

81-RF-2180

ROCKY FLATS PLANT  
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Contractor to  
U. S. Department of Energy



Rockwell  
International



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81-RF-2180

Mr. E. W. Bean  
DOE, RFAO

GROUNDWATER MONITORING PROGRAM PLAN

The attached Groundwater Monitoring Program Plan has been prepared in response to your request dated September 8, 1981. This plan is for your consideration to inform the EPA that the Rocky Flats Plant has a program that adequately meets the conceptual intent of 40 CFR 265.9. A response to the Region VIII EPA is necessary by November 19, 1981.

This plan specifically covers only the monitoring of groundwater in areas of the Plant that might be affected by the solar ponds and holding ponds that contain toxic and/or hazardous wastes. The overall Plant groundwater monitoring program has been modified slightly to be consistent with the EPA requirements. These modifications involve sampling frequency, measurement of water table depth and the addition of a few new analysis parameters.

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Orig. and 1 cc - Mr. Bean  
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CLASSIFICATION	LTR	ENCL
UNCLASSIFIED	X	X
CONFIDENTIAL		
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AUTH. CLASSIFIER SIG.		
DATE	<i>11/13/81</i>	
IN REPLY TO LTR. NO.		

LTR. APPROVALS

ORIG. & TYPIST INITIALS  
*TC*

I. Groundwater Sampling and Analysis Plan

In response to 40 CFR Part 265-91, Groundwater Monitoring System:

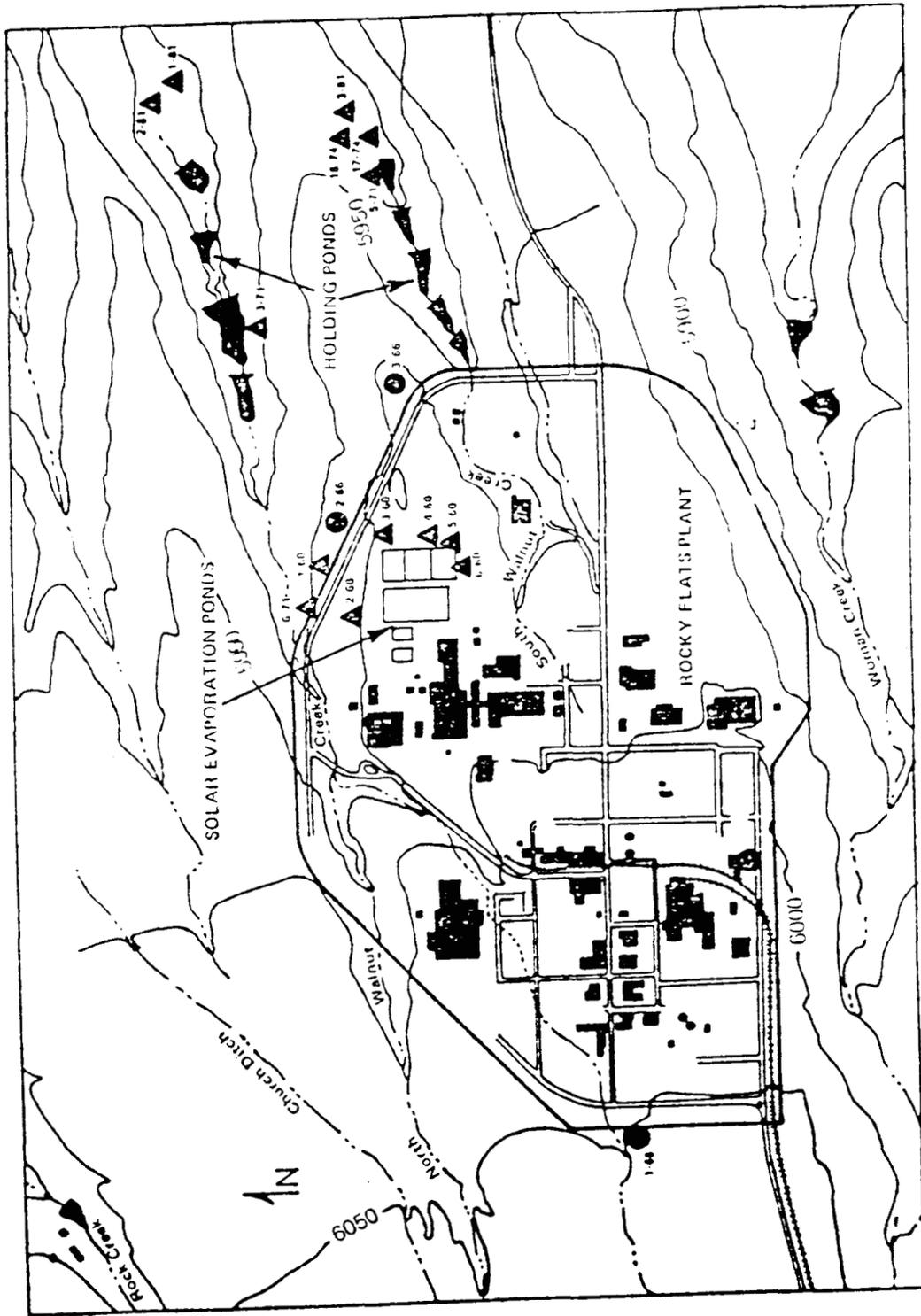
A. The Rocky Flats Plant has a groundwater monitoring system capable of yielding groundwater samples for analysis. The locations of the monitoring wells are shown in Figure 1.

