REMEDIAL INVESTIGATION SCOPE OF WORK - Example

The purpose of the remedial investigation (RI) is to collect the data necessary to adequately characterize the nature and extent of contamination at a Facility which will allow for the development of cleanup levels and evaluation of effective remedial alternatives that address human health and environmental risks. Activities developed and conducted under the RI include project scoping, and collecting, evaluating, and interpreting data. The primary objectives of an RI include the following: 1) to adequately characterize the nature and extent of releases or threatened releases of hazardous or deleterious substances; 2) to allow an assessment of health and ecological risks and development of site-specific cleanup levels; and 3) to allow the effective development and evaluation of alternative remedies to be included in the feasibility study (FS). The RI is intended to build on existing data and fill identified data gaps. For questions regarding sampling, installation of monitoring wells, standards and screening levels, data validation, etc., please see: State Superfund | Montana DEQ (mt.gov).

Depending on the amount of historical data available for a Facility, preparation of a Data Summary Report (DSR) may be needed prior to preparation of the RI Work Plan. If a DSR is needed, it must present a brief narrative of previous investigations, the sampling and analytical methods used, the laboratory method detection limits achieved and how they compare to current screening levels, a discussion of the quality of the data and its usability for scoping the RI and potentially evaluating risk, a summary of the results of those investigations, tables of the results (including any data qualifiers) sorted by media and compared to current screening levels, sample location, sample depth, and other relevant information), figures of the results and the sample locations, and a preliminary site conceptual model that identifies sources of contamination and the location of contamination based on the existing information. If the data will be used quantitatively for decision-making purposes, then it must be validated (some historic data may not have been validated at the time, but may have the necessary information needed to validate the data during the development of the DSR). In some instances, it may only be appropriate to use older data qualitatively since it may not be representative of current conditions.

All documents must be submitted in hard copy and modifiable electronic formats; also submit final documents in compiled pdf versions. In addition, a schedule for submittal of all required work must be included for DEQ approval.

A. Components of the Remedial Investigation Work Plan

The RI Work Plan describes the technical approach, methods, and justification for conducting the RI at the Facility, typically through a sampling and analysis plan (SAP), consisting of an integrated field sampling plan and quality assurance project plan (QAPP), as well as a health and safety plan (HASP). The RI Work Plan includes the following information:

1. A characterization that compiles available information regarding the Facility and known or suspected contaminant releases at the Facility. The characterization consists of:
   a. General information such as project title, and legal and general descriptions of the

location of the Facility.

b. A complete history of operations including discussion of identity and dates of owners, operators, transporters, and generators; a summary of any records relating to hazardous or deleterious substances, description of known releases or disposal of hazardous or deleterious substances, and all identified operational components, pipelines, etc., associated with any hazardous or deleterious substances (with references/citations to original sources of the information).
c. A complete history of regulatory involvement at the Facility including the timeframes, reasons for involvement, activities regulated by each agency, and any environmental permits (with references/citation to original sources of the information). The history also includes a description of all previous interim remedial actions taken at the Facility, including the demolition/removal of buildings, fuel lines, and storage tanks, and any prior or ongoing removal or remediation of hazardous or deleterious substances.
d. A description of natural features of the Facility such as regional and local topography, geology, soil, meteorology, ecology, demography, hydrology and hydrogeology (with references/citation to original sources of the information). Existing information on the characteristics to be investigated should also be incorporated. The hydrology/hydrogeology characterization includes:
   (1) a summary of available groundwater and surface water quality data;
   (2) a description of current and possible future uses of surface water and groundwater at or near the Facility to include identification of area wells and well log information for wells within one-half mile of the Facility, including industrial, commercial, irrigation, stock, drinking water, and monitoring wells;
   (3) a description of groundwater aquifers and the connection between aquifers;
   (4) surface water and groundwater flow rates and directions;
   (5) location of surface water within one mile of the Facility;
   (6) groundwater and surface water classification;
   (7) location of groundwater discharge/recharge; and
   (8) a description of surface water drainage patterns.
e. A description of current land use of the Facility and surrounding areas, including zoning information.
f. An existing conditions map of the Facility illustrating relevant features such as property boundaries, surface topography, surface and subsurface structures, utility lines/easements, pipelines, well/borehole locations, general areas of known or suspected contamination, wetlands or floodplains, areas of ongoing erosion or runoff, and other pertinent information.
g. A site conceptual model identifying sources of hazardous or deleterious substances, and potential hazardous or deleterious substance migration pathways, including release mechanisms.
h. Current and historical aerial photos, as well as Sanborn Fire Insurance maps.
i. Name and location of regulated site(s) (i.e., leaking underground storage tank (LUST), Water Quality Act (WQA), Enforcement Division (ENFD), spills) within ¼-mile of the Facility.
j. Any other identified data gaps or available information.

