

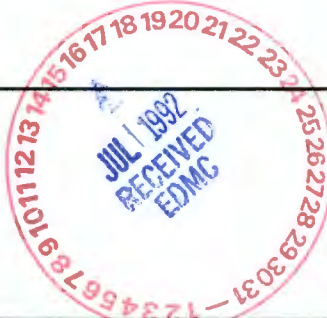
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7. Abstract

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- 1 Observed Hydraulic Head Measurements of the Rattlesnake Ridge Interbed, Hanford Site

1.0 INTRODUCTION

A potentiometric map of the Rattlesnake Ridge Interbed, Figure 1, was prepared to support the 200 Aggregate Area Management Study. The Rattlesnake Ridge Interbed is areally extensive beneath the Hanford Site and surrounding area. The interbed occurs within the Ellensburg Formation of the Saddle Mountains Basalt. On the Hanford Site, the Rattlesnake Ridge Interbed is considered the uppermost confined aquifer within the Columbia River Basalt Group (DOE, 1988).

The potentiometric map of the Rattlesnake Ridge Interbed was constructed from head data summarized in Table 1. This table contains the most complete and available set of data points taken in the Rattlesnake Ridge Interbed on the Hanford Site.

2.0 DISCUSSIONS

Figure 1 shows the potentiometric map and inferred groundwater flow directions, based on observed hydraulic heads, for the Rattlesnake Ridge Interbed. In general, the inferred pattern depicted in Figure 1 is believed to be representative of groundwater flow for aquifer within the upper Saddle Mountains Basalt. The map was constructed from available hydraulic head data measured in December 1986 and January 1987 at 15 monitoring wells on the Hanford Site. Other hydraulic head values were available from 10 test boreholes drilled over a period of about 20 years. Although these values represent a short monitoring period to establish static conditions and were obtained over a span of several years, they are useful in interpreting areal groundwater flow direction in the Rattlesnake Ridge Interbed where the availability of long-term monitoring is limited.

Observed hydraulic heads can be appropriately used to infer groundwater direction for the Rattlesnake Ridge Interbed without converting to fresh water heads. Spane and Mercer (1985) showed that only minor head corrections are required for depths of less than 650 m (2,130 ft) for selected horizons on the Hanford Site. In the case of the Rattlesnake Ridge Interbed, which occurs at depths of less than 244 m (800 ft) for observations wells shown in Figure 1, the head error caused by fluid-density variations is less than 1 cm (0.4 in.).

Salient features shown in Figure 1 are:

- o An inferred northerly to easterly groundwater flow direction within most of the 200 West area (south of Umtanum Ridge-Gable Butte).

- o An inferred northwesterly flow direction in the area between 200 East Area and Gable Mountain (Graham et al., 1983, p. 62; Schatz and Green 1986, p.4).
- o The presence of a localized hydraulic head low in the Umtanum Ridge-Gable Mountain area.
- o An arcuate shaped recharge mound in the central part of the 200 West Area.
- o The dominant line-sink (potential discharge) area appears to be along a broad region bordering the Columbia River. This poorly defined discharge area appears to be several miles wide and does not always correspond to the existing Columbia River channel.

Since 1986 several wells in the vicinity of B-Pond have been routinely monitored for heads in the Rattlesnake Ridge Interbed on a semiannual to annual basis. Comparison of heads measured in 1986 and 1991 for wells 299-E33-12, 699-E-47-50, and 699-49-55B indicate a head decline of about 0.7 m (2.3 ft) over that period of time. This area of head decline does not affect the overall flow directions depicted on Figure 1. The reasons for the head decline are not known, but could be related to seasonal changes or related to recent reductions in volumes of effluent discharge to the soil column in the vicinity of B-Pond. Further studies are needed to fully understand the inter-aquifer communication between the Rattlesnake Ridge Interbed and the unconfined aquifer system and impacts of waste management activities on these aquifer systems.

