

Metals and Controls SPECIAL EXPOSURE COHORT (SEC 236) ISSUES MATRIX

F1 SEC Issue	F1 NIOSH Response
<p>Internal exposures associated with subsurface maintenance and repurposing activities in Building 10 during the residual period should be explicitly included in the ER. NIOSH should not assume that there is sufficient conservatism inherent in the internal dose reconstruction methods employed in the ER to account for these exposures.</p>	<p>In October 2017, NIOSH (with SC&A's participation) conducted interviews with personnel knowledgeable of subsurface activities during the residual period. Upon review of that data, NIOSH determined the current ER requires improvement to reflect exposure potential, and therefore created the subsurface exposure model white paper and will include the model in the revised ER.</p>
<p>F1 WG Notes:</p> <p>At the 5/3/18 meeting, the WG asked how NIOSH determined that the volumetric contamination data taken from the drain line characterization is representative of the exposures experienced by maintenance workers throughout the residual period; they asked if it could have been much higher. SC&A stated the use of a 95th percentile value from the sample data would accommodate the potential that there may have been higher contamination levels encountered that were missed by the characterization study.</p> <p>The following items were also discussed: the use of available sample data that was analyzed with either isotopic identification or gross alpha techniques, and the ability to model thorium exposures with the data. The amount of time subsurface work was performed each year as described by former workers was discussed. It was agreed that the use of a reference man heavy-breathing rate was a TBD issue. SC&A discussed their selected dust-loading value, and that it compared favorably with the value independently determined by NIOSH.</p>	

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Metals and Controls SPECIAL EXPOSURE COHORT (SEC 236) ISSUES MATRIX

F1 SEC Issue (continued)	F1 NIOSH Response (continued)
<p>6/6/18: J. Beach email:</p> <ol style="list-style-type: none"> 1. NIOSH needs to demonstrate and back up their conclusions using example dose reconstructions applying assumptions and models being proposed with the information and data that is available. 2. NIOSH needs to confirm the adequacy and completeness of the data. 3. Work during M&C residual period; included renovations, demolition, and extensive maintenance all taking place without health physics support, training or knowledge of radiological hazards for the entire class period. 4. Radiological exposure potential in subsurface area drains, utility trenches and exterior areas during all previously mentioned activities have a high potential for residual radioactivity where workers were not monitored. The swipe samples NIOSH intends to use from late in the operation periods do not represent actual work that took place in the residual years. 5. No mention of maintenance work performed on the roof or potential exposure to workers is mentioned in the ER. As stated during worker interviews roof work could have taken 2-3 months in a given year. 6. Unknown levels of Uranium and Thorium in subsurface areas inside and outside areas. 7. Combining and reducing all activities intrusive work, e.g., roof work, including rooftop, roof penetration work, roof line just under the roof deck, and drains, utility trenches, and exterior soil etc. to one month per year seems on the low side. 8. Please review and add petitioners concerns from [redacted] memo of May 28, 2018, as appropriate. 	<ol style="list-style-type: none"> 1. As a standard practice, NIOSH documents example DRs and provides them to the Board after DR methods are determined and the ER is finalized. 2. This comment was discussed at the WG meeting and since then WG members have been provided with NIOSH's Subsurface Exposure Model white paper. NIOSH considered the data available to characterize the subsurface environment and determined that the information used in this white paper was adequate for use with appropriate layers of conservatism applied. NIOSH will continue reviewing new information and working with SC&A to resolve any remaining data issues. 3. This statement is accurate for covered work but not for HFIR and D&D. 4. NIOSH determined the need for follow-up interviews after presenting the original ER to the Board. NIOSH then obtained additional information that was used to create a new model for bounding subsurface exposures that do not use swipe samples from late in the operational period. 5. NIOSH will address roof penetration work in a new white paper. 6. NIOSH determined the 44 inside samples and 292 outside samples sufficiently characterized the subsurface work environment. 7. This issue is addressed by issue P4. 8. [redacted] concerns were added to this matrix as issues P1 through P10.

