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Brookhaven National Laboratory Water Treatment Plant Recharge Basin Area

**Facility Environmental Monitoring Report
Calendar Year 2001**



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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 in the Water Treatment Plant area.

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.

Until February 2002, discharges of the WTP backwash water to the basins were 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) had also 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 had required 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. Until February 2002, Water Treatment Plant discharges to the recharge basins were 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 was monitored monthly for dissolved and suspended iron. In the mid 1990s, BNL attempted to collect six months of operational data to demonstrate to the NYSDEC that discharges to Basin HX were not impacting 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 2001 showed the total concentration of iron to be as high as 624 mg/L. The dissolved fraction accounted for approximately 1.8 mg/L of this total.

Based upon a review of the discharge monitoring data, in February 2002 the NYSDEC agreed to discontinue the requirements for monitoring iron levels in the discharges to Basin HX (NYSDEC, 2002). BNL will continue to monitor flow and pH levels on a monthly basis.

Groundwater Monitoring

The groundwater monitoring wells in the WTP's recharge basin area were sampled in June 2001. 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 will occur during CY 2002:

- Based upon BNL's updated SPDES permit, BNL will discontinue monitoring iron levels in WTP discharges to Basin HX starting in February 2002.
- Concurrent with the termination of monitoring iron levels in WTP discharges to Basin HX, BNL will discontinue the collection of groundwater samples from wells located near the basin. BNL will maintain the wells for the collection of water level measurements and for potential future collection of water samples to periodically verify water quality.

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). BNL-52584.

NYSDEC, 2002. Letter from M.C. Carrara (NYSDEC) to M. Holland (USDOE) titled: NYSDEC Permit #1-4722-00032/00072; SPDES Facility #NY-0005835. Dated February 8, 2002.

**BNL Facility Environmental Monitoring Report
Water Treatment Plant Recharge Basin Area
Groundwater Monitoring Program
Water Quality Results for CY 2001**

Table 1

Well	Sample Period	Chlorides (mg/L)	Sulfates (mg/L)	Nitrate (mg/L)
063-01(a)	NS	--	--	--
063-02 (a)	NS	--	--	--
063-03	June	21.0	11.8	<1.0
073-01	June	21.7	9.4	<1.0
073-02	June	20.2	9.4	<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.

NS: Upgradient wells not sampled because background values have already been established.

**BNL Facility Environmental Report
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Metals Analytical Results for CY 2001
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)	NS	--	--	--	--	--	--	--	--	--	--	--
063-02 (a)	NS	--	--	--	--	--	--	--	--	--	--	--
063-03	June	<0.001	0.011	<0.001	<0.001	<0.002	<0.075	<0.0001	<0.002	12.5	<0.0013	<0.004
073-01	June	<0.001	0.009	<0.001	<0.001	0.006	<0.075	<0.0001	<0.002	12.8	<0.0013	<0.004
073-02	June	<0.001	0.006 J	<0.001	<0.001	<0.002	<0.075	<0.0001	<0.002	12.4	<0.0013	<0.004
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

NS: Upgradient wells not sampled because background values have already been established.

J: Estimated value.

