

Larsen, Sarah

From: Stock, Paul
Sent: Monday, June 20, 2005 4:55 PM
To: Larsen, Sarah
Subject: Leak Site #3534, Junction Food-N-Fuel, Hermantown, MN

RE: my review of TPT's 2.8.05 "Annual Monitoring Report Fact Sheet 3.26 (February 2001)" recommending corrective action.

Sarah, I last reviewed this site in Sep-04 when I reviewed TPT's 9.30.03 Excavation Report and 5.24.04 AMR. In a 10.7.04 MPCA Incomplete Report Notification/RAW letter, we requested corrected tables, 1/4ly MW GW monitoring, and annual nearby water well sampling. The work requested was to address risk to nearby water wells and surface water. During 1996 the on-site water well was found to petroleum contaminated so in 1997 was sealed and replaced with a new water well, however, a more recently updated receptor survey indicated, in addition to the new on-site water well, there are 3 water wells of uncertain construction within 500 ft of the site along with another water well just outside the 500 ft radius. Recall that, under a MPCA approved CAD, ORC was injected at the site during Jul-98 but has not appeared to have any discernable effect, however, I think it likely that it did have some effect where it was installed within the dissolved plume (i.e., no source area NAPL) around MW1, upgradient of MW8. Unfortunately, the opportunity to observe this effect was almost impossible as MW8 was installed too late. Although I have determined that there is considerable uncertainty associated with the MW elevation data - and the associated flow maps showing considerable variation in flow direction over time - it seems pretty clear that the predominant GW flow direction is NE from the source areas. A recently installed most downgradient MW8, located adjacent to a wetland, had occasionally yielded samples exceeding Class 2D Benzene (114 ug/l) Chronic Standards and GRO Criterion (200 ug/l) - although Minn Rules have an Oil CS of 500 ug/l. The 5.24.04 AMR contained MW GW monitoring data and nearby water well sampling results through 12.16.03.

The **2.8.05 AMR** includes the following new information:

1. Updated fluid level and water sample analytical results tables.
2. Updated receptor survey.
3. 4 MW GW monitoring events on 4.28, 8.9, 10.11 and 12.27.04.
4. Per field sheets, repaired MWs 2b and 7 on 4.28.04 (and resurveyed elevations on 1.31.05).
5. 2 nearby water well sampling events on 10.11 and 11.17.04.
6. Surface water visual inspection results for an undocumented date(s)?
7. Recommendations for quarterly MW GW monitoring, annual nearby water well sampling, and a "CCAD" for AS/SVE using horizontal wells.

Because a conceptual CAD was included in the body of the AMR, I added a CAD report to the TALES Leak Site Reporting tab, FYI. I took me considerable time to evaluate this conceptual CAD.

It looks like TPT made a determined effort to get the fluid level and analytical results tables updated correctly to make them cumulative and complete but I did not closely review them. I do believe they may still be missing some data that is in our files. TPT offers to review the MPCA's files for additional data if we want. To be sure, there are some obvious errors in the analytical results table.

The updated receptor survey is composed of discussion and an updated map. Essentially, a 2nd active water well (called PW5506B) and a apparently inactive well (hand pump) were discovered at the 5506 Hwy 194 property, however, along with the first well (PW5506A), these wells are located just outside the 500 ft radius. TPT believes this newly discovered well is used for livestock and "yard"(?) use. Including the site well, there are 3 active water wells within 500 ft of the site. Other than the site's sealed contaminated water well (PW1) which was 60 ft deep (screened above bedrock?) per the MDH sealing record, the new 600 ft deep (bedrock) site water well (PW2) and anecdotal evidence that the Radco well is 75 ft deep (and would thus likely be screened above bedrock), no construction data is available for the other nearby wells including the 3 wells at 5506 Hwy 194. With this uncertainty and the apparent preponderance for shallow wells here, I recommend we assume a high risk aquifer scenario. I note that the receptor survey continues to omit an apparently inactive on-site well, located on the W side of the property as identified on a site map in TPT's 4.16.97 RI Addendum Report and a photocopy of a legal survey map included in TPT's 9.15.97 "Response to Request for Additional Information" letter report? FYI, legal survey map also shows the location of the site's now sealed PW1 along with the proposed location of PW2.

