



Memorandum

To: The Metals and Controls Working Group and SEC-00236 Petitioners
From: LaVon B. Rutherford, CHP
Subject: Response to comments related to soil disturbances at the burial ground
Date: February 8, 2021

INTRODUCTION

On January 20, 2021, NIOSH received information regarding topics of concern that would be discussed at the next Metals and Controls (M&C) Working Group meeting. This information included a document with comments related to soil disturbances at the burial ground. This response memo provides verbatim text from the document and addresses those associated comments.

WORKING GROUP DOCUMENT

NOTE: The following italicized text is the verbatim text presented in the Working Group document provided to NIOSH [Burial area operations, no date].

BURIAL AREA OPERATIONS

Background and Operations up to 1961

The M&C Burial area is located between Bldgs. 11 and 12. Burials were made from 1958-61; site was closed 1967. The 1964 TI H&S manual states "uranium and thorium-contaminated noncombustible scrap material and machinery were collected in 55-gallon steel drums and disposed of through authorized agencies or were buried on-site in compliance with 10CFR20.304." (Sowell, 1985, p.1 and NIOSH 2017a, Table 1)

"Records indicate two known burials, one in 1958 of contaminated ductwork, and one in 1961 of 28.4 mCi of enriched uranium noncombustible scrap." (Sowell, 1985, p.1)

"The former waste burial site was believed to have operated from approximately 1958 through 1961 however materials found during the 1992 excavation suggest that the first burials may have occurred in the early 1950s." (CPS Report, 1993, p.1)

Disturbance of the Burial Area

Sowell Report: "Ground penetrating radar and subsurface investigations did not identify extensive areas of buried debris as had been expected. The topographical study indicates that

as much as 3-4 m of dirt may have been removed from the burial area during the construction of Building 12. This could explain the proximity of contamination to the surface as well as the lack of debris which is normally encountered when drilling into burial and landfill areas." (Sowell, 1985, p.12 and Appendix A, Table I) Note that a Texas Instruments safety engineer, "a trained health physicist" not otherwise named in the report, told an NRC inspector during a June 8-12, 1981 M&C inspection that "To the best of the safety engineer's recollection the burial trench filled over twenty years ago was about eight feet wide, 20 to 30 feet long, and 15 to 20 feet deep." (NRC Inspection Report, 7/15/1981, p.8) [underline-DK]

CPS Report: It appeared that a trench of contaminated material exhibiting elevated levels of radioactivity, easily identifiable by both radiation levels and a characteristic dark gray color, cut diagonally through these grid points. This trench was at a depth of approximately 4-6 feet." [1.3-2 m] (CPS Report, 1993, p.13).

Conclusion: Debris buried in the burial site was not representative of radioactive materials (U and Th) handled throughout the AWE operational period (1952-67), but was a selective sample of those materials, largely from 1958-1961 near the top of the burial area trench. Furthermore, the ground covering of the burial site appears to have been disturbed during the construction of Building 12. [NOTE: Need to check and confirm construction dates of Building 12].

QUESTION: In what way was burial ground data used by NIOSH in determining the claimants' exposures, and was any such use appropriate?

NIOSH RESPONSE

With input from the Working Group and SC&A, NIOSH developed six separate exposure models to assign radiation doses incurred by M&C employees from covered exposures during the residual period. The burial ground data were used for one of those models, referred to as "outside subsurface exposures." To develop the outside subsurface exposure-model, NIOSH used 594 lines of burial-site data from the "Radiological Survey of the Texas Instruments Site, Attleboro, Massachusetts" report [Sowell 1985] and blended them with data from other outside areas into a 2391-line spreadsheet used to determine exposures. Therefore, the Sowell burial data contributes a small amount of data to one of our six exposure models.

NIOSH reviewed the entire outside subsurface model data to determine if the burial ground samples are significantly different from the rest of the samples. NIOSH found all of the outside areas' data were consistent, making sense because the site grading (See discussion below) in 1980 was responsible for much of the contamination on the other parts of the site. Therefore, NIOSH finds it appropriate to include the burial ground data in our model because workers did disturb and were exposed to the soils in this area.

In addition, NIOSH reviewed the following two reports from the *Supplement to the 1992 Remediation Plan* [Texas Instruments Incorporated 1994], which states:

[Burial Ground:] Located in the landscaped lawn area south of Bldg. 12 and of unspecified dimensions.

