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MEMORANDUM

TO: Tom Greengard

FROM: Mike Anderson/Suzanne Paschke

DATE: November 30,1988

SUBJECT Interim Remedial Action for the 881 Hillside
WESTON W.O. No.: 2029-20-03

Per your request, this memorandum presents a summary of the key issues pertaining to the proposed remedial action at the 881 Hillside, the recommendations for resolution of the issues, and the implications for submittal of the final RI/FS report. The contents of this memorandum were discussed in our meeting with DOE on November 16, 1988. In attendance were Kari Schneider and Greg Underberg representing DOE, Rebecca Weed, Suzanne and I representing WESTON, Bob James and you representing Rockwell, and Ben Doty.

Because of the compressed time frame for preparation of the 881 Hillside Final Draft RI/FS report, the inorganic chemistry of background alluvial and bedrock ground water was inadequately characterized. As a result the ARAR analysis performed for the FS identified a number of inorganic constituents in ground water at the 881 Hillside Area whose concentrations were above chemical specific ARARs, but that cannot be conclusively stated to be above background. (They are, however, above estimated background levels). Table 1, which is based on data in the FS, identifies average concentrations of inorganics in alluvial ground water that are above ARAR. Table 2 indicates that an ARAR non-compliance condition also exists for bedrock ground water. The central issue regarding compliance with ARARs is that until background chemistry is characterized, it is not possible to determine if a variance from meeting these ARARs can be justified, i.e., that background chemical conditions do not meet chemical specific ARARs. Until background has been adequately characterized, the implications of proceeding with the FS preferred remedial action are: 1) discharge to the valley fill alluvium of effluent treated only for organics may be unacceptable to the agencies; 2) the proposed remedial action does not address apparent bedrock ground-water contamination; and 3) the french drain may be improperly located for collection of all "contaminated" alluvial ground water. Table 3 presents the alluvial wells downgradient of the proposed location of the french drain and the inorganic concentrations above ARAR.

The obvious solution to this problem is to collect the necessary background data, determine where variances from ARARs are justified, and then revise the RI/FS so that the preferred remedial action is the cost effective remedy for the 881 Hillside that meets or exceeds ARARs as appropriate. It has been determined that the

RI/FS report cannot be finalized until mid 1990 given the time constraints of drilling and sampling to characterize background.

Because organic contamination has not migrated away from the 881 Hillside Area, and inorganic "contamination" has not migrated to any appreciable extent, it is unlikely that contamination will become more wide spread and therefore more costly to remediate if remedial action is not taken until the RI/FS report is finalized (i.e., the wastes were disposed at the 881 Hillside more than 20 years ago). However, there may be negative public perception of delaying remedial action until 1990. Should Rockwell want to avoid potential poor community relations, an interim remedial action could be implemented. As required by CERCLA/SARA, an interim remedial action must be consistent with the final remedy for the site. The implication of this requirement is that discharge of inorganic "contaminated" water to surface water or ground water may exacerbate the environmental problem at the site, and thus not be consistent with the final remedy. Therefore, any interim action must necessarily include treatment for inorganics. The disadvantages of treatment for inorganic removal during interim remediation are potential needless expenditure of additional funds and creation of a community/political climate that would look unfavorably upon ceasing such treatment if it is determined at a later date that background chemical conditions do not comply with ARARs.

The options for interim remedial action discussed at the November 16, 1988 meeting are variations on the preferred remedial action presented in the FS. The preferred remedial action was to install a french drain at the base of the hillside to collect the alluvial ground water, pump alluvial ground water from the vicinity of well 9-74 (location of highest organic contamination), collect the building 881 footing drain flow, and treat these waters for organic contaminant removal using a UV peroxide system. The options for interim remedial action are listed below.

1) To the FS preferred action, add an ion exchange unit for removal of inorganics as necessary. Ion exchange regenerant would be treated in the Building 374 flash evaporator.

2) Delete from the FS preferred action the french drain and reinjection system. Batch treat ground water collected from well 9-74 vicinity for organics removal, transport the effluent via tanker truck to Building 374 for treatment in the flash evaporator. The footing drain flow would be treated for organics removal and discharged into the South Interceptor Ditch. (Inorganics in the footing drain discharge comply with ARARs).

3) Reinject effluent from the FS preferred action upgradient of the french drain.

4) Discharge effluent from the FS preferred alternative treatment system into the Rocky Flats Plant process waste collection system for eventual treatment at Building 374.