No measurable FP was found in the MWs including relatively new MW2b where "globules" of FP have been detected in the past.

Although TPT's flow maps do not honor the data very well, and in some cases ignore data, and by TPT's own admission, some of the data may not be reliable (p. 4), TPT's flow maps show GW flow direction varied considerably over the 4 events. However, the GW contamination data strongly suggest dissolved contamination migration near the water table is to the NE from the source areas towards MW8 and the wetland.

Contamination concentrations remain high in MWs 1 and 2b. Concentration trends appear to have decreased over time in MW3b but appear to be rising in MW5. Very little to no contamination is present in the samples from MWs 4, 6 and 7. MW8, adjacent to the wetland, has now been sampled at total of 8 times. The data show that MW8 Benzene concentrations have exceeded the 114 ug/l Class 2D CS only 4 out of 8 times with the highest Benzene concentration of 360 ug/l on 11.11.04. Average Benzene concentration is 136 ug/l. However, the benzene concentration trend in MW8 appears to be upward per linear regression best fit line. GRO concentrations have exceeded the 200 ug/l Criterion only 3 out of 8 events and have exceeded the 500 ug/l Oil CS only 2 times. I note that using the anomalously high initial sampling event GRO data results in an overall downward concentration trend, while ignoring the 1st event data results in an upward trend. Average (all 8 samples) GRO concentration is 333 ug/l using the detection limit as data for the 3 ND events. TEX concentrations have never exceeded their respective Class 2D CSs. While these data do not appear very alarming to me and I am not sure they clearly indicate a need for additional corrective action, the fact that a petroleum sheens can still(?) be observed on nearby surface water in the wetland (see p. 5), strongly supports a presumption of unacceptable adverse surface water impacts. Also, petroleum contamination was detected in 3 surface water samples collected from the wetland on 11.20.03.

Noting that TPT's Table 3 contains errors in reporting water well sampling results, no petroleum contamination was detected in the 2 new samples collected from PW2 or in the single new samples collected from PW5497 (Radco), PW5492 (McDonald Rental House) and PWs 5506A (residential/domestic) and 5506B (livestock?). PW4621 (Texas Rust Free Parts/Misco) has yet to be sampled - the facility is inactive and TPT has not been able to contact anyone to get access permission.

It is clear that the corrective action reason for TPT's CCAD is contaminated GW discharging to surface water. The CCAD recommends AS/SVE pilot testing and presents a conceptual layout and operation plan that is of unusual design in several respects with some aspects unclear. I discussed the design with Tim Jefferson-TPT on the phone on 6.17.05. TPT plans to install the 24 (per text...map shows 25) AS points using large bore horizontal drilling methods so the 18-24 inch long AS injection screens will be horizontal (as opposed to vertical with a standard design) and 8 AS screens will be installed (Map E), more or less evenly spaced, in a single horizontal boring (i.e., 3 horizontal borings) with the borings plugged with bentonite at each end, i.e., open hole along much of the boring with no plugs between AS screens. These AS points will be located 15 ft below the 3.7 to 4.9 ft deep WT with a presumed 22.5 ft radius of influence. Without adequate explanation, TPT indicates the rationale for using horizontal borings is "site infrastructure". One of the proposed AS points is directly underneath the occupied (business) site building, raising concerns about indoor vapor intrusion. The proposed SVE system is composed of 4 lateral lines (Map F). I am not sure if the SVE lateral lines and/or screens will be installed using horizontal borings but I do not think so? 3 of the SVE lateral lines will be connected to separate horizontal screens of varying lengths (12 + 27 = 39 ft, 20 + 55 + 25 = 100 ft, and 75 + 75 = 150 ft) and varying configurations that will be buried about 3 ft bgs. A 100 ft long screen roughly encircles the W, N and E sides of the on-site building but if the building footings are buried at depths that are or occasionally become deeper than the water table, I see an opportunity for vapor being trapped below the building floor which could lead to dangerous conditions. In addition, experience has shown me that it is generally ineffective to attempt SVE on anything longer than ~10 ft screen lengths due to short circuiting along the closer spans of the screen, i.e., little or no vacuum at end of line, however, it appears that TPT plans to use only low vacuum to recover AS vapors with the SVE system or use SVE in a passive (or pressure-relief) mode if the vacuum pump is not turned on or is not operating. In a non-active venting mode, no vacuum will be applied to the lines but AS vapors are expected to find their way to the screens and ultimately discharge to the atmosphere from gooseneck risers with one way valves located on the lateral lines prior to the vacuum pump. Although I am not saying that TPT's design won't work or will cause problems, the design is in opposition to MPCA guidance documents which require that SVE (extraction) air flow be 5X more than AS (injection) air flow to prevent vapors being forced into nearby structures such as occupied buildings. A 4th SVE line will be stubbed off adjacent to on-site building for connection to the building if it becomes obvious that venting of the building itself is necessary. TPT provides some limited data for a similar Leak Site as justification for this CCAD, however, it is not clear to me how applicable that design is to this one, but, one can not help but note that apparent quick success of the cleanup at Roddy's.