Elevated surface radiation levels were identified in couple of spots on the lawn by ORAU in 1983 [as also shown in Sowell 1985]. It is believed that final grading at the conclusion of the Bldg. 12 construction project in 1968 distributed a thin layer of contaminated material in a southeasterly direction emanating from the source at the former Burial Site location. Since historical photographs show that the former Burial Site remained undisturbed while Bldg. 12 was under construction, no contamination is expected to exist under the building [Texas Instruments Incorporated 1994, PDF p. 38].

Based on earlier subsurface investigations, potentially contaminated soils were expected to exist at a depth of 2 to 4 feet below the ground surface. This was confirmed by the systematic sampling [Texas Instruments Incorporated 1994, PDF p. 38].

Bldg. 12 Air-line Debris

Located on the eastern boundary of the developed portion of the [M&C site]. A small area of approximately 2500 sq. ft. was pinpointed by an employee who was involved in the placement of soils at this location in 1980 [Texas Instruments Incorporated 1994, PDF p. 39].

During the installation of a buried, compressed air line between Bldgs 11 and 12 in 1980, one leg of the excavation cut through a portion of the Bldg. 12 Burial Site. After conferring with the NRC, TI employees sorted through the contaminated excavated material to remove debris with elevated radiation measurements. The material demonstrating elevated radiation levels was packaged and dispositioned to a licensed disposal facility in Barnwell, South Carolina. The remaining soil was re-buried at its current location on the eastern edge of the developed portion of the site [Texas Instruments Incorporated 1994, PDF p. 39–40].

Since the current location is a popular spot for placing construction project and grounds keeping soils and debris, a low hill with an elevation of approximately 10 to 15 feet above the original ground surface has evolved above the spot where the potentially contaminated soil was buried. Assuming that the 1980 burial would not have extended far below the original ground surface, the sampling depths for this exercise extended down to 25 feet below the existing ground surface. Systematic sampling confirmed our expectations. Elevated soil contamination was found within a narrow stratum at a depth of 15 feet below the existing ground surface [Texas Instruments Incorporated 1994, PDF p. 40].

Another report, *Request for Reimbursement of Costs for Decontamination and Decommissioning of the Texas Instruments Attleboro Facility* [Texas Instruments Incorporated 1996], states:

[M&C] surveyed the area southeast of Building 12 and found slightly elevated levels of radioactivity. The contamination likely came from dirt moved from the burial site when [M&C] was installing the airline in 1980. The air line debris area was investigated but did not require remediation because levels of radioactivity detected were below applicable NRC release criteria [Texas Instruments Incorporated 1996, PDF p. 33].

