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# **Brookhaven National Laboratory Water Treatment Plant Recharge Basin Area**

**Facility Environmental Monitoring Report  
Calendar Year 2000**



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**Brookhaven National Laboratory  
Water Treatment Plant Recharge Basins  
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*Summary of Results: Routine monitoring of Water Treatment Plant discharges to Recharge Basin HX indicate that backwashed water from the plant's filters contains mostly insoluble iron. Furthermore, analysis of groundwater samples indicates that routine discharges of the backwash water to Basin HX have not impacted groundwater quality*

## **Background**

The BNL Water Treatment Plant (WTP) is designed to remove naturally occurring iron from groundwater pumped from drinking water supply wells 4, 6 and 7. The WTP uses a conventional lime softening process for iron removal with air stripping for volatile organic compound removal. Precipitated iron is removed using multi-media (sand and anthracite coal) filters, which require routine backwashing. When the plant is in full operation, the filters are backwashed one to two times a day. The effluent from this backwash process is discharged into Recharge Basin HX, located adjacent to the plant. (Note Basin HX is divided into east and west sections that are separated by a sand berm.) The majority of the water percolates through the sand below the basin, but an iron residue is left at the bottom of the basins. Typically over several years of use, the iron residue builds up to an extent that prevents proper percolation of the backwash water, and creating a potential overflow condition. To restore proper percolation, the iron residue is periodically scraped off the basin floors.

Discharges of the STP backwash water to the basins are monitored as part of BNL's State Pollutant Discharge Elimination System (SPDES) program (SPDES Outfall 007). Because the discharges typically have iron concentrations in excess of the State discharge limit to groundwater of 0.6 mg/L, the New York State Department of Environmental Conservation (NYSDEC) has required BNL to determine whether the backwash effluent has a detrimental effect on groundwater quality before a variance could be issued. In 1992, BNL installed five monitoring wells. These wells have been routinely monitored since that time. Additionally, the SPDES permit requires that samples of the backwash water be collected monthly, and analyzed for soluble and insoluble iron

## **Environmental Monitoring Program**

In response to a 1992 request by the NYSDEC, BNL established a groundwater monitoring program at the Water Treatment Plant to evaluate potential impacts from plant discharges to nearby recharge basins. Water Plant discharges to the recharge basins are monitored as part of BNL's SPDES program. The groundwater and SPDES monitoring programs for the Water Treatment Plant recharge basins are described in the BNL Environmental Monitoring Plan (Daum *et al.* 2000; BNL, 2001).

## **Monitoring Results**

### **SPDES Monitoring**

To determine if the discharge of iron-sludge generated from the lime-softening process would potentially impact groundwater quality, the backwash water from the WTP sand filters is monitored monthly for dissolved and suspended iron. As required by the SPDES permit, six months of operational data must be collected to permit the NYSDEC opportunity to assess any potential the impacts to groundwater quality. However, due to the infrequent use of the WTP from 1995 to 2000, samples of filter backwash water were not collected on a routine basis. In April 2000, water treatment operations at the plant became more routine when the Laboratory switched to supply wells 4, 6 and 7 to obtain most of the water (~85%) needed for daily consumption. Analytical results of backwash samples have been reported monthly since April 2000. Review of the analytical results for the backwash samples reported in the Discharge Monitoring Reports for 2000 showed the total concentration of iron to be as high as 375 mg/L. The dissolved fraction accounted for approximately 1.0 mg/L of this total. In accordance with the BNL SPDES permit, the NYSDEC will review the operational data to determine future monitoring requirements and establish effluent limits for this discharge. Monitoring of the discharges to Basin HX will continue at its current monthly rate until the NYSDEC reaches a decision regarding future monitoring requirements.

### **Groundwater Monitoring**

The groundwater monitoring wells in the WTP's recharge basin area were sampled in June 2000. Analytical results indicate that anions and metals (including iron) concentrations were below the applicable New York State Ambient Water Quality Standards (NYS AWQS) and were consistent with established background levels for Long Island (Tables 1 and 2). Since the beginning of the groundwater monitoring program in 1992, iron has rarely been detected above the typical detection limit of 0.075 mg/L in groundwater near Basin HX, and has never exceeded the 0.3 mg/L water quality standard.

## **Future Monitoring Actions**

The following actions are recommended for the CY 2001 monitoring period:

- With NYSDEC concurrence, end the routine groundwater monitoring program for the WTP area. Maintain the wells for potential future use.
- Continue monitoring WTP discharges to the recharge basins in accordance with the SPDES permit.

## **References**

BNL, 2001. Brookhaven National Laboratory Environmental Monitoring Plan, CY 2001 Update (January 2001). BNL-52584 Update.

Daum, M., Dorsch, W., Fry, J., Green, T., Lee, R., Naidu, J., Paquette, D., Scarpitta, S., and Schroeder, G., 2000. Brookhaven National Laboratory, Environmental Monitoring Plan 2000 (March 31, 2000).

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 Water Quality Results for CY 2000**

**Table 1**

<b>Well</b>	<b>Sample Period</b>	<b>Chlorides (mg/L)</b>	<b>Sulfates (mg/L)</b>	<b>Nitrate (mg/L)</b>
063-01(a)	June	19.5	12.8	<1.0
063-02 (a)	June	16.8	11.7	<1.0
063-03	June	18.3	10.2	<1.0
073-01	June	18.5	10.6	<1.0
073-02	June	18.7	10.3	<1.0
Typical MDL		4.0	4.0	1.0
NYSAWQS		250	250	10

(a): Well is located upgradient of the recharge basins.

MDL: Minimum Detection Limit

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Metals Analytical Results for CY 2000  
Table 2**

Well	Sample Period	Ag (mg/L)	Al (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	Fe (mg/L)	Hg (mg/L)	Mn (mg/L)	Na (mg/L)	Pb (mg/L)	Zn (mg/L)
063-01(a)	June	<0.001	0.009	<0.001	0.002	0.023	<0.075	<0.0002	0.002	17.2	<0.0013	0.004
063-02 (a)	June	<0.001	0.017	<0.001	0.002	0.008	<0.075	0.0003	<0.002	11.2	<0.0013	0.005
063-03	June	<0.001	0.007	<0.001	0.002	0.002	<0.075	<0.0002	<0.002	13.2	<0.0013	0.007
073-01	June	<0.001	0.008	<0.001	0.002	<0.002	<0.075	<0.0002	<0.002	13.7	<0.0013	<0.004
073-02	June	<0.001	0.013 J	<0.001	0.002	0.007	<0.075	<0.0002	<0.002	13.1	<0.0013	0.006
Typical MDL		0.001	0.002	0.001	0.001	0.002	0.075	0.0002	0.002	1.0	0.001	0.004
NYSAWQS		0.05	0.1	0.01	0.05	0.2	0.3	0.0007	0.3	20	0.025	0.3

(a): Well is located immediately upgradient of the recharge basins.

Note: Primary potential contaminants shown. Other metals were analyzed for – see database for complete data set

MDL: Minimum Detection Limit

NA: Not analyzed for.

J: Estimated value.