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F1 Actions:

To Be Determined

Metals and Controls SPECIAL EXPOSURE COHORT (SEC 236) ISSUES MATRIX

F2 SEC Issue	F2 NIOSH Response
<p>NIOSH incorrectly transcribed some of the Landauer film-badge dosimetry reports and incorrectly calculated annual 95th percentile external penetrating doses to workers in the residual period.</p>	<p>NIOSH agrees transcription errors were made and has recalculated doses as follows. Film badges at the end of AWE operations (i.e., 1967) were processed quarterly by Landauer (SRDB 13654 pp. 18-20, 97-133). NIOSH used all 374 of the “X” or “Gamma” exposure results from 1967 to determine the quarterly geometric mean (GM) dose rate and geometric standard deviation (GSD). A quarterly GM gamma dose rate was determined to be 12 mrem/quarter (or 4 mrem/month) with a GSD of 2.61. Since the GSD is less than the Battelle-TBD-6000 default value of 5, a GSD of 5 will be assumed to be claimant favorable. Doses will be assessed assuming a claimant favorable gamma energy of 100% 30-250 keV.</p>
<p>F2 WG Notes:</p> <p>At the 5/3/18 WG meeting, SC&A described their finding and were made aware of NIOSH’s response above. This Issue will be held in abeyance pending the outcome of Observation 5.</p> <p>5/15/18: R. Anigstein email - SC&A agrees with the solution to this issue that is proposed by NIOSH.</p>	

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F2 SEC Issue (continued)	F2 NIOSH Response (continued)
<p>6/6/18: L. Valerio email:</p> <ol style="list-style-type: none"> SRDB 13654 (Landauer External Dosimetry Reports) appear to list daily readings in excess of 12 mrem/quarter. Pages 69-70 list some employee readings of 100+ Gamma & x-ray doses for one day? (e.g.: Page 69, employee identification number 0528 shows 170 mrem on 10/1/1966). In addition, readings for 4/1/66 show ~ 15 employees with readings above 100 mrem. Is this the quarterly value? Film badges issued to "SR" and "Temp" status workers show substantially higher "Permanent" readings. How do these represent the 12 mrem/quarter? 	<ol style="list-style-type: none"> Page 69 contains data from 1966 and was not used because AWE operations were still winding down and had not yet reached residual levels. NIOSH only used data from the last year of the AWE period, i.e., 1967. NIOSH intends to develop an exposure model that is based on exposures that are representative of M&C personnel. The SR (Smidgen Room) badges were area monitors, and the "Temp" badges could have been assigned for a fraction of a quarter; therefore they were not used (See SRDB 13631 p. 11).
<p>F2 Actions: To Be Determined</p>	

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Metals and Controls SPECIAL EXPOSURE COHORT (SEC 236) ISSUES MATRIX

F3 SEC Issue	F3 NIOSH Response
<p>NIOSH incorrectly calculated annual 95th percentile beta skin-doses to workers in the residual period.</p>	<p>NIOSH has recalculated doses as follows. Film badges at the end of AWE operations (i.e., 1967) were processed quarterly by Landauer (SRDB 13654 pp. 18-20, 97-133). NIOSH used all 14 of the Type 2 or “Skin” exposure results from 1967 to determine the quarterly geometric mean (GM) dose rate and geometric standard deviation (GSD). A quarterly GM skin dose rate was determined to be 36 mrem/quarter (or 12 mrem/month) with a GSD of 1.98. Since the GSD is less than the Battelle-TBD-6000 default value of 5, a GSD of 5 will be assumed to be claimant favorable. Doses will be assessed assuming an electron energy of 100% >15 keV.</p>
<p>F3 WG Notes: No Action to Date</p>	

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Metals and Controls SPECIAL EXPOSURE COHORT (SEC 236) ISSUES MATRIX