Additional water well sampling over time could provide data showing low risk to these receptors. I am fairly confident that residual NAPL and possible mobile NAPL (i.e., FP) is present under at least the S half of the on-site building. Although I can find no maps showing the expanded building footprint, it is my understanding that the building footprint was expanded out to the S and the expansion area would then almost certainly overlie highly contaminated soil and GW (NAPL?). Therefore, it is my opinion that vapor risks, including chronic risks due to vapor intrusion, need to be better evaluated using our updated guidance document.

RECOMMENDATIONS

Upon my initial review of the file I had recommended that the MDH be informed of the unused (i.e., abandoned) but possibly unsealed water well on the W side of the property. It appears that this was not done due to MPCA PM reassignments.

I recommend that a RAW letter be sent. Items language to include in the RAW letter are discussed below.

Please note that the MPCA has recently revised its guidance documents including reporting forms. Use of the updated guidance is required for all work done after May 15, 2005.

MPCA staff concede that available information, especially the presence of sheens on surface water and upward dissolved petroleum concentration trends at MW8, support the need for active remediation. Remediation goals would thus be no FP and dissolved petroleum concentrations below Class 2D chronic Standards and Criterion. However, since it appears that site might also be managed under a high risk aquifer scenario, MDH HRLs may apply as cleanup criteria. In addition, the MPCA has recently revised the guidance documents to include assessment of indoor vapor intrusion. Action is necessary to correct any verifiably detectable vapor impacts in living spaces. Available site data strongly indicate that residual petroleum is present at the site and may extend to beneath the site building. Finally, MPCA staff note a proposed air sparge point located directly under the site building and are concerned that active sparging under the building could lead to adverse vapor impacts.

Continue MW ground water monitoring and on a quarterly schedule but also observe surface water in the wetlands NE of the site for evidence of petroleum contamination such as sheens and rainbows on the same schedule. Prepare flow maps for each event honoring the data from all wells. Ground water samples collected from the MWs can be analyzed for BTEX, MTBE and GRO. Carefully evaluate ground water sample results from MW8 relative to surface water standards and concentration trends.

Continue nearby water well sampling on an annual schedule, including from PW2, and PWs 5497, 4621, 5492 and 5506A. Ground water samples collected from water wells must be analyzed for VOCs and GRO. Continue to determine available well construction data (e.g., depth, screen, etc.) usage for the nearby off-site water wells. Continued lack of detection of petroleum contamination in nearby wells should be evaluated relative to a high risk aquifer scenario.

