



Minnesota Pollution Control Agency

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

May 20, 2005

Mr. Douglas Hildre, P.E.
Environmental Control Manager
United Defense LP
Armament Systems Division
4800 East River Road
Minneapolis, MN 55421-1498

RE: FMC Corporation Superfund Site

Dear Mr. Hildre:

The Minnesota Pollution Control Agency (MPCA) staff has reviewed the document entitled "Results of Monitoring Well Installation and Extraction Well Modification, Former FMC Site, 4800 East River Road, Fridley Mn," ("Report") dated March 1, 2005. The Report was submitted pursuant to the Response Order by Consent between FMC Corporation (FMC) and the MPCA, dated October 28, 1986.

The MPCA staff hereby modifies the Report pursuant to Attachment I of this letter.

The Report is an excellent presentation of the data that was collected during the cone penetrometer (CPT) field work. The data collected shows that stratification of the plume does exist at the FMC Site downgradient of East River Road and that the long-screened monitoring wells are not adequate to provide accurate data regarding the FMC Site plumes and the progress of the FMC Site ground water cleanup. A much better understanding of the unconfined and confined plumes has emerged from the work although the MPCA staff is requesting some additional work. Additional new monitoring wells are requested based on the CPT work to monitor FMC Site plumes. The MPCA staff requests modifications to some existing wells, abandonment of others, some additional investigation work that may result in additional monitoring wells as identified in Attachment I. These modifications to the well network will be used to monitor the progress of ground water remediation with results reported in future annual monitoring reports (AMRs).

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The MPCA staff requests that UDLP/FMC prepare a work plan (including a schedule) outlining this work for MPCA staff review and approval within 60 days from receipt of this letter. The MPCA staff requests that UDLP/FMC complete the monitoring well modifications in a timeframe that will allow for the wells to be sampled and the data included in the 2005 AMR and future AMRs.

Unfortunately, the work identified in the Report indicates that the FMC Site remedy is not performing effectively at capturing the FMC Site on-site plumes and reducing the off-facility plumes to the required cleanup levels. Modifications to pumping well RW-4 do not seem to have resulted in reductions in concentrations downgradient. Discharge of the plumes to the Mississippi River and the spring discharge located in the river bank indicate that the water quality standards for this reach of the Mississippi River are greatly exceeded.

As UDLP/FMC is aware, the decision rules from the Data Quality Objectives (DQOs) section of the Quality Assurance Project Plan are as cited below:

a. RAP Decision Rule

If contaminated ground water exceeding 270 ug/l for TCE is migrating beyond FMC Site property boundary (waste management unit boundary), continue implementing, and, if necessary, modify the ground water extraction system pursuant to the RAP. If not, discontinue implementing the ground water extraction system and continue long-term ground water monitoring.

b. ROD Decision Rule

If contaminated ground water exceeds MCLs and/or MDH Recommended Allowable Limits (now transformed into Health Risk Limits) for FMC Site COCs on-site or off-site, continue implementing, and, if necessary, modify the ground water extraction system pursuant to the ROD. If not, discontinue the ground water extraction system and continue long-term ground water monitoring.

Also as UDLP/FMC is aware, in Section IX., Recommendations, of the CERCLA Five-Year Review Report, dated March 17, 2004, there is the following recommendation:

If data from the modified monitoring network indicates that the current remedy does not meet cleanup goals, or if data indicates that protectiveness is not achieved, modifications to the current remedy or alternative remedial actions should be proposed and implemented conditional on regulatory approval of such changes.

Furthermore, the CERCLA Five-Year Review Report memorializes that the Minn. R. 7050 requires that the discharge of pollutants to surface waters, including pollutants in ground water plumes, must be controlled to meet the drinking water quality standard in the river, which in the case of TCE is 5 ug/l. This concentration is applied to the ground water wells nearest the river.

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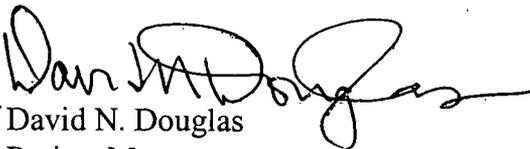
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Given the cleanup requirements and DQOs cited above, the MPCA staff believes that the TCE ground water contaminant concentrations found by the study in off-facility wells downgradient of East River Road (e.g., 366 ug/l and 350 ug/l TCE in well RMC-54A; 441 ug/l and 280 ug/l TCE in well USGS-6; and 780 ug/l in the seep) indicate that the current remedy is not effective at meeting the cleanup goals and that it is necessary that UDLP/FMC modify the ground water extraction system pursuant to the RAP and the ROD.