F3 SEC Issue (continued)	F3 NIOSH Response (continued)
<p>5/15/18, R. Anigstein email:</p> <ol style="list-style-type: none"> 1. SC&A has a different interpretation of the beta skin dose dosimetry data. We found only 12 quarterly badge reports with beta skin doses during 1967—badges that had a blank in the beta column were not counted. We found three numerical results—60, 90, and 140 mrem—and nine results recorded as “M” (minimal). Since the LOD for beta doses was 40 mrem, according to Landauer, we assigned these badges a value of LOD/2 or 20 mrem. On that basis, we obtained a GM of 29.22 mrem per quarter, or 9.7 mrem/month, with a GSD of 2.03. 2. A larger issue is that the Landauer badges only recorded betas with energies > 1.5 MeV; whereas betas with energies as small as 100 keV can contribute to skin dose. This issue needs to be explored further. 	<ol style="list-style-type: none"> 1. NIOSH reexamined the Landauer report and agree with the SC&A’s numerical results but found 11 “M” results. 2. The general note Landauer provides on their standard form indicates dosage due to betas less than 1.5 MeV may be recorded but not necessarily in millirems unless arrangements were made for calibration at other energy ranges (SRDB 13654 p. 16). However, on page 17 of SRDB 13631, Landauer says in a private letter to M&C, “The skin dose will be determined by measuring the density at the open window and comparing this with a calibration curve prepared in the same way from exposures to the natural uranium beta. The difference between this value for the open window and the gamma radiation value determined will be reported as the skin dose.”
<p>F3 Actions: NIOSH and SC&A will exchange spreadsheets used to calculate the Beta dose and hold a technical call if necessary to resolve the disparity identified as item 1 in the 5/15/18, R. Anigstein email above.</p>	

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O1 SEC Issue	O1 NIOSH Response
<p>SC&A suggests that a more appropriate approach to deriving the chronic airborne concentration of uranium from resuspension during the residual period would be to use the average value for the swipe data (i.e., 12.3 dpm/100 cm²) and a resuspension factor of 1E-5/m. This would result in chronic uranium inhalation rates that are about 2 times higher, but well within a reasonable range for these types of exposures, given the available data.</p>	<p>NIOSH agrees that the use of average contamination levels is more appropriate, and will instead model the more aggressive airborne dust-producing activities with an enhanced resuspension factor. An updated approach will be in the revised ER.</p>
<p>O1 WG Notes:</p> <p>At the 5/3/18 meeting, the WG questioned the appropriateness of the survey locations included in the model, and the overall representativeness of the swipe data used in this model, given that much of the information was illegible. NIOSH described how these obstacles were overcome, and SC&A described their independent review of the data. The WG asked how well the model bounded exposures in the ceiling area near the rafters, or work performing roof penetrations, or HVAC maintenance. NIOSH indicated that these work scenarios would be included in the revised ER. The WG also expressed a concern regarding whether the equipment and machinery in building 10 had pockets of residual contamination or if they had been surveyed. NIOSH explained that equipment was shipped off-site at the end of operations and that the site documented surveys of equipment (e.g. SRDB 114235 pp. 45).</p>	
<p>O1 Actions:</p> <p>NIOSH will create a white paper and include methods to bound exposures in the ceiling area, work performing roof penetrations, and HVAC maintenance.</p>	

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O2 SEC Issue	O2 NIOSH Response
<p>The distinction between production and non-production workers should be better defined in the ER. After discussions with NIOSH, it was determined that the production worker group is intended to refer to workers who may have entered production areas. This includes construction trade workers, including but not limited to those listed in the ER. Additional text adding clarity to this point would ensure this distinction is consistently applied to workers.</p>	<p>NIOSH will revise the ER to clarify with language such as the following. All atomic weapons employees in the Facilities Construction and Maintenance Services Organization (Facilities) or Production Machine Operators/Helpers and Production Repair & Maintenance (R&M) organizations having access to, and work within Buildings 4, 5, and 10, or that performed subsurface work in the area surrounding Building 10, in the former Burial Area, the Metals Recovery Area, the Building 11 Stockade Area, the Building 11 Railroad Spur Area, and in the Building 12 West and South Lawn Areas, are considered to be production workers. The remaining atomic weapons employees having access to, and work within Buildings 4, 5, and 10, are considered non-production or administrative employees.</p>
<p>O2 WG Notes:</p> <p>At the 5/3/18 meeting, the WG expressed a concern regarding the job titles of those that performed subsurface work outside of building 10. NIOSH explained that former workers indicated which job descriptions were called upon to perform this work and that it was the same group that was identified to perform the inside subsurface work and other maintenance activities such as HVAC maintenance and roof penetrations.</p>	