2. A SAP which details the specific investigations to be conducted and the procedures to be

followed in the RI. The SAP includes:

a. A field sampling plan that presents a detailed description of all field investigation methodologies, sampling, data gathering, and analytical methods used to conduct the RI, including:
   (1) objectives and data quality objectives (DQOs);
   (2) specific description of proposed sampling design for the initial and ongoing groundwater, soil, surface water, sediment, and air monitoring (as applicable);
   (3) schedules and task assignments;
   (4) access and permit arrangements (if applicable) for all sampling;
   (5) field verification procedures including, but not limited to:
      (a) monitoring well specifications and procedures for installation and development;
      (b) licensed global positioning system (GPS) survey of monitoring wells for location and elevation, with the survey tied in to a known United States Geological Survey (USGS) benchmark (wells that have already been appropriately surveyed do not need to be surveyed again unless there is a reason to suspect the survey is no longer accurate), as well as latitude/longitude coordinates in decimal degrees for each well location to allow entry into DEQ's EQuIS system;
      (c) methods for determination of groundwater flow direction and rate and aquifer characteristics;
      (d) identification of all physical hazards; and
      (e) identification of all plumbing, pipeways, product conveyance lines, foundations, trenches, recovery sumps, and all other related underground features at the facilities;
   (6) sampling procedures including, but not limited to:
      (a) sampling methods;
      (b) sample locations (both planimetric and vertical), identification (ID) numbers (map), and rationale (table);
      (c) survey of sample locations, including conversion to latitude/longitude coordinates in decimal degrees for entry into DEQ's EQuIS system;
      (d) frequency and order of sample collection;
      (e) decontamination of equipment to prevent cross-contamination;
      (f) sample media (soil, groundwater, surface water, sediment, air, dust, or waste) and objectives;
      (g) quality assurance/quality control (QA/QC) samples;
      (h) sample labeling procedures, with shipping and handling arrangements;
      (i) split sampling opportunity; and
      (j) analytical parameters, including:
         i) justification for choice of analyses;
         ii) laboratory and analytical method identification, including method detection limits;
         iii) comparison of the method detection limit to DEQ screening levels, including the most recent version of the EPA Regional Screening Levels (RSLs), Montana Numeric Water Quality Standards (DEQ-7), EPA Drinking Water Maximum Contaminant Levels, Montana Tier I Risk-

Based Corrective Action Risk-Based Screening Levels, EPA Region 3 Biological Technical Assistance Group Freshwater Sediment Screening Benchmarks (for sediment), or other screening levels identified by DEQ;

iv) sample containers, preservation and documentation methods, and holding times; and

v) laboratory-generated QA/QC samples.

(7) procedures (including any hazardous waste issues) for management of investigation-derived wastes (IDW) including, but not limited to, drill cuttings, purge water, wash water, and disposable equipment/clothing.

b. A QAPP presenting the policies, organization, objectives, functional activities, and specific quality assurance and quality control activities designed to ensure valid data that addresses:

(1) field QA/QC methods:

(a) standard operating procedures for field sampling methods;

(b) field documentation methods;

(c) frequency of QA/QC samples (duplicates, rinsates, blanks);

(d) field instrument calibration;

(e) preventative maintenance and corrective action procedures and schedule for field equipment;

(f) field chain of custody procedures.

(2) laboratory analytical protocol (LAP):

(a) laboratory identification;

(b) sample custody;

(c) analytical turn-around time;

(d) calibration procedures and frequency;

(e) data reduction, validation, and reporting;

(f) internal quality control checks;

(g) laboratory chain of custody procedures;

(h) performance system and audits, including corrective action procedures; and

(i) specific procedures for routine assessment of data precision, representativeness, accuracy, and completeness.

(3) data reduction, documentation, validation, reporting, and tracking procedures for both field and laboratory data (see "How to Prepare and Submit Data" at Cleanup & Reclamation Resources | Montana DEQ (mt.gov)).

c. A HASP describing the procedures to be employed to comply with applicable federal and state health and safety laws and regulations that address the following:

(1) levels of protection;

(2) hazard evaluation;

(3) waste characteristics;

(4) special site considerations;

(5) medical surveillance and emergency information;

(6) personnel responsibilities and training;

(7) decontamination procedures, including:

(a) entry and exit controls;

(b) disposal of wastes (IDW) from sampling effort; and

(c) equipment and personnel decontamination.

