

Agricultural Chemical Incident Remedial Investigation Report and Corrective Action Plan

Guidance Document 10

The fourth step in MDA guidance document [GD3 Seven Steps to a Historical Agricultural Chemical Cleanup](#) entails submitting a Remedial Investigation Report/Corrective Action Plan (RI/CAP). For the RI/CAP, the environmental consultant will evaluate all information gathered during the site investigation and then discuss appropriate corrective actions with the client. Once this is completed, a RI/CAP will be submitted to the MDA for review and approval. This guidance document is designed to provide instruction for completing an RI/CAP, and is divided into two sections: one for the RI report and one for the CAP, although these reports are usually submitted together as an RI/CAP.

The RI/CAP should clearly present the site history and background information, site investigation results, and propose corrective actions for contaminated soil, water or other media. The CAP should adequately address impacts to and protection of public health and the environment. The RI/CAP must be approved by the MDA prior to carrying out any corrective actions. With MDA's approval of the RI/CAP, corrective action costs for the site may be submitted for reimbursement through the Agricultural Chemical Response and Reimbursement Account (ACRRA). See MDA guidance document [ACRRA.001 Reimbursement of Costs for Agricultural Chemical Incident Cleanups: ACRRA](#).

REMEDIAL INVESTIGATION REPORT

All remedial investigation work should be completed in accordance with MDA guidance document [GD9 Remedial Investigation and Work Plan](#) and other applicable guidance documents. After the remedial investigation work is completed, an Agricultural Chemical Incident Remedial Investigation Report (RI Report) must be submitted to the MDA. The RI Report should be a comprehensive document. All data used in the remedial investigation, such as geologic logs, well construction logs, and laboratory data, should be reproduced in the appropriate tables and appendices, without reference to previous reports. Although following the RI Report format is not required, MDA staff have the option to reject incomplete reports. If RI activities do not accomplish the RI objectives, additional activities and reports may be necessary.

1. INTRODUCTION

This section of an RI Report should address the following:

- a. The purpose of the investigation;
- b. When and by whom the work was authorized;
- c. The scope of services for the project;
- d. A brief summary of the report; and
- e. The dates the work was performed.

2. BACKGROUND INFORMATION

This section should contain:

- a. A description of the site, the surrounding area and the regional hydrogeology;
- b. A brief chronology of events related to the incident, including the source of the release and the estimated volume of the release;
- c. A description of previous sample results, including MDA sampling or by others, and a discussion of these results if pertinent; and

d. A description of known or suspected contaminants or sources in the area, such as petroleum tanks or dispensers, non-agricultural chemicals or other potential agricultural chemical sources, and previously reported incidents or releases at the site and corrective actions associated with those releases.

3. **RESULTS**

This section should describe:

- a. The results of all work conducted during this investigation, such as (but not limited to) soil borings, monitoring wells, trenches, laboratory analyses, water level measurements and tank testing results;
- b. A summary of the results of calculations made during the investigation, including those used to determine hydraulic conductivity, hydraulic gradients, groundwater flow direction and average linear velocity of the groundwater. Calculate vertical hydraulic gradients and determine directions of vertical flow for all nested well groups, and
- c. The Contamination Impacts Survey (Attachment 2 of MDA guidance document GD9 Remedial Investigation and Work Plan) for ground water, surface water or other receptors, as applicable for the site.

4. **DISCUSSION**

This section should discuss:

- a. The results of all work performed to date;
- b. The site geology and hydrogeology (based on the results of the investigation);
- c. A comparison of results of current work with the results of previous work;
- d. Any difficulties experienced during the investigation;
- e. Unanticipated or questionable results; and
- f. Any other details the author wishes to emphasize.

5. **CONCLUSIONS**

This section should summarize the findings of the investigation including:

- a. The source of the contamination;
- b. The extent and magnitude of contamination in soil, groundwater, and any other contaminated media;
- c. An evaluation of the potential impacts to receptors from the contamination; and
- d. Evaluation of site-specific risk to groundwater contamination for determination of soil cleanup goals.

6. **RECOMMENDATIONS**

This section should present:

- a. Recommendations for any additional investigation or corrective actions;
- b. Rationale for the recommendations; and
- c. If corrective action is recommended, a "Corrective Action Plan" proposal must be submitted; OR
- d. If "No Further Action" is recommended, it must be adequately justified.