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O2 SEC Issue (continued)	O2 NIOSH Response (continued)
<p>5/15/18, R. Anigstein email – SC&A disagrees with the distinction between construction, maintenance, and repair workers, and other workers who spent a major portion of their workdays in the residually contaminated areas. This is a TBD issue which does not affect the SEC. However, looking ahead, all workers whose doses will be reconstructed should be assigned radiation exposures of workers in the residually contaminated areas, unless it can be established that a large majority of their time was spent outside these areas, in which case they should be assigned to a separate job category.</p>	<p>The description above includes both production and maintenance type workers (i.e. the primary occupants of the contaminated facilities); however, NIOSH agrees that all M&C workers that had access to Buildings 4, 5, and 10 should be assigned radiation exposures commensurate with their occupancy rate.</p>
<p>O2 Actions: To Be Determined</p>	

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O3 SEC Issue	O3 NIOSH Response
NIOSH should consider adopting the approach used in the ER for Carborundum and the ER and technical basis document for General Steel Industries (GSI) for deriving ingestion doses during the residual period.	When estimates of air concentration values are available, the OTIB-009 approach is the preferred approach. When air concentration data is not available, but surface or mass-based contamination values are, NIOSH uses NUREG /CR-5512. The contamination data used for estimating ingestion rates are taken from the end of AWE operations and decayed over time consistent with the source-term depletion rate calculated with OTIB-70 methods.
O3 WG Notes: No Action to Date	

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O3 SEC Issue (continued)	O3 NIOSH Response (continued)
<p>5/15/18, R. Anigstein email – OCAS-TIB-009 describes two pathways that contribute to the ingested intakes. One (Mode 2) is the deposition of the airborne activity on a beverage cup, the other (Mode 3) is the hand-to-mouth transfer from a contaminated surface. During the operational period, the two pathways make approximately equal contributions. Since the air concentration due to resuspension is much smaller than that during the AWE period, Mode 2 can be neglected during the residual period. Mode 3 assumes that 10% of the contamination on an area of 0.0155 m² is ingested per day, which is equal to the contamination on an area of 0.00155 m². This is double the ingestion rate of 10⁻⁴ m²/h cited in NUREG/CR-5512. Since the Mode 3 pathway is dependent only on the surface contamination level, it can be applied just as readily as NUREG/CR-5512. It is more claimant favorable and consistent with the ingestion intakes assigned in other circumstances.</p>	<p>TIB-9 is based on the concept that ingestion is proportional to contamination and contamination is proportional to airborne. We are aware that the NUREG hourly ingestion rate is approximately one-half of that used in TIB-009. In fact, this issue was addressed in a review by the Procedure's Subcommittee. The discussion of this is documented in the Board Review System under Overarching Issue #2.</p>
<p>O3 Actions: To Be Determined</p>	

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O4 SEC Issue	O4 NIOSH Response
Exposures experienced by High Flux Isotope Reactor workers cannot be used “as supporting evidence to validate the bounding method used in Section 7 of this report”, as stated on page 24 of the ER.	NIOSH agrees that exposures to personnel working within the HFIR Fuel Manufacturing Area were likely much larger than exposures to covered personnel. NIOSH will delete or edit our comparison to the reference cited by SC&A (SRDB 24654 p. 34) to clarify the assessment.
<p>O4 WG Notes: At the 5/3/18 WG meeting, SC&A agreed with the NIOSH response.</p>	
<p>O4 Actions: To Be Determined</p>	

