

**ENVIRONMENTAL
SITE INVESTIGATIONS
IN
MANITOBA**

June 1998

Revised May 2002



PREFACE

This Guideline provides information and direction on the methods and protocols considered acceptable by Manitoba Conservation for the investigation of sites where the quality of groundwater, surface water, sediments and/or soil may have been affected by contaminants as result of past or present usage of the site.

The Guideline has been developed as a reference document for the use by environmental consultants, industry stakeholders, and the general public. The contents of this document include procedures for the investigation and characterization of sites which may possibly be contaminated sites; the requirements and regulations relating to the management of contaminated sites; and the procedures site stakeholders should follow in order to comply with existing government regulations.

This Guideline replaces the existing Manitoba Conservation document entitled, "A Guideline for the Investigation and Remediation of Petroleum Storage Sites in Manitoba, dated July, 1993". The 1998 document focuses not only on petroleum impacted sites, but encompasses the requirements for the investigation of sites potentially impacted by various contaminants. The Guideline reflects the principles established by the Canadian Council of Ministers of the Environment (CCME) for the management of sites in Canada and the requirements of *The Contaminated Sites Remediation and Consequential Amendments Act*, (CSRA) of Manitoba.

With the enactment of the CSRA, the term "contaminated site" now has a specific meaning in Manitoba. The definition is found in section 1.3. The generic term "site" has been used throughout this document to mean any location, whether a designated contaminated site or not, that may be subject to the processes described herein. Where the term "contaminated site" is used, it refers only to sites designated under the CSRA.

TABLE OF CONTENTS		PAGE
1.0 INTRODUCTION		3
1.1 Objectives		3
1.2 Background		3
1.3 Definitions		3
2.0 ASSOCIATED MANITOBA LEGISLATION AND GUIDELINES		4
2.1 <i>The Contaminated Sites Remediation Act</i>		4
2.2 Petroleum Storage Program		4
2.3 Hazardous Waste Management Program		4
2.4 Petroleum Contaminated Soil Treatment/Disposal		5
2.5 Submission of Remedial Action Plans		5
2.6 CCME Guidelines and Codes of Practice		5
3.0 REPORTING AND APPROVALS		6
3.1 Submission of Reports/Plans to Manitoba Conservation		6
3.2 Manitoba Conservation Approval		6
4.0 SITE INVESTIGATION		7
4.1 Introduction		7
4.2 Non-Intrusive Environmental Site Investigations		7
4.3 Intrusive Environmental Site Investigations		8
4.3.1 Investigation Plan		8
4.3.2 Field Investigation Methods		9
4.3.3 Laboratory Analysis		9
5.0 COMPARISON OF INVESTIGATION RESULTS TO CRITERIA		10
5.1 Site Classification		10
5.2 Tier 1 Evaluation (Criteria Based)		10
5.3 Tier 2 Evaluation (Site Specific Objectives)		10
5.4 Tier 3 Evaluation (Risk Assessment)		11
6.0 REPORT FORMAT		11
7.0 MANITOBA CONSERVATION OFFICES		13

1.0 INTRODUCTION

The Guideline for the Environmental Site Investigations in Manitoba, hereafter referred to as the Guideline, has been developed by Manitoba Conservation to assist stakeholders in understanding the technical and environmental issues associated with sites that may have been affected by contaminants. The Guideline is intended to provide environmental consultants with a baseline for conducting site assessments, characterizing sites and for developing applicable risk-based remedial action and management plans.

The investigative procedures are described in general terms on the assumption that site investigations will be conducted by qualified environmental professionals who are capable of adapting these procedures to deal with site specific conditions. Any major deviations from the Guideline are subject to review by Manitoba Conservation prior to their implementation.

Although this Guideline is not in itself a legally enforceable standard, parts of the document may be referenced in orders issued by Manitoba Conservation, which are legally enforceable.

1.1 Objectives

The principle objective of the Guideline is to provide direction for the investigation of sites where soil, sediment, surface water, and groundwater may have become impacted by contaminants. The Guideline also establishes a process whereby the party responsible for a contaminated site can work with the regulatory authority to ensure the protection of human health, safety, and the environment in an economically feasible and sustainable manner. Based on the completion of a site investigation and following the procedures outlined in this document, decisions regarding the designation of a site as contaminated, and the necessity for any management or remedial actions, will be made under the guidance and authority of *The Contaminated Sites Remediation Act (CSRA)*.

1.2 Background

The preparation of this Guideline included a review of various regulatory approaches to the environmental investigation and risk management of sites. The document was developed specifically for application to the highly variable geographic, geological, and environmental conditions present within the Province of Manitoba. One of the purposes of the Guideline is to provide a standard approach to site investigations that will ensure that the results can be applied consistently within the framework of the CSRA.

1.3 Definitions

The following section provides a number of definitions used in this Guideline.

“Contaminant” in relation to a site, means any product, substance or organism that is foreign to or in excess of the natural constituents of the environment at the site, and that:

- (a) has affected, is affecting, or may affect the natural, physical, chemical, or biological quality of the environment; or
- (b) is, or is likely to be, injurious or damaging to the health or safety of a person.

“Contaminated Site” means a site, designated under the CSRA, where contaminants are present at a level which poses or may pose a threat to human health or safety or the environment.

“Department” means Manitoba Conservation.

“Groundwater” means all water under the surface of the ground.

“Impacted Site” means a site where contaminants are present in concentrations above background levels, but which does not pose a threat to human health or safety or the environment.

