

**RED WATER PONDS
FOCUSED REMEDIAL INVESTIGATION**

RECOMMENDATIONS

MAY 1996

**235 PEACHTREE STREET, N.E.
NORTH TOWER, SUITE 2000
ATLANTA, GEORGIA 30303**

RED WATER PONDS FOCUSED REMEDIAL INVESTIGATION RECOMMENDATIONS

The Plum Brook Ordnance Works (PBOW) Red Water Ponds Focused Remedial Investigation included assessment of soils and groundwater in both former red water ponds areas, and assessment of surface water and sediment in the west pond at the West Area Red Water Ponds. The results of the Focused Remedial Investigation confirm that nitroaromatics are present in the soils and the groundwater in both former red water ponds areas. High levels of explosives residues were detected in both media at the Pentolite Road Red Water Ponds. Lower levels of explosives residues were detected in the soils and the overburden groundwater monitoring wells at the West Area Red Water Ponds. However, a groundwater sample from a pit excavated immediately north of the west pond contained very high levels of explosives residues indicating that higher levels of contamination may be present in portions of the aquifer where wells are not currently installed. Dames & Moore believes that the horizontal extent of contamination has been adequately delineated in the soils. The vertical extent of soil contamination has not been delineated; however, as discussed below, additional investigation of the vertical extent of soil contamination is probably not necessary.

Dames & Moore believes that the groundwater contamination at the site is a potentially much more significant concern than the soil contamination.

- Nitroaromatics levels in the surface and shallow soils in those samples where it was detected was lower than the Region III U.S. Environmental Protection Agency risk-based residential screening criteria. The elevated levels of contamination were detected in the deeper sampling intervals.
- Significant levels of nitroaromatics are present in the groundwater in the overburden in the immediate vicinity of the former ponds in both red water ponds areas. The dominant direction of groundwater flow in the overburden is likely vertically downward rather than horizontal. The fact that no nitroaromatics were detected in the overburden wells located downgradient from either red water pond area indicates that horizontal migration of contamination is probably not occurring. The results of this investigation appear to indicate that a pool of groundwater containing high levels of explosives residues is ponded on top of the bedrock in both red water ponds areas. Based on the presence of some biodegradation products in the groundwater samples, natural degradation appears to be occurring, but at a very slow rate. Movement of contaminated

groundwater into the bedrock and then offsite by horizontal flow through the bedrock is possible.

- Groundwater in the overburden at the site is very shallow and the depth to water is very seasonal. In many wells, water levels in the overburden in March 1995 were within 3 feet of the surface. At the Pentolite Road Red Water Ponds, in March 1995 the depths to water in the three overburden wells where nitroaromatics were detected were all less than about 5 feet. In the two overburden wells with the highest levels of contamination, water levels even in December 1994 were only slightly deeper than 10 feet. At the West Area Red Water Ponds, the depth to water in March 1995 in the two wells where nitroaromatics were detected was 6 feet or less. Therefore, the vertical extent of soil contamination to and into the water table appears to have been delineated.

Based on the results of this investigation, Dames & Moore does not recommend additional assessment of the soils at this time. However, additional investigation of the groundwater flow regime and groundwater quality is recommended.

Groundwater Quality

The results of the investigation indicate conclusively that nitroaromatics are present in the overburden wells in the immediate vicinities of the two red water pond areas. Elevated levels of nitrates and some metals are also present in the wells containing high levels of explosives residues. However, the investigation does not indicate conclusively that nitroaromatics are present in the bedrock aquifer. Additional sampling is necessary to evaluate groundwater quality in the bedrock.

Dames & Moore recommends that the groundwater chemistry data from this investigation be confirmed by additional sampling and laboratory analysis. Because groundwater in the overburden in some areas is present seasonally, such sampling should be scheduled for late winter or early spring when water would be expected to be present in most of the overburden wells at the site. Dames & Moore recommends that, at a minimum, two additional rounds of groundwater samples be collected with approximately 3 months between sampling events.

Groundwater Flow Regime

In order to characterize the groundwater flow regime, Dames & Moore recommends that the following activities be performed, at a minimum.

1. An additional bedrock well should be installed adjacent to overburden well DM-MW7 at the Pentolite Road Red Water Ponds. The purpose of this well is to evaluate whether nitroaromatics are migrating from the overburden into the bedrock immediately beneath the former ponds.
2. Dames & Moore recommends that an additional overburden well be installed at the West Area Red Water Ponds, on the north bank of the west pond. Red water was observed in a test pit located in this area and characterization of the groundwater quality is needed.
3. In order to evaluate the vertical component of flow between the overburden and bedrock hydrostratigraphic units, well pairs should be installed. Installation of a bedrock well near overburden well DM-MW7 at the Pentolite Road Red Water Ponds, provides one additional well pair. Dames & Moore recommends that three additional well pairs be established. A third bedrock well is recommended at TNT Area A, near overburden well DM-MW10. Low levels of explosives residues were detected in this well. A bedrock well is recommended near overburden well MK-MW17 at TNT Area B. Low levels of explosives residues were detected in this well. Dames & Moore also recommends that a fifth overburden well be installed at TNT Area C, near bedrock well BED-MW13. Low levels of nitroaromatics were detected in well BED-MW13.
4. A program of regular monthly water level measurements should be instituted at the site in order to establish seasonal variations in water table fluctuations and groundwater flow conditions.
5. If groundwater contamination of the bedrock aquifer is confirmed, aquifer testing should be performed to evaluate groundwater flow parameters in each of the hydrostratigraphic units at the site. Knowledge of the groundwater flow parameters is necessary for further assessment of the direction and rate (both horizontal and vertical) of groundwater movement. This assessment will be necessary to adequately evaluate potential remediation methods.