1. Monitoring well 1-66 is installed hydraulically upgradient from the limit of the waste management area. This well is 148 feet deep and sufficient to yield samples that are:

- a. representative of background groundwater quality in the uppermost aquifer near the facility; and
- b. not affected by the facility.

2. There are 16 monitoring wells installed hydraulically downgradient at the limit of the waste management area. Monitoring wells 2-66 and 3-66 are 146 feet and 153 feet deep respectively. The remaining 14 monitoring wells are less than 50 feet deep. Their number, locations and depths ensure detection of any statistically significant amounts of hazardous waste or hazardous waste constituents that could migrate from the waste management area to the uppermost aquifer.

B. The Rocky Flats Plant has three surface impoundments-solar evaporation ponds, and two series of holding ponds. These surface impoundments are shown in Figure 1. The solar evaporation ponds are used to store process waste water containing hazardous materials. The holding ponds store laundry process water which



Legend

- Monitoring well depth greater than 30 meters
- ▲ Monitoring well depth less than 15 meters

FIGURE 1 Location of Groundwater Monitoring Wells

does not contain hazardous materials. The holding ponds are also used as emergency containment for the solar evaporation ponds. The waste management area is described by an imaginary boundary line east of monitoring wells 1-81 and 2-81. The boundary line circumscribes the three waste management components.

- C. All monitoring wells are cased in a manner that maintains the integrity of the monitoring well bore hole. Table I shows the casing diameter, type, and depth of the monitoring wells at the Rocky Flats Plant. The casings on all wells are perforated and packed with gravel or sand to enable sample collection at depths where appropriate aquifer flow zones exist. The annular space above the sampling depth is sealed with cement grout to prevent contamination of samples and the groundwater. Each well also has a weather-tight cap.

The following is a response to CFR 40 Part 265.92, sampling and analysis:

- A. The Rocky Flats Plant collects and analyzes samples from the installed groundwater monitoring system. The Rocky Flats Plant will expand and consolidate monitoring procedures necessary to constitute a groundwater sampling plan. The plan will be kept at the facility, and include procedures and techniques for:
  - 1. Sample Collection - These are outlined in Rocky Flats Plant Water Sampling Procedure EA-S-3. These procedures and techniques are in accordance with "Procedures Manual for

TABLE I. ROCKY FLATS MONITORING WELLS

<u>Rocky Flats Well No.</u>	<u>Diameter (inches)</u>	<u>Casing Type</u>	<u>Depth of Well Below Surface (feet)</u>
1-66	6	Galvanized iron	148
2-66	6	"	146
3-66	6	"	153
1-60	6	"	23
2-60	6	"	30
3-60	6	"	30
4-60	6	"	30
5-60	6	"	30
6-60	6	"	30
3-71	6	steel	30
5-71	6	steel	22
6-71	4	plastic	28
17-74	6	plastic	16
18-74	6	plastic	7
1-81	6	PVC	20
2-81	6	PVC	20
3-81	6	PVC	20

Groundwater Monitoring at Solid Waste Disposal Facilities,"  
EPA-530/SW-611, August 1977, Section 6.2.1.

