

7/13/90

**CORRECTIONS TO
ENVIRONMENTAL ASSESSMENT FOR 881 HILLSIDE
(HIGH PRIORITY SITES) INTERIM REMEDIAL ACTION**

A review of the Environmental Assessment for 881 Hillside (High Priority Sites) Interim Remedial Action (DOE/EA - 0413) identified two errors. Table 2-1, Hazardous Chemical Concentrations (page 2-2), misstated the data for uranium in surface soils in units of pCi/gm rather than mg/kg. A corrected copy of Table 2-1 is attached which presents the concentration of uranium in surface soils in both sets of units. The calculations for the Environmental Assessment as published (January 1990) were based on the correct concentration values.

The second error involves the calculation of the Exposure Duration Adjustment (EDA) on page F-2 of Appendix F. The calculation unnecessarily included a correction for an eight-hour work day (8/24). Removal of this factor changes the calculated radiological exposure values in Table F-1 and F-2. The committed effective dose equivalent (CEDE) to a worker from fugitive dusts for uranium increases from 4.78 E-2 rem to 1.43 E-1 rem . The CEDE to the same worker for plutonium increases from 2.95 E-4 rem to 2.07 E-3 rem . The committed effective dose equivalent to a member of the public (Table F-2) increases from 5.03 E-3 mrem to 1.51 E-2 mrem for uranium and from 7.88 E-5 mrem to 2.36 E-4 mrem for plutonium. The corresponding exposure values in the text in Section 5.5 also change. Corrected copies of pages 5-13, 5-14, 5-18, F-2, F-5 (Table F-1), and F-6 (Table F-2) are attached.

Table 2-1
Hazardous Chemical Concentrations

<u>Hazardous Chemical</u>	<u>Alluvial Groundwater⁶</u>		<u>Soil⁷</u>	
	<u>Average</u>	<u>Maximum</u>	<u>Average</u>	<u>Maximum</u>
<u>Organics</u>				
Bis-(2-ethylhexyl)phthalate	NR ¹	NR	1.24 E+0	7.21 E+0
Carbon Tetrachloride	4.60 E-1 ²	2.80 E+1	8.00 E-3	8.00 E+0
E-3,1,2-Dichloroethane	1.59 E-1	1.60 E+1	8.00 E-3	1.00 E-2
1,1-Dichloroethene	2.30 E+0	4.80 E+1	8.00 E-3	8.00 E-3
t-1,2-Dichloroethene	NR	NR	8.00 E-3	1.80 E-2
Tetrachloroethene	9.46 E-1	1.32 E+1	1.30 E-2	1.90 E-1
Trichloroethene	2.89 E+0	7.20 E+1	1.10 E-2	1.50 E-1
1,1,1 Trichloroethane	1.92 E+0	3.03 E+1	NR	NR
Chloroform	5.00 E-3	5.10 E-2	NR	NR
1,1 Dichloroethane	2.80 E-2	3.50 E-1	NR	NR
1,1,2 Trichloroethane	2.13 E-1	1.47 E-1	NR	NR
<u>Metals</u>				
Manganese	2.41 E-1	9.59 E-1	NR	NR
Mercury	3.00 E-1	9.00 E-1	NR	NR
Nickel	1.90 E-1	8.64 E-1	1.30 E+1	7.10 E+1
Selenium	5.96 E-1	3.20 E+0	4.90 E-1	4.90 E-1
<u>Uranium (total)</u>				
Groundwater	5.12 E+0 (32 pCi/l) ⁴	9.95 E-2 (56 pCi/l)	NA ³	NA
From core borings	NA	NA	3.14 E+0 (2.13 pCi/gm)	6.73 E+0 (4.56 pCi/gm)
Surface soils ⁵	NA	NA	3.90 E+2 (264 pCi/gm)	4.48 E+3 (3030 pCi/gm)
<u>Plutonium</u>				
Surface soils ^{8,5}	NA	NA	1.63 pCi/gm	4.8 pCi/gm

¹ NR = Contamination not reported above minimum detection limit in any on-site sample from this medium

² 4.60 E-1 = $4.60 \times 10^{-1} = 0.46$

³ NA = Not Applicable

⁴ Total Uranium expressed in radiological units. pCi/l = picocuries per liter

⁵ From enclosure (1) to Rockwell letter 881HS-1 dated 9-1-88

⁶ From Interim Remedial Action Plan (maximum of values in Table 2-1, 2-2, and 2-3) for 881 Hillside Area unless otherwise indicated.

⁷ From Feasibility Study Report for High Priority Sites (881 Hillside Area), Table 4-1, unless otherwise indicated.

