



STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING



JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

November 12, 2009

Mr. Steven C. Lucas
Senior Remediation Leader
The Dow Chemical Company
1078 Building
Midland, Michigan 48667

Dear Mr. Lucas:

Subject: Outline for City of Midland Corrective Action Presumptive Remedy Model Work Plan Revisions (Model Work Plan); The Dow Chemical Company (Dow); Midland, Michigan; MID 000 724 724

The Michigan Department of Environmental Quality (MDEQ), Waste and Hazardous Materials Division (WHMD), is providing the enclosed outline as requested by Dow during the technical conference call on October 23, 2009. The outline describes a process for using geostatistical modeling and additional soil sampling to assist in the identification of an area for a presumptive remedy for Midland Area Soils. Dow is revising the Model Work Plan that is due on December 16, 2009, based on the review and comments letter from the MDEQ dated October 15, 2009, and requested the outline to assist them in meeting the MDEQ's expectations. The Model Work Plan is a component of Dow's proposal to use a presumptive remedy as an alternative process to satisfy the requirements of Condition XI.B. of the hazardous waste management facility operating license (License) issued to Dow on June 12, 2003, under Part 111, Hazardous Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, for releases beyond the facility boundary for Midland Area Soils.

Staff of the MDEQ; U.S. Environmental Protection Agency (U.S. EPA); Dow; Dow's contractor, ToxStrategies; and the MDEQ's contractor, Dr. John Kern, met by conference call on October 23, 2009, to discuss the WHMD technical review comments on Dow's presumptive remedy work plans that were transmitted to Dow on October 15, 2009. During the conference call, Dow requested that the MDEQ provide an outline that describes the geostatistical modeling and additional soil sampling process discussed during the meeting. In an effort to move this process along, the MDEQ agreed to develop an outline (enclosed) that identifies the MDEQ's expectation for a step-wise process for deliverables from Dow as part of the revisions to the Model Work Plan and associated consultation with the MDEQ at each step in the process. The importance of the geostatistical modeling details is limited in step 1, although it becomes more important for the refined geostatistical modeling in step 5. The MDEQ is willing to have further discussion on the steps of the described process or considerations included in the outline to further assist Dow in revising the Model Work Plan. The intent of the described process is to decrease the uncertainty of predicted soil concentrations that will result in a smaller and more accurate presumptive remedy footprint.

As noted in the October 15, 2009, review comments and during the conference call on October 23, 2009, air dispersion modeling (1) has not been demonstrated to predict soil concentrations more accurately than geostatistical methods alone and (2) has the potential to create a false perception of reliability in the predicted soil concentrations in areas with limited or

no soil samples. Therefore, the use of air dispersion modeling as a component of the Model Work Plan is not approved.

If you should have any questions regarding this letter or the enclosed outline, please contact Dr. Deb MacKenzie-Taylor, Hazardous Waste Section, WHMD, at 517-335-4715 or by e-mail at mackenzie-taylor@michigan.gov; Mr. Al Taylor, Hazardous Waste Section, WHMD, at 517-335-4799 or by e-mail at taylora@michigan.gov; or you may contact me.

Sincerely,



DeLores Montgomery, Chief
Hazardous Waste Section
Waste and Hazardous Materials Division
517-373-7973

Enclosure

cc/enc: Mr. Greg Rudloff, U.S. EPA, Region 5
Dr. John Kern, Kern Statistical Services, Inc.
Mr. Jim Sygo, Deputy Director, MDEQ
Mr. Frank J. Ruswick, Jr., Senior Policy Advisor, MDEQ
Mr. George W. Bruchmann, MDEQ
Mr. Steve Buda, MDEQ
Mr. Terry Walkington/Ms. Trisha Confer, MDEQ
Ms. Cheryl Howe/Dr. Deb MacKenzie-Taylor/Mr. Al Taylor, MDEQ
Corrective Action File

Outline for Midland Presumptive Remedy Model Work Plan Revisions

(As Requested by Dow)

Process Steps for Identifying a Presumptive Remedy Footprint (in consultation with the MDEQ at each step in the process)

1. Geostatistics to produce coarse map - Kriging or Conditional Simulation
 - a. Consider trend (low order polynomial) vs no trend models
 - i. Incorporation of trend may correct for apparent non-stationarity in the variogram
 - ii. Incorporation of trend may improve precision and can be evaluated by looking at cross validation statistics with and without incorporation of trend
 - iii. If conditional simulation is anticipated one could consider cross validation of kriging analysis as a surrogate for a full cross validation of the simulation procedure
 - b. Look at anisotropy
 - i. Check to see if incorporation of a trend model eliminates anisotropy
 - ii. Removal of anisotropy would improve reliability of variogram estimation by eliminating the need to estimate empirical variogram values specific to direction and distance
 - iii. Geometric anisotropy (i.e., directional variation in range of influence) and zonal anisotropy (i.e., directional variation in sill values) should both be considered
 - iv. Zonal anisotropy is often an indicator that large scale spatial gradients have not been accounted for which would justify inclusion of a trend model
2. Identify preliminary remedial footprint that includes prioritized areas for remediation activities and identifies those areas that require additional data collection to decrease uncertainty for remedial decision making (e.g., map with "halos of uncertainty")
3. Identify prioritized areas for sampling (focused on refining the boundary of the presumptive remedy footprint) considering:
 - a. Concentration
 - b. Uncertainty levels (λ)
 - c. Land ownership and use
4. Implement Sampling program
 - a. Sampling for extent
 - b. Sampling for small scale heterogeneity, depth, contaminants of potential concern recommend using four distinct geographic areas distributed in the community near residential properties (also consider use of existing "blinded" multi-property samples)
5. Reanalyze data to refine the extent of the presumptive remedy footprint(s)
 - a. More refined map based on geostatistics
6. Evaluate need to return to steps 3, 4, and 5, as necessary.

Considerations

1. Uncertainty

- Uncertainty in the predicted soil TEQ results in large numbers of houses likely to be in the presumptive remedy footprint. Considerations for addressing uncertainty:
 - Overly large presumptive remedy footprint
 - Additional soil sampling to decrease uncertainty
 - Focused and/or iterative to determine edge/borders
 - More comprehensive sampling to try to limit to one sampling campaign and/or
 - Provisions to respond to individual property sampling in areas within and/or outside presumptive remedy footprint to determine if presumptive remedy is necessary or available.

2. Data Handling

- Default to inclusion of all data unless covered by other corrective action programs or demonstrated not to be related to releases from Dow
- Analysis based on surface samples only
- Regression to estimate TEQ from TCDD-only samples

3. Data Gaps

- Depth of contamination is unknown in general
 - Pilot study as well as a subset of sampling locations described here should be sampled to determine depth of contamination
 - The depth distribution will be used to develop a presumptive depth for application to corrective actions
- Land use and land ownership maps
- Understanding of small scale variability relative to composite sampling across multiple properties
- Other contaminants of potential concern
- Provisions of presumptive remedy (e.g., trust fund)