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O5 SEC Issue	O5 NIOSH Response
<p>SC&A is concerned that it may be inappropriate to use external dosimetry data collected during the last year of Atomic Weapons Employer (AWE) operations as the basis for bounding the external doses during the residual period. Specifically, during the AWE operations period, large quantities of uranium and thorium were on site and handled by AWE workers to manufacture fuel elements and fuel assemblies. All of this fuel, which would have been responsible for the majority of external exposures to AWE workers, was removed from the site at the end of AWE operations and would not have been present during the residual period.</p>	<p>AWE fuel was removed at the end of AWE operations in 1967; however, a sizable amount of HIFR fuel remained (SRDB 168315). Therefore, rad levels inside the HFIR area would have been higher than those outside of HFIR as concluded by SC&A in Observation 4 above. In addition, M&C was required by their H&S Manual to perform routine surveys and would have identified anomalous rad levels in accessible areas (SRDB 16985). The highest average dose to HFIR workers during a 5 ¼ year period was 48.3 mrem/quarter. This compares favorably with the doses NIOSH calculated for those outside HFIR area, i.e. 12 mrem/quarter.</p> <p>In its current approach, NIOSH does not deplete the source term for external doses during site residual period, making doses assigned in the ER more conservative than that described by this observation. However, NIOSH agrees that the source term over time should deplete for these exposures, and will provide new calculations in the revised ER to maintain an agreement with depletion of external doses. NIOSH doesn't believe this as an SEC issue because there are other methods including Section 5.1.2 of Battelle TBD-6000 available to bound these doses.</p>

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Metals and Controls SPECIAL EXPOSURE COHORT (SEC 236) ISSUES MATRIX**O5 WG Notes:**

At the 5/3/18 WG meeting, SC&A stated that reliance on film badge data from the end of AWE operations (i.e. 1967) was inappropriate because the fuel that caused that film badge data was no longer on-site. NIOSH stated that the new method uses the geometric mean of the data as opposed to the 95th percentile and that 45% of the film badge results were reported as the minimum quantity measurable, making the use of this data appropriate. NIOSH also pointed out that NMMSS inventory data shows 694 kg of uranium present in 1966 and 172 kg in 1967 (a 4 fold decrease), which indicates the 1967 data was obtained during a period after the AWE source-term was significantly reduced.

O5 Actions:

To Be Determined

Metals and Controls SPECIAL EXPOSURE COHORT (SEC 236) ISSUES MATRIX

P1 SEC Issue	P1 NIOSH Response
<p>The data from the AWE-operational period was from controlled work areas where workers had received health physics training and engineering-administrative controls were in place to limit contamination to workers and the workplace. The class of employees who are the subject of this petition, M&C Facilities Construction & Services, and R&M (M&C maintenance) workers, did not enjoy any of these benefits. They were untrained, unmonitored and unaware of the significant quantities of AWE source materials that they were exposed to on a routine basis when working in subsurface soils, in drains, in utility trenches, on the roofs and in exterior areas where waste materials had been handled. Furthermore, the M&C maintenance workers came in direct contact with the source materials, using aggressive work practices with no engineering/administrative controls to limit exposure. There is simply no comparison between the two populations.</p>	<p>In the ER, NIOSH created a model to bound doses to the majority of M&C workers, i.e., those that performed production and support tasks. NIOSH has since obtained additional information and has developed another model to bound doses to those that performed more invasive tasks, as identified by the petitioner in our Subsurface Exposure Model white paper.</p>
<p>P1 WG Notes: No Action to Date</p>	
<p>P1 Actions: To Be Determined</p>	

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Metals and Controls SPECIAL EXPOSURE COHORT (SEC 236) ISSUES MATRIX

P2 SEC Issue	P2 NIOSH Response
<p>The 1982 decommissioning surveys, on which the NRC based its decisions to release the building interiors for unrestricted use, were substantially flawed. More importantly, they were limited in scope. They only covered accessible former AWE manufacturing areas (note: most of the former AWE manufacturing areas had already been repurposed by this time and were under heavy use 24-hours per day, so access was extremely limited). There were no intrusive surveys of subsurface areas, or inside the drains and utility trenches that served the former AWE areas, or any of the overhead areas, or any of the exterior areas where waste had been managed. And as evidenced by the comprehensive characterization surveys conducted in 1994 and 1995, the 1982 surveys missed considerable amounts of residual activity even in the limited areas they did cover.</p>	<p>NIOSH used the 1982 decommissioning surveys to develop part of the model in the ER used to bound doses to the majority of M&C workers and not to those that performed more invasive tasks as identified by the petitioner. NIOSH considers accessible contamination levels to be more appropriate for use in modeling exposures to the typical worker, as opposed to the contamination in inaccessible areas that was removed during D&D after 1994.</p>
<p>P2 WG Notes: No Action to Date</p>	
<p>P2 Actions: To Be Determined</p>	