7. **SIGNATURE and DATE**

The author's name, address, telephone number, signature, and date of signature should be in the RI Report.

8. **FIGURES**

- a. **Maps:** All maps must include a north arrow, scale, and a legend.
 - i. Site Location Map: Adapt from a U.S. Geological Survey 7.5-minute quadrangle.
 - ii. Site Map: Present all significant features of the site and adjacent properties including, when applicable, the following information:

- a) Physical layout including parcel boundaries, buildings, roads, paved areas, tanks, sumps and water bodies, and identify features by name or owner;
 - b) All potential sources of contamination, including non-agricultural sources;
 - c) Location of all monitoring wells and soil borings completed to date, and include and identify by owner all private wells that have been sampled;
 - d) Soil sampling locations and depths; and
 - e) Utility lines, storm and sewer lines, and tile lines.
- iii. Contamination Impacts Survey Results Map: Identify and label the locations of all water wells supply or other potential receptors.
 - iv. Groundwater Contour Maps: Show all well locations and differentiate the wells constructed in different formations and at different depths. Label groundwater contours and elevations at each data point used for contouring. List the date the water level measurements were collected.
 - v. Groundwater Contaminant Isoconcentration Maps: Show all well locations and differentiate the wells constructed in different formations and at different depths. Label groundwater contaminant concentrations at each data point used for contouring. List the date the water quality measurements were collected.
- b. **Cross-sections:** Geologic cross-sections are required whenever deeper soil borings are completed or monitoring wells are installed. Include vertical and horizontal scales and a key. Identify the location and direction of the endpoints on the site map. At least two perpendicular geologic cross-sections are recommended.
 - c. **Water Level Measurements and Water Quality Diagrams:** Use of a graphical presentation of water level measurements and water quality results are recommended.

9. **TABLES**

All tables for analytical results should include numerical information such as the reporting limit (e.g., "<0.1") rather than "Not Detected" for those parameters not detected above the reporting limits.

- a. Soil Analysis Results: Include laboratory results for all soil analyses and identify the sample location and depth of each sample. Also, list proposed cleanup goals and highlight cleanup goal exceedances. In addition, include laboratory name, sampling date, and sample analysis date.
- b. Water Quality Results: Include all data collected at the site to date, presented in chronological order by sampling date for each monitoring point. Also, list Health Risk Limits, Health Based Values, Risk Assessment Advice, and Rapid Assessment Values as established by the Minnesota Department of Health and highlight any exceedances. In addition, include laboratory name, sampling date, and sample analysis date.
- c. Water Level Measurements: Include all data (depth and elevation) collected at the site to date, presented in chronological order by measurement date for each monitoring point.
- d. Well Construction: Summarize monitoring well information in a table (see Attachment 1). List the well name or number, Minnesota unique well number, location coordinates, date installed, elevations of the ground surface, top of riser, and bottom of well, depths to top of screen and bottom of screen, screen slot size, and well stickup height.
- e. Reference location coordinates in meters to Universal Transverse Mercator (UTM) projection, Zone 15N extended, NAD83 Datum. Reference elevations in feet to the National Geodetic Vertical Datum (NGVD) or to a local benchmark. Provide a description, elevation, and coordinates of the datum or local benchmark.

10. APPENDICES

This section should contain sufficient information to document all activities conducted during the investigation and corrective actions. All data must be legible. At a minimum, this information must include the following (when applicable):

- a. Descriptions of all methods and procedures (with references, when appropriate) used in the investigation or corrective actions, including soil borings, soil sampling, well installation, water sampling and a list of laboratory methods used for soil and water analyses.
- b. Geologic logs for each well or soil boring including logs from previous investigations. Geologic logs should contain the date drilled, name of drilling firm, drilling method, the surveyed elevation of the ground surface, interval sampled, blow counts, classification of soils (ASTM method D2487/D2488), and observations during drilling such as staining or odors.
- c. Monitoring well construction diagrams for all monitoring wells, and copies of Minnesota Department of Health Water Well Records for each well.
- d. Copies of laboratory or subcontractor reports.
- e. Copies of water well records obtained for the Contamination Impacts Survey.
- f. Field data and calculations performed for the investigation.
- g. Copies of permits or approvals required for all work.
- h. Copies of the Laboratory Data Review Checklist (GD29) completed for all laboratory reports.

All information requested in MDA guidance documents GD11 Soil Sampling Guidance and GD12 Ground Water Sampling Guidance.

