NIOSH Response to SC&A's *Review of the Linde Ceramics Plant Special Exposure Cohort (SEC) Petition 00107 and the NIOSH SEC Petition Evaluation Report*, dated June 18, 2009.

Prepared by

**NIOSH/Office of Compensation Analysis and Support
and
ORAU Team**

For

**Linde Working Group Meeting
September 2, 2009**

Note: All comments keyed to "Table 1. Summary of Findings" on page 6 of SC&A document above

Finding 1: The observation that data taken after decontamination of Building 31 were higher than before decontamination calls into question the quality of the radon measurements. This finding is supported by a statement made by the authors of Bechtel 1982 that the radon data from Building 31 were "unconfirmed," again indicating concerns about data quality.

While the scope of the decontamination performed by Union Carbide between 1976 and 1981 is unknown, owing to the fact that the 1976 ORNL report described building 31 as having elevated alpha contamination in "small isolated areas".   This is consistent with the statement on page B-14, "The FB&DU survey team conducted a spot resurvey in 1981 in buildings 30, 31, 38 and a complete resurvey in Buildings 14 and 37, which were decontaminated by the site owner in 1980."

There is no basis for interpreting the statement that the radon data is "unconfirmed" as an expression of the data quality.

Finding 2: Use of the GM rather than the 95th percentile as the appropriate exposure metric needs to be justified for use in a bounding calculation, particularly since measurements taken in 1976 are used to characterize the entire residual period beginning in 1954. Use of 1976 data for a much earlier period needs to be justified by demonstration of equivalent (or less contaminated) radiological conditions.

Comparison of 1954 and 1976 contact beta/gamma measurements in building 30 are not significantly different. The average of the measurements conducted in 1976 is 0.64 mrep/hr versus a weighted average of 0.47 mrep/hr for the 1954 data. This is likely due to the fact that most of the contamination was fixed. This is supported by examination of Table 5 of ORNL 1978.

Location	area, ft2	dose rate, mrep/hr	doserate * area
shipping and receiving	9900	1.00	9.90E+03
Step 1			
Moore Area	5400	0.44	2.38E+03
West Area	13500	0.39	5.27E+03
East Area	11700	0.44	5.15E+03
Tank and Compressor Room	1800	0.84	1.51E+03
Main Balcony	13000	0.27	3.51E+03
Step 2			
Main	12000	0.33	3.96E+03
Balcony	6000	0.48	2.88E+03
	73300	Weighted Average	0.47

Finding 3: Use of measurements taken in 1981 to characterize radon exposures up to 28 years earlier may not be bounding. Use of such data needs to be technically justified.	As stated in the response to finding 2, the radiological conditions did not change within this period.
Finding 4: The NIOSH assumption that a single air sample taken in the 1970s can be used to bound plausible internal exposures to uranium, Th-230, and Ra-226 for over 50 years beginning in 1954 is highly questionable.	As noted in finding 2, the radiological conditions did not change during this period. Note that if one were to apply a resuspension factor of 1 E -5 to the 95th percentile of the fixed alpha readings (assuming a removable fraction of 0.1), the resultant estimation of air activity would be 0.011 pCi/m3 as compared to the value of 0.019 applied in the TBD (and ER)
Finding 5: NIOSH assumes that the GSD of the lognormal distribution is 5, when guidance in Battelle 2007 recommends a value of 10 for site-wide estimates. The placement of the single sample on the lognormal distribution could lead to substantial errors and cannot be reliably done.	Owing to the fact that the 'process' involved is general occupancy and that there are no process emissions occurring, the GSD of 5 would seem more appropriate than the value of 10 cited for site-wide estimates.
Finding 6: NIOSH's use of a constant air concentration, rather than an exponentially declining concentration, may be not be claimant favorable and is not consistent with the guidance in ORAUT-OTIB-0070. Back extrapolation needs to be technically justified by examination of potential site-specific changes in residual contamination.	As stated in finding 2, no significant reduction in contamination levels is evident.
Finding 7: The process selected to establish the pre-decontamination dust level does not appear to be claimant favorable, based on the cited data source (Heatherton 1950).	There is no reason to believe that the decontamination techniques employed during building decon (concrete removal with a pneumatic hammer, flame cleaning, and sandblasting) would be part of building renovation. Additionally, as SC&A points out, the airborne contamination levels during the step III decon were lower than that of step I and II, on which the building renovation scenario is based.

Finding 8: The assumed decontamination factor of 8 is based on pre- and post-decontamination values taken in different areas. Examination of the full dataset suggests that the differences in the potential internal exposures between the early and later decontamination activities may be negligible.	Rather than attempting to reinterpret 50 year old data, NIOSH chose to use the summary data in Table IX, which represents the original authors' representation of pre and post decontamination values. However, if the data in tables 1 and 2 are used directly, the weighted average decontamination factor is 2.

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Locaton	Area, ft^2	Pre Decon contact, mrep/hr	Post Decon contact, mrep/hr	Pre/Post * area
Step 1				
Moore	5400	0.44	0.33	7200
West	13500	0.39	0.11	47864
East	11700	0.44	0.4	12870
main balcony	3000	0.27	0.1	35100
Step 2				
main	12000	0.33	0.4	9900
	55600		Weighted Average	2

Finding 9: It is not clear that the bounding approach used in the SEC-00107 Petition Evaluation Report is more claimant favorable than that proposed in TBD-6001.

The values contained in TBD-6001 are intended to be generic values to be used when site specific data is not available, which is not the case for Linde.

Finding 10: The mix of alpha-emitting radionuclides in the airborne dust needs to be quantified for renovation activities, taking into consideration that raffinates might have been present.

In practice, dose reconstruction would use Table 3-3 of the TBD, which accounts for uranium progeny..

Finding 11: NIOSH needs to explain how internal exposures should be apportioned among the various exposure scenarios.	During the residual period, there are three broad exposure scenarios: general occupancy, the 1960's renovation period, and the FUSRAP remediation periods. Properly speaking, these are TBD issues, rather than SEC issues. We now have bioassay and air sampling data during the Bechtel FUSRAP work that could be worked into the TBD as needed (if there are claims for that period), perhaps when the TBD is revised to accommodate the information from the ER, a section placeholder could be placed noting it as "reserved", alternatively, this data could be evaluated to develop a more appropriate exposure model.