RECOMMENDED POST-REMEDIAL CONSTRUCTION GROUNDWATER MONITORING

Two different groundwater remediation systems have been constructed at Freeman's Saukville, Wisconsin site. The Ranney Collection System is designed to withdraw polluted groundwater from the shallow glacial sediments for subsequent treatment and to prevent further migration of wastes off-site via either lateral flow through the sediments or vertical seepage to the underlying silurian dolomite. The Ranney System consists of 3 central caissons serving a total of 2,350 linear feet of collections systems plus 7 shallow scavanger wells. Groundwater pollution remediation of the dolomite aquifer will be accomplished by reversing the direction of groundwater flow from off-site to back to the site where it can be treated. Groundwater will be withdrawn from the deeper part of the Dolomite aquifer by a 557 foot high capacity well and from its shallow, fractured, and solutioned upper surface by 4 shallow dolomite wells.

Hatcher Incorporated carefully reviewed the existing hydrological data base, the current groundwater quality records, the placement of remedial groundwater clean-up systems, and the monitoring proposed by WDNR (p. 10, items 8 & 9) in the May 12, 1986 letter to Freeman Chemical Corporation. Also, we are aware of the recommendations in the DRAFT "ADMINISTRATIVE ORDER ON CONCENT" currently being reviewed by USEPA, particularly items VI(3), (11), and (12). Based on all of the above, we have developed this proposal for a long term groundwater monitoring program for Freeman Chemical Corporation's Saukville site. The essence of the plan is to:

1. Verify the performance of the hydrological modifications expected of the various dewatering systems.

2. Quantify the changes in groundwater quality.

3. Indicate any potential problems, in particular, appearance on increase in VOC's (or odor) in unexpected locations.

Specifically, Hatcher Incorporated recommends that groundwater remediation progress be monitored at this site by:

1. Determining chemical load removed by determining VOC's and odor in the central sumps of each of the three Ranney Collections Systems, the four pumped shallow dolomite scavanging wells, and the deep dolomite cooling water well, within 15 days of March 15, June 15, September 15, and December 15 each year until the end of the program.

Numbers of the pumped shallow dolomite wells.

WL
City Wells 1-4
Freeman Cooling Well (W-30)
Laubenstein
Shallow Dolomite Wells:
exist { P-7, W-23, W-25, W-22 } DB, DA new; PW-3, W-16A reconst.

2. Monitoring extent, rate of spread, and interference of drawdown cones of influence of pumping dolomite wells through quarterly water level measurements in the four deep Village wells, the new Freeman cooling well, the old Laubenstein well, and 8 (4 existing, 2 reconstructed, and 2 new) shallow dolomite observation wells. See Figure 1 for proposed well locations and Figure 2 for locations of village wells.

all of above would be monitored quarterly for VOCs except City Wells 3 + 4, + DB

WL
16 wells

3. Monitoring effective area of influence of the Ranney Collection Systems through quarterly measurements in 8 existing and 8 new small diameter shallow wells.

Detailed report - DB (Clogman) suggested PW-3A not mentioned

4. Monitoring shallow dolomite plume regression through quarterly sampling of existing wells W-7, W-23, W-25, and W-22; reconstructed wells 16A and PW-3A; and a new shallow dolomite well (DA) at the tank farm.

5. Monitoring deep dolomite plume cleanup through VOC and odor analyses of Village wells 1 and 2 and the Laubenstein well. Samples will be collected yearly, ?

until the end of the program, within 15 days of March 15, June 15, September 15, and December 15.

6. Monitoring shallow glaciofulvial groundwater cleanup through quarterly sampling of existing wells 4A, 14A, and 7 new shallow wells as indicated on Table 1, shown on Figure 1 and as described below.

Water quality of wells

We propose not to sample on any periodic basis those wells in very polluted areas such as at 6A, SC (tankfarm) and at SF (near W-21A), and some wells which are upgradient of the polluted area or have never shown any evidence of past pollution or are not in the aquifer of interest (such as W-20).

27 6A SC 5D 51 should be monitored

do propose this in Table 1.

Monitoring Well System Description and Justification

Dolomite Aquifer

This aquifer will undergo remediation by withdrawing water from a high production 557 foot cooling water well and four shallow dolomite wells open to the upper 30 to 90 feet of the weathered zone.

For the most part, adequate shallow dolomite wells already exist for monitoring progress of cleanup of the top of the dolomite aquifer using:

1. W-23 on the south side of the property.
2. P-7 on the east side.
3. W-22 on the northwest side.
4. W-25 to the northeast but far off-site.

Three additional small diameter wells open to the top of the dolomite are needed at:

DB 1. The vicinity of the Logamann Building. This well is especially needed because there are no monitoring wells in the dolomite on the southwest side of the site.

16A 2. The Catholic School at the location of P-16. A reconstruction of P-16 was authorized last summer but never accomplished because of the wetness of the ballfield.

DA 3. The tank farm complex to monitor remediation progress at the point where the dolomite has been found to be the shallowest and which is a probable major pollutant entry point.

+ PW-3A

Remediation progress for the deeper part of the dolomite aquifer can be adequately monitored through periodic sampling of municipal Wells 1, 2, and PW-8.

Shallow Glaciofluvial Overburden

Wells shown on Figure 1 and listed on Table 1 have been carefully chosen to give the best combination of monitoring of hydraulic and chemical changes in the vicinity of the Ranney collectors.

RC-1

1. Existing Well 8 on the east side of collector which is also downgradient of tanker parking.
2. A new shallow well (SH) at the existing location 16 (Catholic School), on the west side of this collector to monitor water quality at the ballfield.
3. Existing Well 4A on the southeast side for background water quality reference.
4. A new shallow well (SE) on the southwest edge of this collector between Legs AC and AB and east of Building 45A.

5. A new shallow well (SD) on the south side of RC-1, between legs AD and AC and downgradient of the tank farm.

RC-2

1. Existing Well 14A on the northwest end.
2. Existing Wells 6A, 19A, and 27 at the north end and side.
3. A new shallow well (SA) on the east edge of the loading dock to monitor between wells 14A and 6A.
4. A new well (SI) on the east side and between RC-2 and RC-1.

RC-3

1. Existing Well 1A on the extreme north end of the property for water level only.
2. A new shallow well (SB) on the west side of RC-3 located at the south end of the Scale building to monitor water quality between Legs AGH and ACDE.
3. A new shallow well (SG) to the north near the present incinerator to monitor between Legs AG and AI, the Tanker Parking area, and the ballfield.
4. A new shallow well (SF) on the south side of RC-3 at the location of W-21 to monitor between Legs AC and AB of RC-3 and Legs AF and AGH of RC-1.
5. The previously recommended new well (SC) to the south of RC-3 located in the tank farm complex to monitor water level depression between Leg ACDE of RC-3 and Legs AF and ADE of RC-1.