Option 3 was dismissed as not viable because it would be necessary to discharge the base flow either downgradient or offsite once steady state was reached in the hydrogeologic system.

Options 1 and 4 have an advantage over option 2 in that contaminants in alluvial ground water are completely cutoff from further migration by the action of the french drain. Option 4 is less costly in that treatment in the flash evaporator represents a sunk capital cost, and the operational cost would not be assigned to the project. However, there is only 5 gpm residual treatment capacity in the flash evaporator and the effluent discharge flow is predicted to be 5 to 7 gpm. This may render this option infeasible.

Implementation of option 2 will require some modification to the appurtenances of the proposed treatment system. For example it will be necessary to store collected ground water from well 9-74 for subsequent batch treatment, and it will be necessary to store the footing drain flow during batch treatment of the 9-74 ground water. Appropriate piping and valving modifications will also be required. Sizing of the tanks will be dependent on the expected flow of ground water from the vicinity of well 9-74, and the expected time required to remove organics from this highly contaminated water to achieve the effluent standards, i.e., recyle may be required during batch treatment.

In spite of the need for these above mentioned modifications, it was decided at the meeting that option 2 was the most practical and cost effective interim remedial action. First, it resulted in removal of the most contaminated water at the 881 Hillside Area thus mitigating potential contaminant migration downgradient in alluvial ground water and possibly bedrock ground water. Second, it removed organics from the footing drain flow which currently discharges to a surface water pathway Third, it does not require additional cost for installation and operation of an ion exchange unit which may not be needed depending on the outcome of the background characterization. Lastly, the french drain would not be installed in potentially the wrong location if it is determined inorganics are indeed a contaminant requiring removal. It is noted that a negative aspect of locating the french drain further downgradient of the proposed location is eventual further migration of organics within the alluvium and thus the potential for organic contamination of downgradient subcropping sandstones. However, the risk of extensive downgradient migration of organics during the interim action period is significantly reduced by removal of organic contaminated ground water in the vicinity of well 9-74. In conclusion, it was felt by the group that this alternative provided the most flexibility for incorporating additional treatment processes or ground-water collection systems as deemed necessary, would be consistent with the final remedy, and would require the least expenditure of funds that may ultimately be determined to have been unnecessary.

Before a final determination is made on the interim remedial action, the following are recommended:

- consult ion exchange vendors to "ball park" capital and operating cost, and as necessary, conduct bench scale treatability studies to determine the most effective resin and unit size;

- determine the expected flow if the french drain were located in the valley fill alluvium near well 65-86 in order to capture the inorganic plume;

- determine the expected flow of bedrock ground water at the 881 Hillside Area if it were necessary to pump and treat for inorganics;

- determine the expected flow and ultimate volume from pumping ground water in the vicininty of well 9-74;

- determine the expected treatment time to treat a batch of highly contaminated ground water from well 9-74;

- if an interim remedial action is pursued, the design should allow for additional space and piping arrangements to accommodate other units for treatment of inorganics and/or increased flows if required at a later date.

It is further noted that the Plant's NPDES permit may require modification for discharge to the valley fill alluvium or the South Interceptor Ditch. In the former case, interaction between shallow ground water and surface water is likely to trigger a need to comply with the CWA requirements. Additional monitoring parameters will likely include the inorganics identified in Table 1 as well as the Target Compound List (TCL) volatiles (see Table 4). The Target Compound List was formerly known as the Hazardous Substance List (HSL).

Lastly, EPA policy for Superfund sites is to prepare an Engineering Evaluation/Cost Analysis (EE/CA) before non-time-critical removal actions are implemented. The EE/CA serves to 1) satisfy environmental review requirements for removal actions, 2) satisfy administrative record requirements for documentation of removal action selection, and 3) provide a framework for evaluating and selecting alternative technologies. As Rocky Flats Plant is not a Superfund site, an EE/CA is not federally required. However, an EE/CA may be required by the State of Colorado. Such a document may cost on the order of $50,000 to prepare.

TABLE 1

INORGANIC CONSTITUENTS ABOVE CHEMICAL SPECIFIC ARARS IN ALLUVIAL GROUNDWATER AT THE 881 HILLSIDE AREA

Constituent	ARAR (mg/l)	Geometric Mean Concentration (mg/l)
Selenium	0.01	0.03
Strontium	0.46*	1.0
Manganese	0.05	0.07
TDS	400	1053
Sulfate	250	171**

* Based on risk assessment hazard index of 1 for adult drinking water only.

