

October 10, 1997

MEMORANDUM TO:

Michael J. Bell, Acting Chief  
Performance Assessment and HLW  
Integration Branch, DWM

THROUGH:

Keith I. McConnell, Section Leader [Original signed by:]  
Performance Assessment and Integration Section  
Performance Assessment and HLW  
Integration Branch, DWM

FROM:

Mark Thaggard, Senior Systems Performance Analyst [Original signed by:]  
Performance Assessment and Integration Section  
Performance Assessment and HLW  
Integration Branch, DWM

SUBJECT:

TRIP REPORT - SCOPING WORK ON BROOKHAVEN NATIONAL  
LABORATORY TRITIUM PLUME ASSESSMENT

On August 22, 1997, I made a trip to the Brookhaven National Laboratory (BNL) in response to a request from John Austin (DOE Oversight Task Force). Specifically, I was asked to review the available information on the tritium plume as an initial scoping effort to analyzing the potential hazard to the public. The attached report provides an overview of my trip. BNL is still working to definitively identify the source of the plume and delineate the plume dimension; however, there appears to be adequate information available to support a safety assessment.

If you have any questions about the enclosed information, please let me know.

Attachment: As stated

Contact: Mark Thaggard, DWM/PAHL  
415-6718

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PAHL r/f w/att

~~XXXXXXXXXX~~ *Ham*

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**TRIP REPORT - AUGUST 22, 1997 TRIP TO  
BROOKHAVEN NATIONAL LABORATORY  
REVIEW OF BROOKHAVEN NATIONAL LABORATORY TRITIUM PLUME**

The U.S. Department of Energy (DOE) has been working since January 1997 to identify the source of the tritium plume and delineate the extent of tritium contamination. Based upon leak-rate estimates and ground-water contaminant concentrations, DOE believes that the source is the spent-fuel pool, within the high-flux beam reactor (HFBR). DOE has developed two reports on the source identification. A third report was under development during my visit. The tritium is believed to be entering the underlying ground water at the rate of  $1 \times 10^{-3}$  curies per day.

There are still some uncertainties as to whether the spent-fuel pool is the source or only source of the contamination. Two horizontal wells constructed underneath the HFBR building provided inconclusive data. The horizontal well up gradient (north) of the spent-fuel pool had higher ground-water concentrations than the down-gradient (south) well. DOE believes that samples from the down-gradient well were taken at a deeper depth than samples taken from the up-gradient well; therefore, the down-gradient well may be sampling below the plume. They are planning to resample the down-gradient well when the water table drops in the fall. If the spent-fuel pool is indeed the source, ground-water concentrations in the down-gradient well should increase significantly as the water table falls (i.e., as the plume intersects the well).

DOE has installed more than 30 geoprobes and nearly 100 temporary vertical profile wells to delineate the extent of the contamination. Vertical samples were taken at 1.5-3.0 meter (5-10 foot) intervals to delineate the vertical extent of contamination. Maps were provided showing the horizontal and vertical delineation of the plume (attached). The plume is believed to have been occurring for 12 years, and is moving to the south at the rate of 0.23 meters/day (0.75 feet/day). The plume extends roughly 1228 meters (4030 feet) to the south of the HFBR building and 900 meters (2900 feet) north of the southern boundary of the BNL site. The plume dips roughly 0.03 feet/foot in response to recharge to the shallow, unconsolidated aquifer. Near Weaver Drive, parts of the plume occur at a deeper depth than the remaining part of the plume. DOE plans to collect additional samples in this area to help explain the anomaly. They believe that this may be part of a plume from another source (north of the HFBR). The highest tritium concentration has been measured at a depth of roughly 1.5 meters (5 feet), in a geoprobe (GP-33), immediately south of the HFBR building. Tritium concentrations have been measured as high as 700,000 pCi/l.

As an interim remediation measure, DOE has installed a series of wells along the leading edge of the plume (near Princeton Avenue). Contaminated ground water is pumped to a recharge basin to the northeast. The concentration of the tritium at the leading edge of the plume is nearly at the primary drinking water standard (i.e., 20,000 pCi/L).

Geraghty and Miller, Inc., consultants to DOE, is modeling the ground-water system by refining a regional MODFLOW model. This model will evaluate the effects of local pumpage and recharge on ground-water flow. DOE believes that the modeling will ultimately show that if the tritium is not recovered, it will reach concentrations at the site boundary below the primary drinking water standard. Even if the tritium contamination extends beyond the site boundary in the future, DOE believes that no one will be affected because all houses in the subdivision immediately south of

the facility are on the public water system.