CORRECTIVE ACTION PLAN

The Corrective Action Plan (CAP) should present a sufficiently detailed plan of the proposed corrective action to permit evaluation of its likely effectiveness for remediation of the agricultural chemical incident. In addition, the CAP should provide a description of the proposed management practices to prevent future agricultural chemical incidents from occurring. The actual contents will vary according to the type of corrective action being proposed. The work proposed in the corrective action plan must comply with all local, state and federal regulations and ordinances.

The corrective actions implemented for soil should result in the removal or in-situ treatment of all soil contaminants exceeding the applicable soil cleanup goals. Confirmatory sampling of the sidewalls and the base of the excavation should be completed to verify that the concentrations of contaminants remaining in those areas do not exceed the applicable soil cleanup goals. The confirmatory sampling results should be submitted to Incident Response Unit (IRU) staff as soon as the results are available. The excavation should not be backfilled until approval is received from IRU staff.

In general, the following should be included in the CAP:

1. Briefly describe the corrective action alternatives considered for the site and explain why the chosen alternative was selected.
2. Discuss the objectives of the proposed corrective action.
3. Describe the proposed corrective action, including locations, design, and construction techniques for all elements.
4. Discuss the cleanup goals for the site. Include information on how the risk to groundwater was determined and a table listing the cleanup goals for each contaminant detected at the site.
5. Discuss the treatment method for water and/or excavated soil.
6. Describe any pilot testing to be performed.
7. Estimate both the time requirements for completing the corrective action and the operational life of all systems.

8. Describe operation, maintenance and monitoring requirements of the corrective action.
9. List and describe all permits necessary to install and operate the corrective action.
10. Describe off-site disposal needs and transportation plans.
11. Summarize the assumptions and the results of all calculations used during the design of corrective actions and include the appropriate references.
12. Include site maps (each including a north arrow, scale and legend);
 - a. one showing the proposed locations of all elements of the corrective action and all monitoring points; and
 - b. if appropriate, another map showing estimated areas of influence of pump-out wells and/or recovery trenches. This map also should show the locations of all corrective action elements and monitoring points. If a ground water treatment system is required, include a flow diagram which identifies each component of the treatment system.
13. Provide a schedule of the construction and implementation of the corrective action.
14. Describe the monitoring requirements and a schedule of sampling events.
15. Include the following documents as appendices:
 - a. Calculations performed for the corrective action proposal.
 - b. Methods and procedures proposed for the corrective action.
 - c. Estimated costs for installation, operation, maintenance and monitoring of the corrective action.
16. Describe the management practices and facility improvements, as appropriate, to prevent future agricultural chemical incidents from occurring.

17. Attachment 1 – Monitoring Well Completion and Location Information¹
18.

Well number	MDH unique well number	Well location ²		Date installed	Surface elevation (ft amsl) ⁴	Top of riser elevation (ft amsl) ⁴	Bottom of well elevation (ft amsl) ⁴	Depth to top of screen from surface (ft)	Depth to bottom of screen from surface (ft)	Screen slot size (inches)	Well stickup (ft) ⁵
		X Coordinate ³	Y Coordinate ³								
<i>Ex 1</i>	<i>123456</i>	<i>123456</i>	<i>1234567</i>	<i>1/1/17</i>	<i>1023.6</i>	<i>1025.6</i>	<i>1003.6</i>	<i>10</i>	<i>20</i>	<i>0.01</i>	<i>2</i>

¹ Include well construction diagrams and Minnesota Department of Health well logs in the Remedial Investigation Report/Corrective Action Plan.

² Well locations should preferably be provided in Universal Transverse Mercator (UTM) coordinates (meters) to the nearest meter, but geographic coordinates (Lat-Long) are acceptable using decimal degrees with precision to six decimal places.

³ X Coordinate is the easting coordinate and the Y Coordinate is the northing coordinate. The method of obtaining the coordinates must be indicated in the table footnotes; for example: classical surveying, GPS, map interpolation, photo interpolation, or other interpolation.

⁴ The method of obtaining the elevation must be indicated in the table footnotes; for example: classical surveying, GPS (indicate equipment type). AMSL stands for above mean sea level.

⁵ If the top of riser is below grade (at-grade well), indicate the well stickup as a negative value.

Notes: (location and elevation of benchmark, coordinate collection method, elevation collection method)