** Geometric mean does not indicate exceedence of ARAR, but ARAR is frequently exceeded at wells 9-74, 10-74, 69-86, 4-87, 6-87, 43-87.

TABLE 2

INORGANIC CONSTITUENTS EXCEEDING ARAR

IN BEDROCK GROUNDWATER

	ARAR(mg/l)	Range (mg/l)	Arithmetic Mean (mg/l)
Selenium	0.01	0.005U - 0.23	0.04
Strontium	0.46*	0.21 - 3.14	1.20
Manganese	0.05	0.005U - 0.18	0.05
TDS	400	275 - 1852	790
Sulfate	250	23 - 770	262

* Based on risk assessment hazard index of 1 for adult drinking water only.

TABLE 3

ALLUVIAL WELLS DOWNGRADIENT OF FRENCH DRAIN

WITH INORGANIC CONSTITUENTS EXCEEDING ARARS

ARAR Well	------Selenium------ 0.01 mg/l		----Strontium--- 0.46 mg/l		----Manganese---- 0.05 mg/l		------TDS------ 400 mg/l		---Sulfate---- 250 mg/l	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean
2-87	0.005U	0.005U	0.46-0.61	0.51	0.22-0.44	0.34	525-620	560	66-73*	70*
69-86	.002U-.24	.12	0.90-1.20	1.04	0.005U-.06	0.02*	841-1017	948	53-320	211*
48-87		0.03**		2.9**		0.43**		2081**		838**
47-87 dry										
55-87 dry										
64-86	0.005U-0.009*	0.004*	0.42-0.70	0.53	0.03-0.28	0.12	438-742	597	133-180*	162*
65-86	0.005U-0.009*	0.004*	0.52-0.78	0.61	0.006-0.16	0.06	444-690	549	89-220*	144*

* Does not exceed ARAR

** Only one data point

All units mg/l

TABLE 4

TARGET COMPOUND LIST - VOLATILES

Volatiles	CAS Number	Detection Limits* Low Water[a] ug/L	Low Soil/Sediment[b] ug/Kg
1. Chloromethane	74-87-3	10	10
2. Bromomethane	74-83-9	10	10
3. Vinyl Chloride	75-01-4	10	10
4. Chloroethane	75-00-3	10	10
5. Methylene Chloride	75-09-2	5	5
6. Acetone	67-64-1	10	10
7. Carbon Disulfide	75-15-0	5	5
8. 1,1-Dichloroethene	75-35-4	5	5
9. 1,1-Dichloroethane	75-35-3	5	5
10. trans-1,2-Dichloroethene	156-60-5	5	5
11. Chloroform	67-66-3	5	5
12. 1,2-Dichloroethane	107-06-2	5	5
13. 2-Butanone	78-93-3	10	10
14. 1,1,1-Trichloroethane	71-55-6	5	5
15. Carbon Tetrachloride	56-23-5	5	5
16. Vinyl Acetate	108-05-4	10	10
17. Bromodichloromethane	75-27-4	5	5
18. 1,1,2,2-Tetrachloroethane	79-34-5	5	5
19. 1,2-Dichloropropane	78-87-5	5	5
20. trans-1,3-Dichloropropene	10061-02-6	5	5
21. Trichloroethene	79-01-6	5	5
22. Dibromochloromethane	124-48-1	5	5
23. 1,1,2-Trichloroethane	79-00-5	5	5
24. Benzene	71-43-2	5	5
25. cis-1,3-Dichloropropene	10061-01-5	5	5

(continued)

TABLE 4

TARGET COMPOUND LIST - VOLATILES (CONTINUED)

Volatiles	CAS Number	Detection Limits* Low Water[a] ug/L	Low Soil/Sediment[b] ug/Kg
26. 2-Chloroethyl Vinyl Ether	110-75-8	10	10
27. Bromoform	75-25-2	5	5
28. 2-Hexanone	591-78-6	10	10
29. 4-Methyl-2-pentanone	108-10-1	10	10
30. Tetrachloroethene	127-18-4	5	5
31. Toluene	108-88-3	5	5
32. Chlorobenzene	108-90-7	5	5
33. Ethyl Benzene	100-41-4	5	5
34. Styrene	100-42-5	5	5
35. Total Xylenes		5	5

[a]Medium Water Contract Required Detection Limits (CRDL) for Volatile HSL Compounds are 100 times the individual Low Water CRDL.

[b]Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Volatile HSL Compounds are 100 times the individual Low Soil/Sediment CRDL.