Fuel assemblies are currently being removed from the spent-fuel pool, for transport to the Savannah River Plant. Once all of the fuel assemblies have been removed, the pool will be drained and a new liner installed.

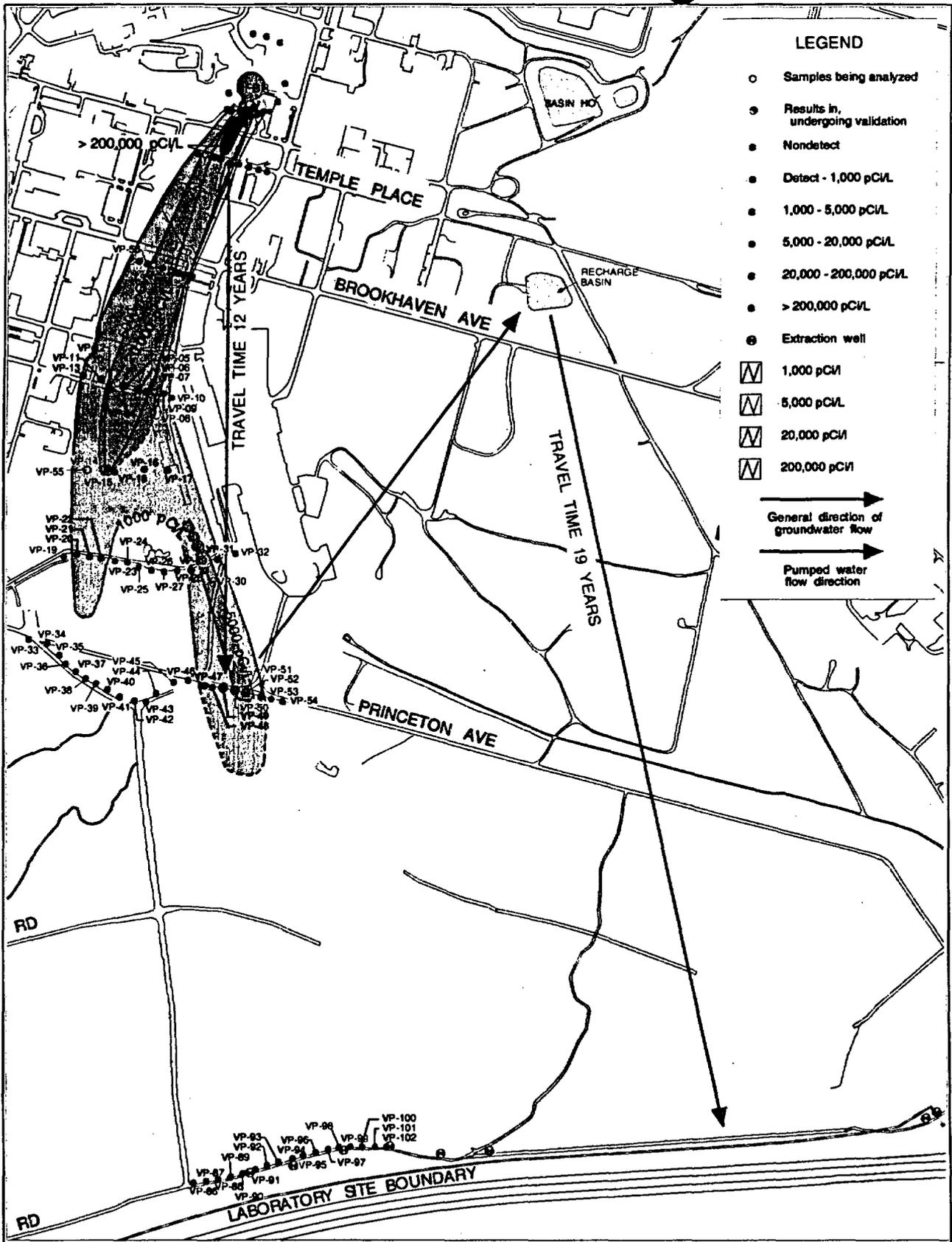
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**Mike Butler, Project Manager (516) 344-3430**