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P3 SEC Issue	P3 NIOSH Response
<p>The 1992 characterization surveys were limited to the former burial site. In 1992, we were still ignorant of the other areas where residual radioactivity from AWE-operations had come to be located: the previously released building interior areas, subsurface soils, subsurface drains, utility trenches, roofs and the exterior areas where waste had been managed. The full extent of the residual contamination remained unknown until after the comprehensive characterization surveys were conducted in 1994 and 1995.</p>	<p>The 1992 characterization surveys are only a small part of the data set NIOSH uses in the new subsurface model. NIOSH considered the data available to characterize the subsurface environment and other work environments. NIOSH determined that the information published in the Metals and Controls Corp. Subsurface Exposure Model white paper was adequate for use with appropriate layers of conservatism applied. Additionally, NIOSH used characterization data from 1982, 1992, and 1994-95 to develop the subsurface, internal, and external models. NIOSH will continue reviewing new information and to resolve any remaining data issues.</p>
<p>P3 WG Notes: No Action to Date</p>	
<p>P3 Actions: To Be Determined</p>	

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P4 SEC Issue	P4 NIOSH Response
<p>I am skeptical of the estimate of the one-month duration of excavation activity over any given year. In addition, to open trench excavations (which seems to be the basis of the one month estimate), M&C maintenance workers would have been exposed to subsurface residual radioactive source materials, perhaps even more often, for tasks that required no excavation. This would have included snaking out plugged drains, pulling wires through underground conduit, installing and repairing services in subsurface utility trenches, etc.</p>	<p>NIOSH and SC&A made a concerted effort to ask site experts about occupancy rates during worker interviews (SRDBs 170018 p. 6, 169916 p. 5, 169938 p. 8, 169924 p. 7, and 169919 p. 5). NIOSH distilled that information to arrive at the 1-month occupancy rate. In SC&A's ER review on page 8, they also arrived at a 1-month occupancy rate. NIOSH appreciates that maintenance rates would have varied from 1968 to 1997, and will reassess the interview transcripts to confirm if one month is an appropriate occupancy rate for combined maintenance work.</p>
<p>P4 WG Notes: No Action to Date</p>	
<p>P4 Actions: To Be Determined</p>	

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P5 SEC Issue	P5 NIOSH Response
<p>The 1995 Drainage System Characterization Report includes 15 grab samples of accumulated sediment or surrounding soils in discrete locations of the pipe where elevated direct measurements were observed. The grab sample analyses report an isotopic analysis of uranium, but no other radionuclides. In retrospect, we now know that thorium would have also been present, as it was historically processed on the same manufacturing equipment as uranium during the AWE program. But given the limitation of the 1995 survey measurements, we have no way of knowing how much thorium source term was present in the residual radioactivity to which the M&C maintenance workers were exposed.</p>	<p>NIOSH is aware that a small amount of thorium work was done on the same equipment in the same areas as the uranium work. NIOSH is also aware that the equipment was cleaned or shipped offsite, and the areas cleaned (not D&D'd) when those Ops ceased prior to the start of the residual period. NIOSH relies on the available data and has modeled thorium exposures for those areas where we have thorium data. If the petitioner is aware of new information, NIOSH will consider it.</p>
<p>P5 WG Notes: No Action to Date</p>	
<p>P5 Actions: To Be Determined</p>	

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P6 SEC Issue	P6 NIOSH Response
<p>NIOSH may argue that there were numerous gross-alpha measurements of contaminated subsurface soils documented under Building 10, but I would argue that is not the same as the drains. So while NIOSH may be able to conservatively assume the worst case for the gross alpha measurements and reconstruct the dose to the organ of concern that would result in the highest dose, whether that be for thorium or uranium, the same cannot be said of the subsurface drains, where we only have isotopic uranium analysis and some direct measurements of beta/gamma radiation. Therefore, we can never know for sure what the exposures were to M&C maintenance workers who were exposed to source materials in the drains.</p>	<p>In the Subsurface Exposure Model white paper, NIOSH presented a new method to model exposures to source materials in the drains that assign both uranium and thorium exposures to M&C maintenance workers.</p>
<p>P6 WG Notes: No Action to Date</p>	
<p>P6 Actions: To Be Determined</p>	