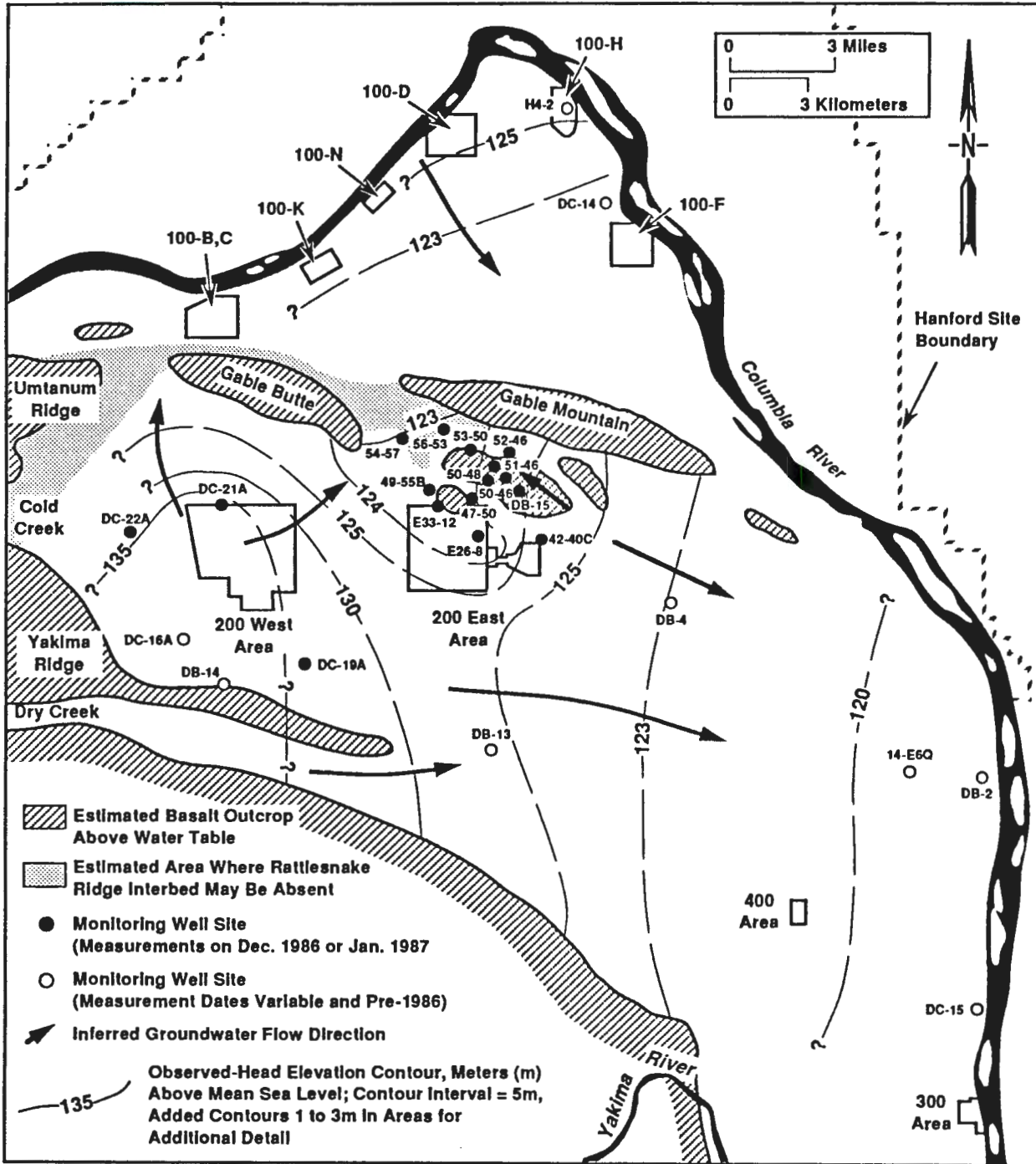
Examination of the Rattlesnake Ridge Interbed potentiometric map and the unconfined water table map reported in Schatz and Green (1986) suggests the following:

- o The potential for groundwater to recharge the Rattlesnake Ridge Interbed from the unconfined aquifer exists in the 200 West Area and in the vicinity of B-Pond. In these areas the hydraulic head gradient is downward.
- o The potential for groundwater discharge for the Rattlesnake Ridge Interbed into the unconfined aquifer exists east of the 200 West, east of B-Pond, and north of Umtanum-Ridge-Gable Mountain. In these areas, the hydraulic head gradient is upward.

3.0 RECOMMENDATIONS

Based on this preliminary report, the following recommendations are suggested:

- o Potentiometric maps of the Rattlesnake Ridge Interbed for the Hanford Site should be prepared on at least an annual basis. The map would serve as baseline input to various DOE environmental programs, e.g. CERCLA, RCRA, and operational.
- o Additional monitoring wells may need to be drilled in the Rattlesnake Ridge Interbed in the areas north of Gable-Butte and Gable Mountain, in the 200 West Area, and east and southeast of the 200 East Area to better delineate areal groundwater flow direction. Little head data in the Rattlesnake Ridge Interbed is available in these areas.



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Figure 1. Potentiometric Map of the Rattlesnake Ridge Interbed, Hanford Site.

Table. 1 Observed Hydraulic Head Measurements of the Rattlesnake Ridge Interbed, Hanford Site.

BOREHOLE	OBSERVED HYDRAULIC HEAD above mean sea level, (m)	DATE OF MEASUREMENT	STATUS	SOURCE
DB-2 (699-15-E13)	117	1974	INACTIVE	FENNIX AND SCISSON, 1974
DB-4 (699-35-27)	123	1974	INACTIVE	FENNIX AND SCISSON, 1974
DB-13 (699-17-47)	127	1978	INACTIVE	GEPHART ET AL., 1979
DB-14 (699-25-80)	137	SEPT 1978	INACTIVE	SPANE ET AL., 1980
DB-15 (699-47-42)	125	APR 1979	DESTROYED	STRAIT AND BROWN, 1983
DC-14 (699-84-34B)	122	JAN 1980	DESTROYED	STRAIT AND MERCER, 1987
DC-15 (699-S16-E14)	117	JAN 1980	DESTROYED	STRAIT AND MERCER, 1987
DC-16A (699-31-84A)	137	SEPT 1981	DESTROYED	STRAIT AND MERCER, 1987
DC-19A (699-29-70A)	134.6	JAN 1987	ACTIVE	HEIS
DC-20A (699-47-80A)	135.4	JAN 1987	ACTIVE	HEIS
DC-22A (699-43-91A)	134.7	JAN 1987	ACTIVE	HEIS
299-E26-8	123.8	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
299-E33-12	123.7	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
299-E33-12	123.1	DEC 1991	ACTIVE	HEIS
699-42-40C	126.5	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
699-47-50	124.3	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
699-47-50	123.2	DEC 1991	ACTIVE	HEIS
699-49-55B	123.5	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
699-49-55B	122.6	DEC 1991	ACTIVE	HEIS
699-50-48	124.8	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
699-51-46	124.4	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
699-52-46A	124.8	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
699-52-48	124.1	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
699-53-50	123.9	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
699-54-57	123.3	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
699-56-53	123.4	DEC 1986	ACTIVE	SCHATZ AND GREEN, 1986
699-14-E6Q	119	1969	INACTIVE	GEPHART ET AL., 1979
199-H4-2	126	1968	INACTIVE	GEPHART ET AL., 1979

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