Complete a vapor intrusion assessment following MPCA Guidance Document 4-01a, *Vapor Intrusion Assessments Performed during Site Investigations*, focusing on the on-site building. Sub-slab air sampling is required, especially at the southerly extent of the building footprint. Indoor air sampling must be completed if indicated by the sub-slab sampling results.

Mobile and residual petroleum occurrence and extent in the subsurface must be investigated using Laser Induced Fluorescence (LIF) borings. A boring location grid using maximum 30 foot spacing is necessary. Instruct your consultant to contact the MPCA Hydrologist assigned to your site for further instruction and discussion regarding the use of LIF before completing this work.

Future site maps provided to the MPCA must show the footprint of the recently expanded building relative to the other sites features such as MWs and remediation points.

Within 180 days of the date of this letter submit a complete Annual Monitoring Report form documenting completion of the above requested work. Include appropriate text, tables, figures and appendices from the Investigation Report Form as applicable and appropriate to document additional investigation work. If, depending on the results of the additional work, corrective action is recommended, submit MPCA Guidance Document 4-19 *Conceptual Corrective Action Design Worksheet* along with the AMR. The Conceptual CAD should address all potential impacts and risks presented at the site. MPCA staff realize that Air Sparge and Soil Vapor Extraction (AS/SVE) may be selected as an appropriate corrective action for the site and concede that the results for Roddy's Store appear impressive. However, MPCA staff are providing the following comments relative to the AS/SVE system proposed for the Junction Food-n-Fuel site.

Your consultant proposes that horizontal drilling methods be used to install the AS points due to "site infrastructure". At this point, MPCA staff do not understand why a more conventional AS point design cannot be employed so this rationale will need to be better explained before the MPCA can provide approval, especially since it appears that the SVE points will be installed using conventional methods. Moreover, MPCA staff have concerns about other aspects of the design such as multiple sparge points installed in a single boring, so, pilot testing will require use of AS/SVE point design consistent with that proposed for the final design. In addition, it would be especially useful if your consultant can identify other sites where this method has been successfully utilized by them before.

The MPCA's requires that SVE system air extraction rates be at least 5 times AS system injection rates in order to prevent potentially dangerous vapor migration. Although MPCA concedes the wisdom of designing the system so as to continue to collect AS off-gases during periods when the SVE is not operating, staff generally do not approve of this operation method as a main design parameter for the SVE system. This is of particular concern given the proposal to

inject air under the on-site building. At the very least, cross-sections will have to be prepared showing the configuration of the AS and SVE points under and around the building relative to the sub-slab environment including the building footings and varying water table depth as the building footings may prevent pneumatic connection between the sub-slab environment and the horizontal SVE wells located outside the building footprint. It appears that active sub-slab ventilation must be considered. MPCA staff suggest that if indoor air vapor intrusion is determined to be an additional risk factor at this site (via the above required assessment), appropriate indoor vapor intrusion mitigation methods may also be utilized to mitigate AS forced vapor migration. Vapor intrusion mitigation methods can consist of potential vapor entry point (e.g., cracks, utility lines, etc.) sealing, sump sealing and/or venting, active or passive sub-slab ventilation, and/or air exchanger installation and operation, among others.

MPCA staff have noticed that long vertical and horizontal (>10 ft) SVE screens often perform less than adequately at removing petroleum vapors due to excessive vacuum loss near the top of the screen and short-circuiting. Although staff realize that this may not be as much of a concern when SVE is used in a passive mode, we do note that the 3 proposed SVE points are composed of screens with total lengths of approximately 40, 100 and 150 feet, respectively. MPCA staff suggest that horizontal screens should have a riser at the terminal end of the screen so that induced vacuum can be measured, however, appropriately located vapor monitoring points, including appropriately screened MWs, could be used to effectively measure radius of pneumatic influence without or in addition to horizontal SVE point risers.

I am returning the file to you today via interoffice mail/Speedee Delivery. Please let me know if you have any questions or concerns about my recommendations - feel free to edit my language as you see fit. Thanks!

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