The MPCA staff requests that the staff and UDLP/FMC staff begin preliminary discussions regarding modifications to the FMC Site remedy and/or application of other supplemental remedial options in potential on-facility source areas to improve the effectiveness of the existing FMC Site remedy in achieving the remedial action goals. If on-facility source treatment options are pursued, on-facility field work to define the potential source areas to be treated will need to be defined by the appropriate field sampling measures. The impacts of these remedy modifications will need to be monitored by the upgraded off-facility monitoring well network. The MPCA staff requests that UDLP/FMC develop a work plan, for MPCA review and approval, for modifications to the existing ground water extraction system and/or supplemental source treatment options. Although initial discussions can begin regarding remedy modifications the development of a formal work plan for remedy modification, the MPCA staff believes that advanced discussion on this issue probably cannot occur until after the new monitoring well network data has been reviewed that the staff has requested be included in the 2005 AMR.

If you have any questions regarding this letter, please contact me at (651) 296-7818.

Sincerely,



David N. Douglas
Project Manager
Superfund Unit 2
Superfund and Emergency Response Section
Majors and Remediation Division

DND:csa

Enclosure

cc: Lonnie Norman, FMC Corporation (w/enclosure)
Denice Nelson ARCADIS G&M, Inc. (w/enclosure)
Thomas Smith, U.S. Environmental Protection Agency (w/enclosure)
Dan Owens, U.S. Navy (w/enclosure)

Attachment I

**Modifications to the Report Entitled,
"Results of Monitoring Well Installation and
Extraction Well Modification,
Former FMC Site, 4800 East River Road, Fridley MN,"
Dated March 1, 2005**

- 1.) **Monitoring Well Network, Cross Section C-C'**: The southern end of the plume is defined by the concentration measured in monitoring well FMC 64 (73 ug/l TCE) in cross-section C-C'. The southern edge of the plume has not been defined given the revised cross section. The MPCA staff requests that UDLP/FMC perform stepped push probe ground water sampling south of FMC-64 to define the southern edge of the plume(s). The MPCA staff may perform split samples of the collected ground water samples. The data will be reviewed and a decision made regarding the best way to monitor the southern edge of the plume(s) in this area.
- 2.) **Monitoring Well Network, Cross Section D-D'**: Data from the newly installed monitoring wells indicate that the southern edge of the unconfined plume has been defined to 50.1 ug/l TCE. The MPCA staff requests that UDLP/FMC perform stepped push-probe ground water sampling south of FMC-21A to define the southern edge of the plume. The MPCA staff may perform split samples of the collected ground water samples. The data will be reviewed and a decision made regarding the best way to monitor the southern edge of the plume in this area.
- 3.) **Conclusions, Bullet 1**: The MPCA staff disagrees that the plumes have been sufficiently defined to the south and has requested additional work to define the plumes to the south (see Modification 1 and 2).
- 4.) **Conclusions, Bullet 4**: Elevated COC concentrations are not confined to USGS-6. VAP-6 and VAP-5 both indicated elevated COCs. The width of the area of elevated COC concentrations is approximately 150 - 200 feet wide and includes USGS-6, VAP-6 and VAP-5. The relationship to this elevated COC area to the seep and discharge of the plume to the river is an important one and should be further evaluated. The MPCA staff requests that a cross section be constructed perpendicular to the river using on-facility wells, off-property monitoring wells and CPT data (VAP-6), river bank elevations, the seep elevation and the Mississippi River water elevation that shows in cross section the lithologic, hydrologic and chemical concentrations in ground water and in the seep. The MPCA staff requests that this cross section be included in future AMRs.
- 5.) **Conclusions, Bullet 5**: It appears evident that modification of the pump location in RW-4 has not had a significant impact on reducing elevated down gradient VOC concentrations. The MPCA staff requests that UDLP/FMC evaluate additional remedial options including supplemental remedial options to reduce the off-facility concentrations of COCs in the plumes.

- 6.) **Recommendations, Bullet 1:** The MPCA staff does not discourage UDLP/FMC from attempting modifications to RW-4 or any other pump out wells to optimize the effectiveness of the capture system. Past modifications to well RW-4; however, have not seemed to have produced substantial results. Unfortunately, the additional work presented in the report indicates that the UDLP/FMC remedy is not performing effectively at reducing the off-property plumes to the desired cleanup levels. Discharge of the plumes to the Mississippi River and the spring located in the river bank indicate that the water quality standards for this reach of the river are not being met.

As noted in the cover letter, the MPCA staff requests that the staff and UDLP/FMC staff begin initial discussions regarding modifications to the UDLP/FMC remedy and/or application of other supplemental remedial options.

- 7.) **Recommendations, Bullet 3:** Once the work requested in this letter has been completed, reviewed, and decisions made regarding the extent of the plumes, any additional monitoring wells needed to define the lateral extent of the plume(s) can be included in the monitoring network for future AMRs.
- 8.) **Recommendations, Bullet 4:** The MPCA staff requests that prior to developing a work plan for a tracer study that UDLP/FMC staff, their consultant, and MPCA staff meet to discuss the goals, assumptions, methods and reporting requirements of a proposed tracer study. This discussion may result in a more focused work plan that will reflect a broader consensus of the work planned for such a study.

MPCA Staff Modifications to the FMC Site Off-Property Monitoring Well Network:

The MPCA staff requests UDLP/FMC make the following modifications to the FMC Site off-property monitoring well network to monitor the FMC Site off-property plumes. The staff requests that UDLP/FMC sample these wells and the sampling data be presented in unconfined and confined plume maps, equipotential maps and cross sections (similar to those presented in this Report) in future AMRs.

