



MEMORANDUM

TO: Blockson Chemical Company Work Group
FROM: SC&A, Inc.
DATE: May 22, 2018
SUBJECT: Final SC&A Position on the Application of Overtime Hours at Blockson

Introduction

As part its review of Special Exposure Cohort (SEC)-00225 for the Blockson Chemical Company (SC&A 2016a, 2016b), SC&A raised concerns about the National Institute for Occupational Safety and Health's (NIOSH's) assumption of 2,000 work hours per year in formulating external dose assignments during the residual period. This issue was discussed during the Blockson Work Group teleconference on June 28, 2016 (ABRWH 2016). During that discussion, NIOSH raised a number of questions/concerns as follows:

1. Is the evidence of overtime work related to the residual period, operational period, or potentially both? (See ABRWH 2016, page 31.)
2. As a follow-on to item 1, would the issue of overtime affect other dose reconstruction (DR) techniques currently utilized in the site profile? (See ABRWH 2016, page 33.)
3. Was the reported overtime of a "casual" or "consistent" nature? (See ABRWH 2016, page 32.)

Following that discussion, NIOSH and the Work Group agreed that the issue of overtime work needed to be more thoroughly vetted before coming to a conclusion (see ABRWH 2016, pages 33–35). NIOSH provided a response memo to the Work Group and SC&A on March 9, 2018, that discussed the issue of potential overtime work, among other issues related to Blockson (NIOSH 2018). In that response, NIOSH did not reevaluate the evidence of overtime work, but rather modeled a new dose rate distribution by fitting the background-corrected survey data to a lognormal distribution.¹ Using this newly calculated "fitted" distribution in conjunction with 2,500 hours per year, NIOSH concluded that their original external dose estimates were more claimant favorable. Therefore, NIOSH does not intend to update the dose reconstruction methodology to include overtime work.

¹ The original dose rate distribution was a "modeled" (rather than "fitted") distribution that assumed the median parameter was the background of the instrument measurements (0.03 milliroentgen per hour [mR/hr]) and the 95th percentile parameter was the maximum observed hot spot (0.2 mR/hr).

DISCLAIMER: This is a working document provided by the Centers for Disease Control and Prevention (CDC) technical support contractor, SC&A, for use in discussions with the National Institute for Occupational Safety and Health (NIOSH) and the Advisory Board on Radiation and Worker Health (ABRWH), including its Working Groups or Subcommittees. Documents produced by SC&A, such as memorandum, white paper, draft or working documents are not final NIOSH or ABRWH products or positions, unless specifically marked as such. This document prepared by SC&A represents its preliminary evaluation on technical issues.

NOTICE: This document has been reviewed to identify and redact any information that is protected by the [Privacy Act 5 USC §552a](#) and has been cleared for distribution.

This memorandum provides SC&A's final technical position on the treatment of overtime hours at Blockson. As part of SC&A's response to NIOSH's current position, SC&A also provides analysis and discussion of the three questions/concerns that were posited during the 2016 work group meeting, as well as observations that arose during SC&A's further investigation of the issue. Following the discussion in the next section is a summary of SC&A's final recommendation to NIOSH and the Work Group concerning overtime at Blockson.

Discussion of Overtime Issue

NIOSH's main contention in its recent response (NIOSH 2018) to the issue of overtime is that claimant-favorable assumptions had been applied in other aspects of the external dose assignment (namely, the dose rate distribution) that indirectly account for the potentially longer exposure times associated with overtime. To illustrate this point, NIOSH calculated a new dose rate distribution by fitting the limited available survey data to a lognormal distribution after correcting for natural background. This newly formulated dose rate distribution, when combined with an assumption of 500 additional overtime hours per year (or 2,500 hours per year total), resulted in a lower annual external dose than the original method, which assumed 2,000 hours per year.

It is not clear from this response whether NIOSH's current position is that the original dose rate distribution formulation was inappropriate and should have been calculated using the new lognormal fit method provided in NIOSH 2018. If NIOSH feels that the original dose rate distribution was technically inappropriate, then it seems logical that the older dose distribution should be removed for the scientifically appropriate formulation. SC&A assumes that the original method for deriving an external dose distribution was chosen due to the limited number of survey data points (63) and the fact that only seven of those survey data points were above background for the instrument used in the facility survey. SC&A's assumption appears to be supported, at least in part, by the discussion by NIOSH recorded on pages 20–22 of the transcript of the 2016 Work Group meeting, specifically:

So, there's just this one isolated spot. And you really can't fit a distribution to those values. ...if you discount the two that aren't really relevant in my opinion to external exposure reconstruction there is no distribution. [ABRWH 2016, page 21]

If the original "modeled" dose rate distribution *is* technically appropriate, then SC&A does not feel using the inherent claimant favorability in the dose rate to account for the potentially unfavorable parameter (exposure time) is an appropriate dose reconstruction approach. SC&A believes that while different parameters may have varying levels of claimant favorability, each parameter should be treated separately and selected such that it is the most technically appropriate and defensible for dose reconstruction.