**William Gunther, Manager, Office of Environmental Restoration (516) 344-7961**

**Douglas Paquette, Hydrogeologist**



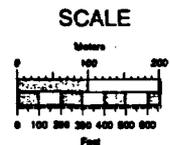
OFFICE OF ENVIRONMENTAL RESTORATION  
 OER Map Index No. 2010, Rev. 12a

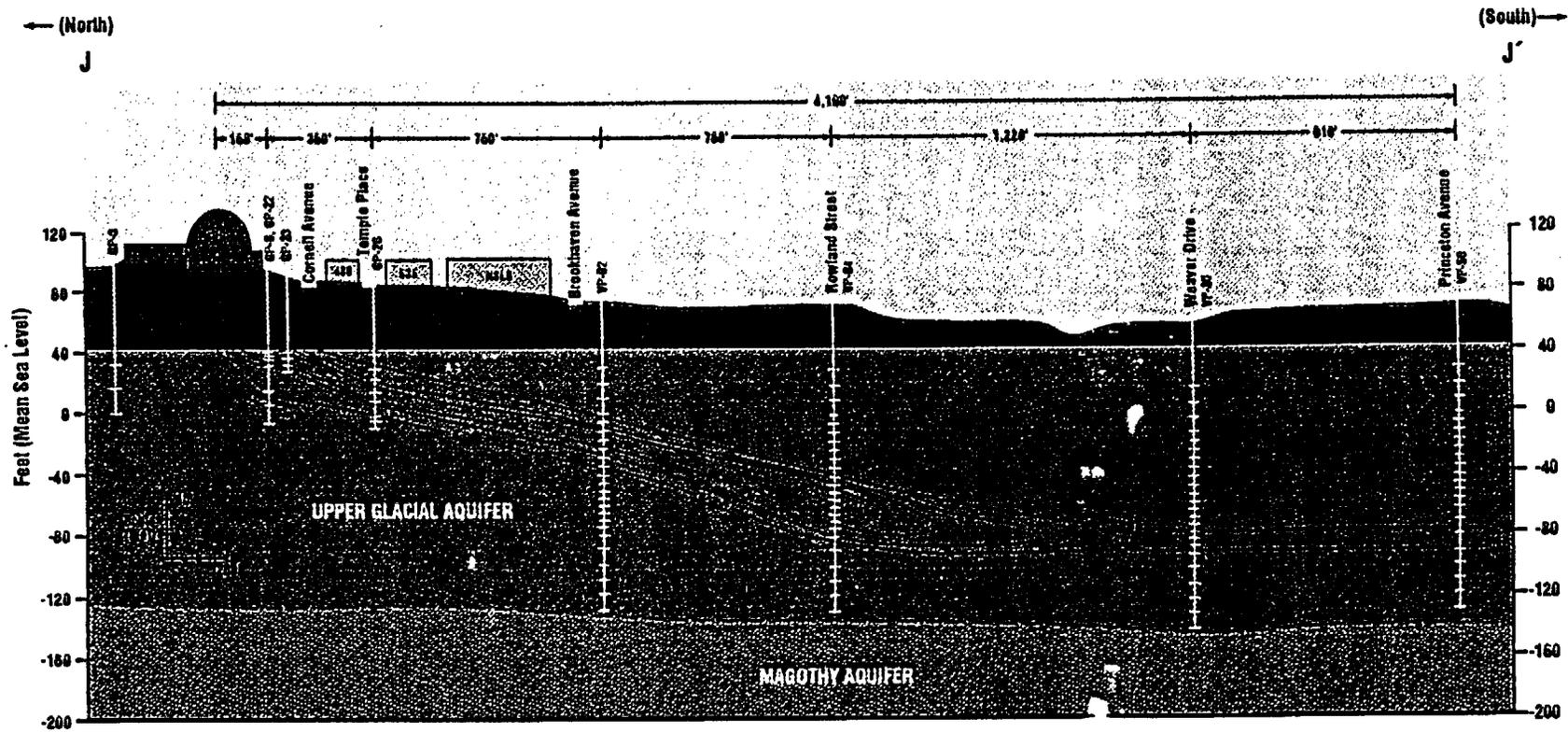
**HFBR TRITIUM  
 PLUME CHARACTERIZATION  
 STATUS OF  
 DRILLING, SAMPLING, AND ANALYSIS**

BROOKHAVEN NATIONAL LABORATORY

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JULY 11, 1997





CROSS SECTION J-J'  
TRITIUM (pCi/L)



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

WASHINGTON, D.C. 20555-0001

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