3. A description of any other information collection and evaluation activities necessary for the RI, such as:
   a. Vapor Intrusion - RI data may be used, along with other existing data, to evaluate vapor intrusion**.** As part of the development of the vapor intrusion conceptual site model, the RI will evaluate VOC concentrations in the groundwater and soil, potential current and future exposure pathways, soil type, and distance to existing or future structures and preferential pathways, including buried utility lines and other pathways of preferential VOC migration. If the Facility contaminants and soil characteristics indicate vapor intrusion may be a risk, further investigation including the collection and analysis of air/vapor samples will be necessary to evaluate the risk to human health.
   b. Fate and Transport - Fate and transport models may be used in the development of site-specific clean-up levels. If little is known about Facility contaminants and soil characteristics prior to developing the RI Work Plan, include provisions in the RI Work Plan for collecting the fate and transport data. Please see DEQ's Fate and Transport Modeling Guidance for sampling and data gathering requirements: Montana DEQ - General Field Data Needs For Fate And Transport Modeling - September 2008 (mt.gov). Fate and transport data collection typically includes organic carbon, pH, moisture content, bulk density, and particle size and may include sampling for Synthetic Precipitation Leaching Procedure (SPLP); see below for methodologies:
      (a) Total organic carbon – ASA Monograph #9, Part 2, Method 29-3.5.2
      (b) pH – EPA Method SW-846, 9045D, performed in the field
      (c) Moisture content – ASTM Method D2974
      (d) Dry bulk density – ASTM Method E1109
      (e) Particle size – ASA Monograph #9, Part 1, Method 15-2
      (f) SPLP
         I. SPLP analysis is useful for quantifying contaminant partitioning and mobility in site soils for metals and ionizing organic compounds. SPLP data can be used to define site-specific partitioning behavior (i.e., calculate the soil water partitioning coefficient or K_d) or to develop site-specific leaching to groundwater cleanup levels. To be useful, soil samples for both SPLP and the standard analytical method for the contaminant of concern must be collected from the same interval.
         II. Samples are collected from areas representative of the contamination at the facility, i.e. collecting samples from a range of known chemical concentrations and soil types.
         III. Data can be supplemented with literature values as opposed to field collected data.
   c. Asbestos – Some Facility operations may have asbestos present in gaskets, insulation, piping, building materials, etc. Include completion of an initial shoulder to shoulder survey to determine if any potential asbestos contaminated debris/materials are present.

2. A provision for submittal of a final RI Work Plan that incorporates all DEQ comments on the draft RI Work Plan and a provision for submittal of both a draft RI and a final RI that

incorporates all DEQ comments on the draft RI.

B. Components of the Remedial Investigation Report

The RI Report describes the results of the RI at the Facility and presents the results, along with historical data (if available). The RI Report may also summarize historical site activities, remedial actions, and other information pertinent to characterization of the Facility. The RI Report includes the following information (with references/citation to original sources of the information):

1. A general introduction describing the purpose and organization of the Report;
2. A summary of Facility history, compiled per Section A(1)(b) and (c), including an overview of the operational history, property ownership history, regulatory events, investigations, and interim actions.
3. A summary of the investigations conducted pursuant to the final RI Work Plan;
4. A summary of general field observations and any deviations from the final RI Work Plan, and how the deviations affect the objectives of the investigation;
5. A natural features characterization incorporating the information presented in the final RI Work Plan and any additional information on natural features characterization developed in the execution of the final RI Work Plan;
6. Data summary tables, sorted by media, as well as all validated field and laboratory analytical results. Laboratory analytical results reports and associated data validation reports may be separately presented in an appendix;
7. A presentation and evaluation of the QA/QC results according to the QAPP;
8. All field notes and borehole and monitoring well logs showing well construction details and driller's observations, which may be presented separately in an appendix;
9. All photographs, including pertinent details about the subject of the photograph, date taken, and photographer name, which may be separately presented in an appendix;
10. A presentation and evaluation of the results of the investigations conducted pursuant to the final RI Work Plan to include groundwater potentiometric surface maps, sample location maps, wetlands delineation, and hazardous or deleterious substance concentration maps [to include maps depicting distribution of non-aqueous phase liquid (NAPL) or sludge, contaminant concentrations, and the lateral and vertical extent of contamination, including lines depicting the DEQ-7 required reporting value and the human health standard, or other applicable screening levels as appropriate for the media];
11. An evaluation of the horizontal and vertical extent of contamination in each affected medium (cross sections may be necessary) and a comparison of the data to the standards and screening levels identified in the final RI Work Plan;
12. A discussion of potential hazardous or deleterious substance migration routes and human and ecological receptors;
13. A summary of any other pertinent information obtained during the RI;
14. An updated site conceptual model; and
15. Conclusions, including identification of and recommendations for filling any remaining data gaps.