Moreover, as noted by NIOSH during the 2016 Work Group meeting and discussed in the Introduction of this memo, the issue of exposure time may very well have effects beyond the annual external dose assignment during just the residual period (see NIOSH questions/concerns 1 and 2, above). Specifically, the formulation of internal doses to uranium and thorium compounds

during the operational period also assumes a standard work year (2,000 hours). The Blockson technical basis document (TBD) (NIOSH 2014) develops intake values from calcining operations² at the site in the following manner:

*Bounding intakes from uranium and thorium (and associated progeny) were calculated based on a breathing rate of 1.2 m³/hr and being exposed to that high level of dust for **2000 hours per year**. [Emphasis added.] [Section 3.2.1, page 17]*

Additionally, the modeling of external dose from a uranium drum during the operational period was described in Section 4.2.2 of NIOSH 2014, specifically:

*The air kerma values were converted to annual organ doses by assuming a worker's exposure time was lognormally distributed. The median exposure time was determined by **assuming all workers were working eight hours per day, one day per week at a distance of 1 foot (30 cm) from the drum**. This was normalized to 400 hours per work year. The 95th percentile exposure time was determined by **assuming the worker spent 2000 hours per year at a distance of 1 foot from the drum**. This results in a whole body dose distribution with a median value of 1.592 rad per year with a geometric standard deviation of 2.7. [Emphasis added.] [Section 4.2.2, page 28]*

Both of these dose reconstruction approaches are used during the operational period; therefore, NIOSH's concerns about which time periods are affected by potential overtime work are of particular import. To address this concern, SC&A reexamined the claimant population to include all workers and not just those workers with covered employment in the residual period. It should be noted that as part of this updated analysis, SC&A made a concerted effort to identify claims in which overtime work was indicated but for which only intermittent entry into radiological areas was also indicated and/or highly likely. For example, in SC&A's analysis, a claim would not be classified as an "overtime" worker if the EE was identified with an administrative position and the EE or survivor stated they only entered radiological areas for 25 hours per week (even if it was indicated typical work at Blockson was greater than 40 hours per week).

Table 1 summarizes the number of claimants who reported working overtime during each period of interest. As seen in the table, 157 claims³ are included in this analysis, with the number reporting overtime work fluctuating between ~67% (operational period only) and ~83% (both operational and residual period). Out of the entire claimant population, approximately 80% reported working at least some overtime hours. Conversely, only 16% of the total claimant population reported working a standard 40-hour work week.

² SC&A notes that internal exposures to calcining operations are only used for organs for which Type S intakes are bounding to the organ of interest. While the Blockson TBD (NIOSH 2014) still includes the instructions to use the intakes derived for the calcining operations, it is not clear if this is still a relevant technique "in practice" during the operational period. Such an evaluation is beyond the scope of this memo.

³ NOCTS shows 158 claims; however, one claim had been pulled by the U.S. Department of Labor (DOL) as not meeting eligibility requirements, and no useful information was available for the purposes of this analysis.

Table 1. Summary of Claims Indicating Overtime by Covered Employment Period

Covered Employment Period	Total # of Claims	# of Claims Indicating Overtime (% of total)	# of Claims Indicating 40 Hours per Week (% of Total)	# of Claims with No Identified Information Relevant to Overtime Work (% of Total)
Operational Period Only (March 1951–June 1960)	15	10 (66.7%)	3 (20.0%)	2 (13.3%)
Residual Period Only (July 1960–December 1991)	21	15 (71.4%)	3 (14.3%)	3 (14.3%)
Both Operational and Residual Periods	121	100 (82.6%)	19 (15.7%)	2 (1.7%)
All Blockson Claims	157	125 (79.6%)	25 (15.9%)	7 (4.5%)

In addition to the number of claimants reporting overtime in each period of interest, NIOSH expressed concern whether the reported overtime was of a “casual” or more “consistent” nature. To attempt to answer this question, SC&A reviewed available claim documentation to gather any available quantitative information on the overtime practices for claimants at Blockson. Not surprisingly, the relative detail about the amount of overtime work varied significantly among different claims but was often sparse in content. Nonetheless, SC&A quantified what information was available to characterize the relative magnitude of overtime work observed in the claimant population.