⁸ Not above ARARs. Included for reference only

Exposures Due to Fugitive Dust

Radiation surveys have indicated there are small isolated areas of localized surface contamination in the area of the 881 Hillside. As shown in Table 2-1, no surface samples have yielded plutonium levels greater than 5 pCi/gm, with the average level being 1.63 pCi/gm. No higher levels of Pu are expected to be encountered during excavation because no borehole samples showed measurable quantities of Pu below ground surface. Elevated levels of uranium have been identified in surface soils with measured levels as high as 3,072 pCi/gm. Uranium has been found in deeper soils through borehole analysis in concentrations lower than the surface concentrations. All analyses have been performed using the higher surface soil concentrations to establish an upper bound of risk.

Soil samples have also been analyzed for metals that are classified as hazardous materials. Neither the radioactive materials nor the metals are readily absorbed through the skin, so they do not present a risk to workers from dermal exposure.

During construction of the facilities, the only pathways of concern for workers would be inhalation of fugitive dust generated during the excavation and inadvertent ingestion. The inadvertent ingestion pathway was discussed in a previous subsection of this report. Dust control measures would be specified in the JSA to limit inhalation exposures. These measures include the premoistening of the excavation area with a sprinkler system for three days prior to start-up and the continued moistening of the site throughout the excavation. Ambient air high volume air samplers will be used to measure radiation and wind velocity. Operations will be suspended by requirements in the OSA if wind velocity exceeds 15 mph or alpha radiation exceeds 0.03 pCi/m³.

Nonetheless, an analysis has been made of the potential inhalation of dust contaminated with plutonium or uranium, and the committed effective dose equivalent (CEDE) from such an intake. If the amount of dust stirred up were to remain less than 10 mg/m³ (the OSHA regulatory limit on nuisance dust in the work environment), the CEDE calculated for uranium is 1×10^{-1} Rem and for

plutonium is 2×10^{-3} Rem. These totals may be compared to the DOE limit for occupational workers of 5 Rem per year (DOE, 1988c). A complete description of the methods used to perform this analysis may be found in Appendix F.

Low-volatility organic chemicals might also be made airborne with fugitive dust. The risks to the workers from inhalation of this dust have been analyzed and are detailed in Appendix F. The carcinogenic risk factor is 1×10^{-8} and for noncarcinogenic risks, the ratio of the chronic daily intake to the appropriate HEC is 1×10^{-4} . Analysis of the impacts of inhalation of metals present in the soil indicates that the greatest carcinogenic risk is from nickel at 6×10^{-6} . The greatest ratio of the CDI to the appropriate HEC is for mercury which is 4×10^{-3} . Details of the analysis may be found in Appendix F.

During operation of the water treatment facility, radioactive materials could accumulate from small leaks or spills of untreated water within the facility. These chemicals are not volatile and are not readily absorbed through the skin. Oral intake presents the only potential concern. Possible accumulations from minor leaks or spills will be controlled to low levels by ordinary good housekeeping practices and as specified in the Operational Safety Analysis.

5.5.3 Site Employee Exposure Risks

The risks to RFP site workers who are not associated directly with the remedial action (site employees) will be due to airborne exposures during construction activities or operation of the water treatment facility. The exposures may be considered in two categories:

- 1 Fugitive dust carried from the site during construction that may be contaminated with either low-volatility organics or radioactive materials.
- 2 Organic chemicals released to the air during construction or operation of the facilities.

- 3 Dermal exposure to low-volatility organic chemicals if the area is released from administrative control

The extent of the increased risks is summarized below. More detailed discussions may be found in the Appendices.

Airborne Exposures

During construction and installation activities for the proposed action, the general public could be exposed to the same sources of airborne VOCs as were discussed in the section on site employees. The risks to the general public from this source of VOC exposure are summarized in Table 5-2. A detailed description of the basis for the numbers in Table 5-2 may be found in Appendix E.

The same sources of VOCs that could impact site employees during water treatment facility operation could also expose members of the general public. The associated risk estimates are summarized in Table 5-2.

The general public may also be exposed to low-volatility organic chemicals through fugitive dust generated during excavation activities. An estimate of the upper bound of the risks from these materials has been included in Appendix F. The results of these calculations have been included in Table 5-2.

The only source of radioactivity to members of the public would be inhalation of fugitive dust generated during the excavation. Dust control measures would limit these exposures as well. Nonetheless, analyses have been performed of the airborne levels at the nearest off-site location, the potential uptake of radionuclides by a member of the public, and the resulting committed effective dose equivalent (CEDE). If the work were to continuously create an airborne dust loading of 10 mg/m^3 (the OSHA limit for nuisance dusts), the resulting average dust levels offsite would lead to doses to a member of the public of $2 \times 10^{-2} \text{ mRem}$ from uranium and $2 \times 10^{-4} \text{ mRem}$ from plutonium. These doses may be compared to the annual limit on CEDE of 100 mRem, as established by the DOE (DOE, 1989).

For DEHP (the only organic reported in soil samples that would be of concern for fugitive dust inhalation), the calculations are performed as described in Appendix A.