1. **Existing Monitoring Wells:** The MPCA staff requests that UDL/FMC add existing monitoring wells USGS-4, USGS-5, USGS-6, FMC-20, FMC-35, FMC-35A, FMC-54A, and FMC-64 to the monitoring well network for future AMRs.
2. **Existing Long Screened Monitoring Wells:** The MPCA staff requests that UDLP/FMC modify the existing long-screened monitoring wells cited below to reduce the open screen interval to a shorter aquifer interval below the fined grained unit. This interval is where the CPT work has shown the highest plume concentrations for the FMC Site off-property confined plume. The shorter screens will isolate the screened zones to the appropriate aquifer interval to be sampled. CPT sampling has shown that, in general, the COC concentrations are quickly reduced to low concentrations lower in the aquifer with depth. It is not necessary to monitor deeper portions of the aquifer that are below cleanup concentrations.

Mixing of water over the long-screened intervals is also a problem that has been much discussed in past MPCA staff correspondence, i.e., concerns about collected representative samples from discrete aquifer intervals. These modifications involve grouting of lower portions of the screen for each well in accordance with Minnesota Department of Health (MDH) well code and installing a packer over the grouted intervals to isolate the grout in the remaining screen and provide a stable "well bottom" for the remaining open screened interval. The MPCA staff requests that several long-screened wells be abandoned. The modifications are listed as follows:

- Well FMC-21: The MPCA staff requests that UDLP/FMC abandon this well in accordance with the MDH well code. The well is constructed in fine grained materials; does not monitor and aquifer interval as intended; and has not been a useful monitoring well. The well has been replaced with wells FMC-21A and FMC-21B, both of which are screened in the appropriate aquifer zones to monitor the FMC Site off-property plumes.
- Well FMC-37: The MPCA staff requests that UDLP/FMC grout the screen from the bottom up in accordance with the MDH well code and install a packer leaving the upper 10' of the screen open to sample ground water below the fine grained unit.
- Well FMC-39: The MPCA staff requests that this well be abandoned in accordance with the MDH well code. It appears that monitoring well FMC-21B will serve to monitor the upper confined aquifer zone that is affected by COC contamination.
- Well FMC-45: The MPCA staff requests that UDLP/FMC grout the screen from the bottom up in accordance with the MDH well code and install a packer leaving the upper 15' of the screen open to sample ground water below the fine grained unit.
- Well FMC-53: The MPCA staff requests that UDLP/FMC abandon this well in accordance with the MDH well code. The well is constructed with a long screen that makes representative ground water samples impossible to collect. The results from the well do not correlate with the CPT results from VAP-3 (approximately 50' away) that shows relatively high COC levels. The MPCA staff requests that this area be monitored with new wells (see item 3 below).
- Well FMC-54: The MPCA staff requests that UDLP/FMC grout the screen from the bottom up and install a packer leaving the upper 20' of the screen open to sample ground water below the fine grained unit. CPT test hole VAP-1 indicates that elevated COC concentrations exist from between 82-180 ug/l are present in this interval approximately 25' to the south of FMC-54. The MPCA staff requests that this interval be monitored with modified monitoring well FMC-54.

3. **New Monitoring Wells:** The MPCA staff requests that two new monitoring wells be installed at the VAP-3 location to replace FMC-53. The MPCA staff requests that one well be screened below the first fine grained unit and above the second fine grained unit. The CPT sample indicated a TCE concentration of 200 ug/l. The MPCA staff requests that the second well be screened below the second fine grained unit and be constructed with a 10' screen. These wells along with the monitoring wells located near the FMC-54 location will bracket the width of the high COC confined plume which appears to be approximately 300' wide in this area.

The MPCA staff requests that UDLP/FMC install another new monitoring well just below the fine grained unit at the VAP-5 location. The screen should be 5-10' in length. This well along with monitoring well USGS-6 would bracket the higher concentration plume in this area which appears to be approximately 120-150' in width prior to discharge to the Mississippi River.

The MPCA staff has requested additional investigation work to identify the southern extent of FMC Site off-property plumes. It is possible that several additional wells may result from this work that might be included in the AMR monitoring network. The MPCA staff will determine the need for any new monitoring wells based on the data collected in a push-probe investigation.

4. **Seep (or Spring) Discharging from the Mississippi River Bank:** The MPCA staff requests that UDLP/FMC sample the seep (or spring) that discharges from the riverbank quarterly for COCs to determine the seasonal variation in COC concentration. The MPCA staff requests that UDLP/FMC develop a method to determine the concentration and amount of water that discharges to the river in gallons per minute. The MPCA staff requests that UDLP/FMC report the mass of COCs discharged to the river per day and per year (flux) in future AMRs.
5. **Notification of Field Work:** The MPCA staff requests UDLP/ FMC notify me two weeks prior to the start of field work regarding field work schedules. The MPCA staff may wish to be present to observe sediment cores and to collect ground water split samples.