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P7 SEC Issue	P7 NIOSH Response
<p>SC&A's review of subsurface exposures in outside areas relies heavily on the Sowell (1985) Radiological Survey, but this investigation was largely limited to surface surveys with only a dozen or so soil borings with samples collected at certain pre-determined depth intervals. Relying on the Sowell (1985) data to estimate the bounding dose of excavation activities is not representative of the likely exposures of M&C maintenance workers.</p>	<p>The Sowell (1985) Radiological Survey is only a small part of the data set NIOSH uses in the new subsurface model. NIOSH considered the data available to characterize the subsurface environment and other work environments. NIOSH determined that the information published in the Metals and Controls Corp. Subsurface Exposure Model white paper was adequate for use with appropriate layers of conservatism applied. Additionally, NIOSH used characterization data from 1982, 1992, and 1994-95 to develop the subsurface, internal, and external models. NIOSH will continue reviewing new information and continue to resolve any remaining data issues.</p>
<p>P7 WG Notes: No Action to Date</p>	
<p>P7 Actions: To Be Determined</p>	

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Metals and Controls SPECIAL EXPOSURE COHORT (SEC 236) ISSUES MATRIX

P8 SEC Issue	P8 NIOSH Response
<p>Internal Exposures Associated with HVAC Maintenance. SC&A suggests a couple of alternative approaches to estimate the accumulated activity on HVAC air filters with no allowance for any residue from the former AWE operations, only what has been deposited during Year-1 from airborne concentrations associated with resuspension of low levels of removable surface contamination inside the buildings. This does not resemble what the M&C maintenance workers have described as grime and debris accumulated during years of AWE operations involving metal finishing operations including melting, forging, extrusion, rolling, chemical milling, machining, welding, and assembly.</p>	<p>NIOSH agrees with the general approaches taken by SC&A to model exposures to HVAC workers, and the only contamination that can be used to model exposures is contamination that originated prior to the start of the residual period on 1/1/1968.</p> <p>NIOSH will create a white paper to include a description of HVAC work and will demonstrate how exposures to HVAC workers are bounded.</p>
<p>P8 WG Notes: No Action to Date</p>	
<p>P8 Actions: To Be Determined</p>	

NOTICE: This report 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.

Metals and Controls SPECIAL EXPOSURE COHORT (SEC 236) ISSUES MATRIX

P9 SEC Issue	P9 NIOSH Response
<p>For roof penetration activities, there should be no depletion of the source term. Each time a roof penetration was made, the Facilities Construction & Services maintenance worker would have been exposed to the full dose of whatever source material had accumulated in that particular location. Each roof penetration was a new location with an un-depleted source term.</p>	<p>NIOSH believes the petitioner is referring to this area's inaccessible nature, and that it was not routinely cleaned. NIOSH has methods available to bound exposures to personnel that access these areas and will address these exposures in a separate white paper.</p>
<p>P9 WG Notes: No Action to Date</p>	
<p>P9 Actions: To Be Determined</p>	

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P10 SEC Issue	P10 NIOSH Response
<p>The 1982 decommissioning surveys were substantially flawed. More importantly, they were limited in scope. They only covered accessible former AWE manufacturing areas (Note: most of the former AWE manufacturing areas had already been re-purposed by this time and were under heavy use 24-hours per day, so access was extremely limited). There were no intrusive surveys of subsurface areas, or inside the drains and utility trenches that served the former AWE areas, or any of the overhead areas, or any of the exterior areas where waste had been managed.</p>	<p>NIOSH created a new method to model subsurface exposures that do not rely upon the 1982 decommissioning surveys.</p>
<p>P10 WG Notes: No Action to Date</p>	
<p>P10 Actions: To Be Determined</p>	

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