As expected, nearly half of the Blockson claimants (76 of 157 or ~48%) did not provide any quantitative information beyond working “40 hours plus.” However, several of the claims in this group did qualitatively describe their typical work practices with statements concerning shift work, getting called in at night, and/or working weekends (28 of 157 or ~18%). Slightly greater than 19% of the claimant population reported working more than 50 hours per week. A small number even reported working greater than 60 and 70 hours per week (four claims and two claims, respectively).

Table 2. Quantitative Assessment of Typical Overtime Hours for Blockson Claimants

Characterization of Typical Work Hours	Number of Claims (% of Total)
Unknown Work Hours	7 (4.5%)
40 Hours Only (No indication of overtime)	25 (15.9%)
40+ Hours (No additional information identified)	48 (30.6%)
40+ Hours (No additional quantitative information, but included indications of shift work, nights, and/or weekends identified in file)	28 (17.8%)
40–49 Hours	19 (12.1%)
50+ Hours	24 (15.3%)
60+ Hours	4 (2.5%)
70+ Hours	2 (1.3%)

During the course of its review, SC&A identified several instances in which claimants specifically questioned whether overtime work had been properly accounted for in their individual dose reconstruction. These individual instances are most often located in (1) “close-out” phone interviews performed by NIOSH after the dose reconstruction had been performed, (2) formal protests of DOL’s final case decision, and (3) informal protests of the final case decision. Table 3 summarizes the examples observed by SC&A.

Table 3. Summary of Examples in which Claimants Questioned whether Overtime Was Considered in the Dose Reconstruction

NOCTS ID# *	Description/Quotations	Source from Claim File
█ (Case A)	<p><i>“He has copies of his paycheck stubs and from these he has calculated that [the EE] regularly worked between 20 and 30 hours of overtime per week. (He will send us copies to be included in the file.) Won’t this mean that the doses need to be recalculated to take into consideration his actual time spent at the plant?”</i></p> <p>Note: SC&A was unable to determine if the paystubs had subsequently been provided to NIOSH based on the available NOCTS files.</p>	Close-out Phone Conversation Report, Version 01, p. 2
█ (Case B)	<p><i>“[The claimant] had the following questions: 1. Was overtime taken into consideration. [Phone interviewer answer]: Yes, all the information given in the CATI was used.”</i></p>	Close-out Phone Conversation Report, p. 2

NOCTS ID# *	Description/Quotations	Source from Claim File
<p>█ (Case C)</p>	<p>“[The claimant] would like to know how many working hours per week was the DR based on. The reason he is asking is because he knows his father worked a lot of overtime... very concerned with the overtime issue and the nature of his father's work... His father worked lots of overtime at Blockson and he does not see where the overtime was accounted for anywhere in the DR... He wondered if it was modeled using the average employee (40 hrs/week), because his father's employment was many, many more hours than 40 hrs/week.”</p>	<p>Close-out Phone Conversation Report, pp. 6, 10</p>
<p>█ (Case D)</p>	<p>“How can you get a dose estimate when they called him to work all hours of the day and night to repair and climb on and under all equipment... That [the EE] regularly worked more than 40 hours per week at Blockson Chemical during the aforementioned time frame... My father was on 24 hour call at Blockson Chemical Company.”</p>	<p>DOL ANRSD Return, Version 01, pp. 37, 38, 162</p>
<p>█ (Case E)</p>	<p>“He continually accepted all the overtime offered to him, sometimes working 16–18 hours per day, in order to support his family.”</p> <p>An affidavit from a coworker states the EE █ █.</p>	<p>DOL ANRSD Return, pp. 42, 99</p>
<p>█ (Case F)</p>	<p>“[The claimant] just wanted also to reiterate that his father worked in Building 55, and worked a lot of overtime (50 to 60 hours) each week.”</p>	<p>DOL ANRSD Return, p. 82</p>
<p>█ (Case G)</p>	<p>“All I can tell you is he probably worked more overtime at that plant than anybody. He probably had the world's record for that. Which means an awful amount of time spent in that place, breathing that place, working in that place... If they sent him to do a job, they could count on him to do it, and he did it. And so I am saying that the changes for him to get further exposure were greater than a lot of people that would put in maybe eight hours a day and go home... Any overtime that is involved there inside that building, it had to be with people that were assigned there, who have been cleared by the FBI. We did all of our work. All the labor work we did ourselves because outsiders couldn't come in there. That was one of the reasons why I wanted to get in there because the overtime was confined to certain people, and I knew nobody else could get it, and I wanted to get all I could get. So I mean that is what you go to work for to make as much money as you can make.”</p>	<p>DOL ANRSD Return, pp. 92, 95, 100</p>