Analyses were also performed on manganese, mercury, nickel, and selenium, the metals that were reported as exceeding ARARs in water samples. Average levels of these metals were determined from the chemical analysis of soil taken from the boreholes nearest the proposed location of the french drain trench as reported in the Remedial Investigation Report (Rockwell, 1988c)

The analysis of radionuclide exposure requires the total uptake of each radionuclide during the exposure period rather than the chronic daily intake (CDI) used for other analyses. The total intake of each radionuclide is calculated by the following equation:

$$I = C_{\text{air}} \times \text{BR} \times \text{EDA}$$

where

$$I = \text{Total intake } (\mu\text{Ci})$$

$$C_{\text{air}} = \text{Average air contamination } (\mu\text{Ci}/\text{m}^3)$$

$$\text{BR} = \text{Adult Breathing Rate}$$

$$= 9.6 \text{ m}^3$$

$$\text{EDA} = \text{Exposure Duration Adjustment (the number of days the dust is being generated } (60) \times 5/7)$$

$$= 14.3 \text{ days}$$

The fifty-year committed effective dose equivalent (CEDE) is calculated by multiplying the total uptake, I, by the appropriate inhalation dose conversion factor for workers (EPA, 1988) or the general public (DOE, 1988b)

Table F-1 shows the results of the risk evaluations for workers involved in the remedial action. All reported values for manganese and selenium in soil were below the minimum

*Total air breathed in an eight-hour shift (ICRP 23).

Table F-1
RISKS TO REMEDIAL WORKERS FROM FUGITIVE DUSTS

Hazardous Material	Soil Concentration	Air Concentration	Inhalation Dose Conversion Factor ¹	Carcinogenic Risk ²	Noncarcinogenic Risk ²	Committed Effective Dose Equivalent
Bis-(2-ethylhexyl)phthalate	2.47 E 0 mg/kg ⁴	2.47 E-5 mg/m ³	NA ⁵	1.16 E-8	9.66 E-5	NA
Uranium	2.64 E-4 μCi/gm	2.64 E-6 μCi/m ³	1.32 E+2 Rem/μCi	NA	NA	1.43 E-1 Rem
Plutonium	1.63 E-6 μCi/gm	1.63 E-8 μCi/m ³	3.08 E+2 Rem/μCi	NA	NA	2.07 E-3 Rem
Mercury	2.60 E-1 mg/kg ⁴	2.60 E-6 mg/m ³	NA	0	3.99 E-3	NA
Nickel	1.43 E+1 mg/kg ⁴	1.43 E-4 mg/m ³	NA	5.70 E-6	0	NA

Exposure duration = 60 days

Airborne dust loading = 10 mg/m³

¹(EPA, 1988)

² See Appendix B

³ 2.47 E 0 = 2.47 x 10⁰ = 2.47

⁴ Average of the boreholes nearest the proposed location of the french drain (BH 2-87, BH 6-87, and BH 13-87) During calculation of averages, when results were less than the minimum detectable levels of analysis, a value of 1/2 the minimum detectable level was used

⁵ Not Applicable

Table F-2
RISKS TO THE GENERAL PUBLIC FROM FUGITIVE DUSTS

Hazardous Material	Soil Concentration	Air Concentration	Inhalation Dose Conversion Factor ¹	Carcinogenic Risk ²	Noncarcinogenic Risk ²	Committed Effective Dose Equivalent
Bis-(2-ethylhexyl)phthalate	2.47 E 0 mg/kg ^{3,4}	2.64 E-9 mg/m ³	NA ⁵	1.66 E-12	1.32 E-7	NA
Uranium	2.64 E-4 μ Ci/gm	2.82 E-10 μ Ci/m ³	1.30 E+5 mRem/ μ Ci	NA	NA	1.51 E-2 mRem
Plutonium	1.63 E-6 μ Ci/gm	1.74 E-12 μ Ci/m ³	3.30 E+5 mRem/ μ Ci	NA	NA	2.36 E-4 mRem
Mercury	2.60 E-1 mg/kg ⁴	2.78 E-10 mg/m ³	NA	0	5.44 E-6	NA
Nickel	1.43 E+1 mg/kg ⁴	1.53 E-8 mg/m ³	NA	8.16 E-10	0	NA

Exposure duration = 60 days

Airborne soil source term = 1200 mg/sec

Dispersion factor (X/Q) = 8.90 E-7 sec/m³

¹(DOE, 1988b)

² See Appendix B.

³ 2.47 E 0 = 2.47 x 10⁰ = 2.47

⁴ Average of the boreholes nearest the proposed location of the french drain (BH 2-87, BH 6-87, and BH 13-87) During calculation of averages, when results were less than the minimum detectable levels of analysis, a value of 1/2 the minimum detectable level was used.

⁵Not Applicable