are counted in Figure 7 for each unique cancer site. Cases with multiple cancers with the same risk model are counted once for each unique risk model. Therefore, the sum of all bars is greater than the number of cases reviewed.

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Acute Lymphocytic Leukemia Acute Myeloid Leukemia All Digestive **Q** All Male Genitalia Bladder 18 Bone Brain/Nervous System **Breast** 10 Colon 15 ■ Cases 1-100 Connective Tissue 0 Cases 101-334 Esophagus Female Genitalia 10 Gallbladder Leukemia, excluding CLL Liver Lung Lymphoma and Multiple Myeloma 10 Malignant Melanoma Non-melanoma Skin (BCC and SCC) Oral Cavity and Pharynx 8 Other and III Defined 10 Other Respiratory Missing Risk Models **Pancreas** CLL Rectum Ovary Skin Stomach 2 6 Other Endocrine Glands Thyroid 3 4 Urinary, excluding bladder 18 0 10 20 30 40 50 60 70 80

Figure 8. Breakdown of Cases 1 through 334 by Risk Model

(Represents 29 of 33 Risk Models)

Cases with multiple cancer sites are counted in Figure 8 for each unique cancer site. Cases with multiple cancers with the same risk model are counted once for each unique risk model (excluding BCC and SCC). Therefore, the sum of all bars is greater than the number of cases reviewed.

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