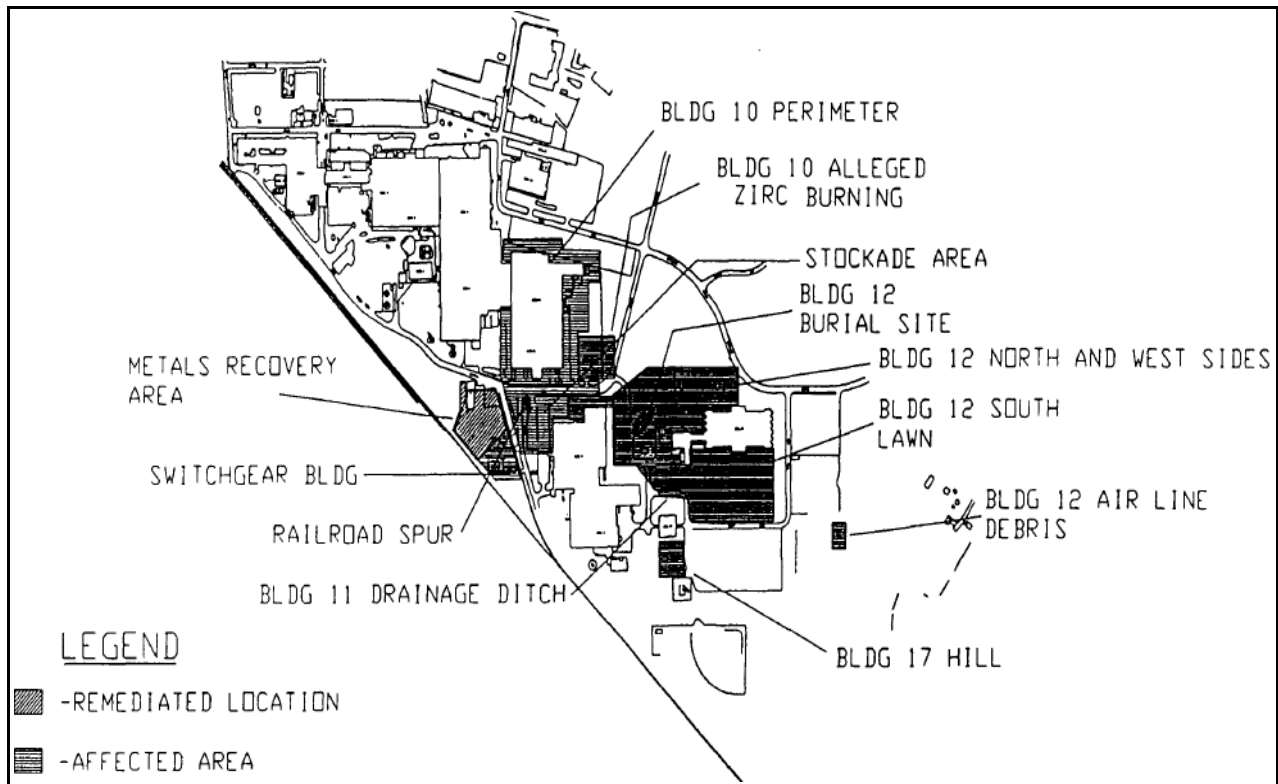
CONCLUSION

NIOSH reviewed interview transcripts and SRDB records, including those reprinted above, and identified two documented burial area disturbances: (1) the final site grading after the Building 12

construction project in 1968, and (2) the installation of a buried, compressed air-line in 1980. Of these two disturbances, the site grading was the only major disturbance and was responsible for many contamination finds on other parts of the site. Since this site grading occurred at the very beginning of the residual period, the source term remained mostly intact thereafter for the residual period. This makes the survey data used by NIOSH representative of maintenance exposures because the source term remained unchanged, and the NIOSH model uses the 95th percentile to account for ongoing maintenance that could have removed contamination before the characterization survey was performed.

The 1980 air-line disturbance falls into the category of an outdoor subsurface "maintenance" activity, which NIOSH's exposure model is designed to bound. Information related to this air-line work indicates that M&C conferred with the Nuclear Regulatory Commission (NRC) and did not hire a contractor but instead used their employees to sort through contaminated, excavated material to remove debris with elevated radiation measurements. Considering that M&C conferred with the NRC, NIOSH believes that if this work had presented a significant exposure risk, then the NRC would have directed M&C to use radiological controls, and reports of this work would be available similarly as they are for the other remediation tasks. It is more likely the "elevated levels" in this case were above background, but less than release criteria (30 pCi/g) as indicated in the excerpt above. Information related to this task supports NIOSH's outside subsurface model, in that the 95th percentile contamination level NIOSH applied (118 pCi/g) is approximately four times higher than the contamination level these workers experienced, and this task certainly took less than the two months of occupancy NIOSH's model assigns to these workers in 1980.

Figure 1 below provides the locations of the burial grounds and air-line debris.



[Texas Instruments Incorporated 1994, PDF p. 81

Figure 1: Map of Open Land Area Depicting Affected and Previously Remediated Areas

REFERENCES

Burial area operations [no date]. Document emailed to NIOSH in January 2021. [SRDB Ref ID: 184557]

Sowell LL [1985]. Radiological survey of the Texas Instruments site Attleboro, Massachusetts. Final Report. Oak Ridge, TN: Oak Ridge Associated Universities. January 1985. [SRDB Ref ID: 94371]

Texas Instruments Incorporated [1994]. Supplement to the 1992 remediation plan. Attleboro, MA: Texas Instruments Incorporated. December 1994. [SRDB Ref ID: 114177]

Texas Instruments Incorporated [1996]. Request for reimbursement of costs for decontamination and decommissioning of the Texas Instruments Attleboro Facility. Attleboro, MA: Texas Instruments Incorporated. December 1996. [SRDB Ref ID: 163071]