NOCTS ID# *	Description/Quotations	Source from Claim File
█ (Case H)	<i>“They would call him out in the middle of the night. His work was not a 40-hour job. When they call you out in the middle of the night, quite a few times, to come out, 2:00, 3:00 o’clock in the morning and then don’t come home until 4:00 o’clock that night, the next day.”</i>	DOL ANRSD Return, Version 01, pp. 75, 84
█ (Case I)	<i>“Some liked to work overtime. That meant more money to take home to their family... her husband worked 40 and 50 hour weeks and some overtime.”</i>	DOL ANRSD Return, Version 01, pp. 19, 71
█ (Case J)	<i>“She states her father worked 60 hours weekly, rather than 40 hours... The recommended decision fails to provide any information relating to the hours worked by [the EE]. The initial dose reconstruction, which was provided to our office, was based on a 40 hour work week. [The survivor] testified that her father worked an average of 60 hours per week. The recommended decision does not account for this variation.”</i>	DOL ANRSD Return, pp. 36, 41
█ (Case K)	<p><i>“[Survivor] wants to know how many overtime hours have been calculated for the doses, because the DRR does not specifically say.... I informed [the authorized representative and survivor] that per the NIOSH HP, we assumed that the EE could have worked more than 2,000 hours per year (2,000 is a bounding amount of time a person could have stood [sic] in the spots with the highest dose rate.”</i></p> <p>It is not clear to SC&A whether the response to the claimant’s concern was meant to state that the EE could NOT have worked more than 2,000 hours.</p>	Close-out Phone Conversation Report, p. 2
█ (Case L)	<i>“They had a few specific questions regarding the monitoring of personnel at Building 55 and the amount of time his father worked there relative to the doses assigned (assumed a 50 hour work week for 52 weeks a year)... I explained that this was a claimant favorable dose assessment as indicated in the DR Report. I also reviewed the various sections pertaining to these questions and provided responses for them based on the information contained in the DR Report.”</i>	Close-out Phone Conversation Report, p. 1

* Case letters in parentheses are arbitrary designations to enable public discussion of this memo and are not otherwise associated with the claim in any way.

Summary Conclusion

As a fundamental dose reconstruction strategy, SC&A does not believe it is appropriate to use the claimant favorability of one assumption to account for a separate (and potentially unfavorable) assumption. In this case, the contention is that the claimant favorability in the original dose rate accounts for the lack of consideration of overtime hours. Moreover, the issue of overtime work applies to more than just the issue of external dose during the residual period for Blockson; the issue of assumed work duration is also applicable to internal and external exposures during the operational period.

In response to NIOSH's questions/concerns expressed during the June 2016 Work Group meeting, SC&A performed additional detailed analysis of the Blockson claimant population. SC&A believes this analysis demonstrates that indications of overtime were applicable to both the operational and residual period. Although SC&A's evaluation of the individual number of typical overtime hours worked was limited by the information provided by the claimants, many claims qualitatively described performing shift work, going in at night and working on the weekend in addition to stating they worked more than 40 hours per week. Nearly 1/5 of the claimant population quantitatively reported working greater than 50 hours.

Finally, SC&A noted several examples where claimants expressed concern that their dose reconstruction was not properly accounting for overtime work. Given that this information comes directly from the claimants or their respective survivors, SC&A feels it is important that the dose reconstruction process accurately reflect this information. SC&A hopes that the analysis and discussion in this memo is helpful to the Work Group and NIOSH in considering whether modification of the dose reconstruction process to include overtime work is appropriate.

References

ABRWH 2016. Transcript: Teleconference Meeting of the Advisory Board on Radiation and Worker Health, Blockson Chemical Work Group. June 28, 2016.

NIOSH 2014. *Technical Basis Document for Atomic Energy Operations at Blockson Chemical Company, Joliet, Illinois*, DCAS-TKBS-0002, Revision 04, National Institute for Occupational Safety and Health, Cincinnati, OH. May 19, 2014.

NIOSH 2018. *Memorandum: NIOSH Response on Open TBD Issues*, National Institute for Occupational Safety and Health, Cincinnati, OH. March 9, 2018. [SRDB Ref. ID 170143]

SC&A 2016a. *Draft Review of Blockson Chemical Company Residual Period SEC-00225*, SCA-TR-2016-SEC003, Revision 1, SC&A, Inc., Vienna, VA. June 3, 2016. [SRDB Ref. ID 161258]

SC&A 2016b. *Memorandum: SC&A Responses to NIOSH Response to SC&A Findings on SEC-00225 Blockson Chemical Company Residual Contamination Period, Dated May 23, 2016*, SC&A, Inc., Vienna, VA. June 15, 2016. [SRDB Ref. ID 161253]