2. Sample Preservation and Shipment - This will be included in the above sampling procedure. The technique will be in accordance with the recommendations under Sections 6.4 and 6.5 in EPA-530/SW-611.
  3. Analytical Procedures - This is outlined in the "Health Safety and Environment Quality Program Plan." The procedures are in accordance with the methods outlined in "Methods for Chemical Analysis of Water and Wastes," - EPA-600/4-79-020, March 1979.
  4. Chain of Custody - This will be included in Procedure EA-S-3 in accordance with the basic guidelines under Section 6.2.3 in EPA-530/SW-611.
- B. The Rocky Flats Plant will determine the concentration or value of:
1. Parameters characterizing the suitability of the groundwater as a drinking water supply, as specified in Appendix III, 40 CFR 265.
  2. Parameters establishing groundwater quality
    - a. chloride
    - b. iron
    - c. manganese
    - d. phenols
    - e. sodium
    - f. sulfate

3. Parameters used as indicators of groundwater contamination:
  - a. pH
  - b. specific conductance
  - c. total organic carbon
  - d. total organic halogen
  
- C.
  1. For all monitoring wells, the Rocky Flats Plant will establish initial background concentrations or values of all parameters specified in paragraph (B). This will be done quarterly.
  
  2. For each of the indicator parameters specified in paragraph (b)(3), at least four replicate measurements will be obtained for each sample and the initial background arithmetic mean and variance will be determined by pooling the replicate measurements for the respective parameter concentrations or values in samples obtained from upgradient wells during the first year.
  
- D. After the first year, all monitoring wells will be sampled and the samples analyzed with the following frequencies:
  1. Samples collected to indicate groundwater ~~contamination~~<sup>quality</sup> will be analyzed at least annually.
  
  2. Samples collected to indicate groundwater contamination will be analyzed at least semiannually.
  
- E. Elevation of the groundwater surface at each monitoring well will

## II. Groundwater Quality Assessment Program

In response to 40 CFR Part 265.93, Preparation, Evaluation and Response:

A. The Rocky Flats Plant has 17 groundwater monitoring wells which can be sampled to determine:

1. Whether hazardous waste or hazardous waste constituents have entered the groundwater. These groundwater monitoring wells are described in the response to Part 265.91, Groundwater Monitoring System. Three of the groundwater monitoring wells are approximately 150 feet deep. One of the 150 foot wells is located west of the Plant and the other two are located downstream of the solar evaporation ponds. The solar evaporation ponds are used to store process wastewater prior to treatment. The remaining 14 monitoring wells range from 7 to 30 feet deep and are located downstream of the solar evaporation ponds and downstream from the holding ponds. The holding ponds are used to store surface runoff, effluent from the sewage treatment plant (sanitary waste) and excess purified water from the Plant's advanced sanitary waste treatment (Reverse Osmosis) facility.

The Rocky Flats Plant routinely analyzes samples from the 17 groundwater monitoring wells. Therefore, the necessary equipment, personnel, and laboratory facilities are available to determine whether hazardous wastes have entered the groundwater.

2. The rate and extent of the migration of the hazardous waste in the groundwater. This will be determined by examining the

hydrologic and hydrogeologic relationships at the Rocky Flats Plant. The hydrology of the Rocky Flats Plant has been described in detail in a report by T. Hurr (USGS Open File Report 76-268). Combining the information in this report with field techniques, the rate and extent of the migration of the hazardous waste in the groundwater can be determined. The field techniques would include direct measurement of groundwater flow. By measuring the groundwater flow, and if necessary, drilling additional wells, any hazardous wastes that have entered the groundwater could be traced.

3. The concentrations of hazardous waste or hazardous waste constituents in the groundwater. This will be determined by sampling and analysis of water in the groundwater monitoring wells.
- B. For each indicator parameter specified in 40 CFR Part 265.92(B)(3), the Rocky Flats Plant will calculate the arithmetic mean and variance, based on at least four replicate measurements on each sample, for each well monitored in accordance with 265.92(D)(2) and compare these results with its initial background arithmetic mean.
  - C. 1. If the comparisons of indicator parameters for the upgradient well show a significant increase (or for pH a decrease) Rockwell International will submit this information to the Department of Energy (DOE) as part of the Annual Environmental Report, and call such

information to the attention of the DOE with reference to pertinent DOE orders and 40 CFR 265.94(A)(2)ii.

