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## Atlantic Richfield Hanford Company

RICHLAND, WASHINGTON

## TITLE AND AUTHOR

Migration of Contaminated Groundwater Offsite

L. M. Richards

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This document classified by:  
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Manager - Advanced Technology Development

MIGRATION OF CONTAMINATED GROUNDWATER OFFSITE

L. M. Richards

June 7, 1973

Operated for the Atomic Energy Commission by  
Atlantic Richfield Hanford Company under Contract AT(45-1)-2130

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June 7, 1973

U. S. Atomic Energy Commission  
Richland Operations Office  
Richland, Washington 99352

Attention: Mr. O. J. Elgert, Director  
Production and Waste Management  
Programs Division

Subject: MIGRATION OF CONTAMINATED GROUNDWATER OFFSITE  
Contract AT(45-1)-2130

Reference: BNWL-CC-1800 83 (declassified with deletions),  
June 16, 1972, F. P. Brauer and H. G. Rieck, Jr.,  
"Radiochemical Analyses of Hanford Well-Water  
Samples"

Gentlemen:

In 1971 the Atlantic Richfield Hanford Company initiated a study to determine radionuclide concentrations in the groundwater near the eastern perimeter of the Hanford reservation using high sensitivity gamma-ray spectrometry and iodine activation analysis techniques. With the aid of these analytical methods, it was possible to determine radionuclide concentrations several orders of magnitude below the routine detection limit used to delineate the extent of contaminated groundwater movement beneath the Hanford reservation. The intent of this study was to provide ARHCO and the Atomic Energy Commission-Richland Operations Office with additional insight into the ultimate fate of nuclides moving eastward with the groundwater toward the Columbia River. It was felt that in the event some unusual flow pattern should be identified by these data there would be sufficient lead time to correct the situation before radioactive materials would enter a potable water supply.

The reference report was released in December of 1972 after a lengthy review of the data by the Department of Defense. The results of the first sampling, together with data acquired earlier under a DOD program, were included in the report. A cursory evaluation of the published data indicated a strong possibility that

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radioactivity from the 200 Areas operations may be entering certain confined aquifers in the vicinity of the 200 East Area and may be moving eastward beneath the Columbia River into water supply wells drilled on the Columbia Irrigation Project. Farm wells near the Columbia River on the Columbia Irrigation Project tap up to six confined aquifers in the basalt bedrock. Data from some of these wells indicate radionuclide concentrations are slightly above concentrations in Hanford rainwater and in the Columbia River. It is possible that only one of these aquifers is contaminated and that the low concentrations in the farm wells is simply due to mixing of the groundwater from more than one aquifer. It would likewise be possible that a farm well could tap this single aquifer as a source of drinking water. To evaluate these possible situations, the study was expanded to include core drilling, testing and sampling the aquifers underlying the Hanford reservation and those east of the Hanford reservation near the Columbia River.

On February 8, 1973, you and Mr. P. G. Holsted, Director, Environmental, Safety and Technical Services Division, were appraised of the status of this study. As a result of this discussion it was decided that until further information is obtained on the possible source of the groundwater contamination and its possible biological hazard, all information should be limited to those individuals in ARHCO, AEC-RL, and Battelle-Northwest who have a need to know. The study presented in the February 8 meeting is described below.

- ° Drill five test holes as follows: three near the eastern perimeter of the Hanford reservation, one of which will be located on the east bank of the Columbia River; one near the 200 East Area; and, one midway between the Columbia River and the 200 East Area. These test holes will be cored to identify confined aquifers, tested to determine the hydraulic potential of the aquifer, and pumped to obtain a representative water sample.

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- ° Groundwater samples from each of the aquifers will be analyzed to determine the concentration of radionuclides present.
- ° An evaluation will be made of the data including any possible biological hazard that may be realistically postulated from the data.
- ° It is anticipated that the drilling will require approximately 150 days from the time drilling begins. Analysis of the groundwater samples will require an additional three months after completion of the drilling. Evaluation of the data will take approximately two months from the time all analytical data are received. This includes the time required to document the results of this study.

- ° Estimated costs for this study are as follows:

Core Drilling, Pumping and Testing	\$120 000
Analysis	40 000
Service of Drilling Engineer*	25 000
Evaluation	<u>15 000</u>
	<u>\$200 000</u>

\*Because of the limited manpower available, ARHCO requests your assistance in obtaining the services of Mr. C. T. Webster, Fenix and Scisson, Inc., who is currently working at the Nevada Test Site. Mr. Webster is an expert drilling engineer familiar with coring basalt rock on the Hanford reservation. Mr. Webster's service would be required during drilling, testing and pumping of the test holes and for a period of three weeks to document the work following completion of the test holes.

Atlantic Richfield Hanford Company will continue this study on a relatively high priority with the 216-Z-9, 216-Z-1A, and tank farm characterization work taking

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precedence over it. If you have any questions regarding the priority of the work to be accomplished, please let me know and we will be pleased to discuss the matter with you.

Very truly yours,

ORIGINAL SIGNED BY  
L. M. RICHARDS

L. M. Richards  
President

LMR:DJB:jmh