2. If the comparisons for down gradient wells show a significant increase (or for pH a decrease), the Rockwell International will obtain additional groundwater samples from those wells, split the samples in two, and obtain analyses of all additional samples to determine whether the significant difference was a result of laboratory error.
- D.
1. If the analyses performed under paragraph C(2) confirm a significant increase (or for pH a decrease), Rockwell International will provide written notice to the DOE within seven days of the date of such confirmation - that the Rocky Flats Plant may be affecting groundwater quality.
  2. Within 15 days after the notification under paragraph (D)(1) the Rockwell International will develop and submit to the DOE a specific plan, based on the outline required under paragraph (A) and certified by a qualified geologist or geotechnical engineer, for a groundwater quality assessment program at the Rocky Flats Plant.
  3. The plan to be submitted will specify:
    - a. The number, location, and depth of wells;
    - b. Sampling and analytical methods for those hazardous wastes or hazardous waste constituents in the Rocky Flats Plant.

- c. Evaluation procedures, including any use of previously gathered groundwater quality information; and
  - d. A schedule of implementation.
4. Rockwell International will implement the groundwater quality assessment plan which satisfies the requirements of paragraph (D)(3) and, at a minimum, determine:
  - a. The rate and extent of migration of the hazardous waste or hazardous waste constituents in the groundwater; and
  - b. The concentrations of the hazardous waste or hazardous waste constituents in the groundwater.
5. Rockwell International will make the first determination under paragraph (D)(4) as soon as technically feasible, and within 15 days after that determination, submit to the DOE a written report containing an assessment of the groundwater quality.
6. If Rockwell International determines, based on the results of the first determination under paragraph (D)(4) that no hazardous waste or hazardous waste constituents from the facility have entered the groundwater, then the indicator evaluation program will be reinstated.
7. If the Rocky Flats Plant determines, based on the first determination under paragraph (D)(4) that hazardous waste or hazardous waste constituents from the facility have entered the groundwater, then:

- a. Determinations required under (D)(4) would continue to be made on a quarterly basis.
- E. Unless the groundwater is monitored to satisfy the requirements of (D)(4), at least annually, Rockwell International will evaluate the data on groundwater surface elevations obtained under §265.92(E) to determine whether the requirements under §265.91(A) for locating wells continues to be satisfied. If the evaluation shows that §265.91(A) is no longer satisfied, Rockwell International will modify the number, location, or depth of the monitoring wells to bring the groundwater monitoring system into compliance with this requirement.

In response to 40 CFR 265.94, Recordkeeping and Reporting:

- A. Unless the groundwater is monitored to satisfy the requirements of §265.93(D)(4), Rockwell International will
  1. Keep records of the analyses required in 265.92(C) and (D), the associated groundwater surface elevations required in §265.92(E), and the evaluations required in §265.93(B) as required by the DOE.
  2. Report the following groundwater monitoring information to the DOE:
    - a. During the first year when initial background concentrations are being established for the facility: concentrations or values of the parameters listed in §265.92(B)(1) for each groundwater monitoring well within 15 days after completing

each quarterly analysis. Rockwell International will separately identify for each monitoring well any parameters whose concentration or value has been found to exceed the maximum contaminant levels listed in 40 CFR Parts 264 and 265, Appendix III.

- b. Annually: concentrations or values of the parameters listed in §265.92(B)(3) for each groundwater monitoring well, along with the required evaluations for these parameters under §265.93(B). The Rocky Flats Plant will identify any significant differences from initial background found in the upgradient wells, in accordance with §265.93(C)(1). This information will be submitted to the DOE as part of the Annual Environmental Monitoring Report.
- c. As a part of the annual report required by DOE Order 5484, results of the evaluation of groundwater surface elevations under §265.93(f), and a description of the response to that evaluation, where applicable.

- B. If the groundwater is monitored to satisfy the requirements of §265.93(D)(4), the Rocky Flats Plant will:
  1. Keep records of the analyses and evaluations specified in the plan, which satisfies the requirements of §265.93(D)\*3).
  2. Annually, Rockwell International will submit to the DOE a report containing the results of the groundwater quality assessment program which includes, but is not limited to, the calculated (or measured)

rate of migration of hazardous waste or hazardous waste constituents in the groundwater during the reporting period. This report will be submitted as part of the annual report required under DOE Order 5484.