“Remediation” means the improvement of a contaminated site to prevent, minimize or mitigate damage to human health or the environment. Remediation involves the development and application of a planned approach that monitors, removes, destroys, contains or otherwise reduces availability of contaminants to receptors of concern.

“Risk Management” means methods employed at a site to confine, control, monitor, or otherwise minimize the potential negative effects of contaminated media at the site. This is considered to be a form of remediation.

2.0 ASSOCIATED MANITOBA LEGISLATION AND GUIDELINES

This Guideline is intended to be applied in conjunction with existing Manitoba Conservation legislation dealing with sites and guidelines concerning hazardous waste and chemical storage. Specific guidelines/legislation which may have some relation to this Guideline are described in the following sections.

2.1 The Contaminated Sites Remediation Act

The CSRA provides a system for identifying and designating contaminated sites in Manitoba, and a means for identifying appropriate remedial measures, if any, to be undertaken in relation to specific sites. The CSRA also provides a fair and efficient process for apportioning responsibility for remediation of contaminated sites. Information regarding the processes involved in the designation of contaminated sites is provided in:

- Guideline for the Designation of Contaminated Sites in Manitoba (March 1997)

2.2 Petroleum Storage Program

Manitoba Conservation maintains records of existing, operating, and decommissioned petroleum storage sites within the Province of Manitoba through the Manitoba Conservation Petroleum Storage Program. Relevant documents pertaining to the Petroleum Storage Program include:

- *The Dangerous Goods Handling and Transportation Act* - Regulation 188/2001, Storage and Handling of Petroleum Products and Allied Products Regulation
- A Guideline for the Dismantling and Removal of Underground and Aboveground Petroleum Storage Tank Systems in Manitoba (January 2002)
- Bulletin: Testing of Underground Petroleum Storage Tank Systems (January 1996)

2.3 Hazardous Waste Management Program

The registration, transportation, and handling of materials classified as Hazardous Waste, is governed by Chapter D12 - *The Dangerous Goods Handling and Transportation Act*, which is administered by Manitoba Conservation. Relevant information is contained in:

- Compliance Guide to Manitoba’s Hazardous Waste Legislation (October 1993)

2.4 Petroleum Contaminated Soil Treatment/Disposal

Presently, Manitoba Conservation regulates the end use of petroleum contaminated soil, depending upon the nature and degree of severity of petroleum contamination. Information is provided in detail in:

- Guideline on Treatment and Disposal of Petroleum Contaminated Soil (April 2002)

2.5 Submission of Remedial Action Plans

Detailed written Remedial Action Plan proposals must be forwarded to Manitoba Conservation for review prior to the onset of any site remedial work. Information is provided in:

- Information Bulletin No. 96-02E Contaminated Sites in Manitoba Submission of Remedial Action Plans

2.6 CCME Guidelines and Codes of Practice

The Canadian Council of Ministers of the Environment (CCME) have generated a number of Guidelines and documents which can be used in dealing with sites in the Province of Manitoba, in association with provincial Guidelines, or where provincial Guidelines do not provide sufficient information for site specific issues. CCME documents commonly used in dealing with petroleum storage and contaminated sites include:

- Interim Canadian Environmental Quality Criteria for Contaminated Sites (September 1991)
- National Classification System for Contaminated Sites (Report CCME EPC-CS39E, March 1992)
- Subsurface Assessment Handbook for Contaminated Sites (Report CCME EPC-NCSR-48E, March 1994)
- Guidance Manual for Developing Site-Specific Soil Quality Objectives for Contaminated Sites in Canada (July 1991)
- A Protocol for the Derivation of Ecological Effects-Based and Human Health-Based Soil Quality Criteria for Contaminated Sites (July 1994)
- Environmental Code of Practice for Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products (CCME EPC-LST-61E, March 1993)
- Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products (CCME-EPC-LST-71E, August 1994)
- Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites (December 1993)
- Subsurface Assessment Handbook for Contaminated Sites (March 1994)
- A Framework for Ecological Risk Assessment: General Guidance (March 1996) and Technical Appendices (1997)
- Canadian Soil Quality Guidelines (March 1997)
- Guidance Document on the Management of Contaminated Sites in Canada (CCME PN1279, April 1997)

-
- Canadian Environmental Quality Guidelines (1999)
 - Canada Wide Standards for Petroleum Hydrocarbons in Soil (April 2001)

3.0 REPORTING AND APPROVALS

3.1 Submission of Reports/Plans to Manitoba Conservation

Submission of site investigation reports to the department is normally voluntary, however where the level of contamination exceeds the Environmental Quality Guidelines for the existing land use, it is recommended that the report be provided to Manitoba Conservation. In some cases submission of reports is required if the investigation was undertaken in order to comply with a remedial order or other regulatory provision administered by Manitoba Conservation.

Environmental site investigation reports that are submitted to Manitoba Conservation are reviewed by the department to determine the status of the site in reference to the Contaminated Site program.

1. Sites where contaminants were not detected are recorded in the department's database for future reference.
2. Sites where contaminants were found, but which are not designated as contaminated under CSRA, are considered to be impacted sites. The site is identified on the department's database and the status of the site is tracked. Tracking may include follow-up monitoring of site conditions or ascertaining any changes in site occupancy.
3. All relevant technical documentation relating sites designated as contaminated under the CSRA will be placed on the Manitoba Conservation Contaminated Sites Registry, which is made available for public viewing. Follow-up action is taken within the scope of the CSRA.

Copies of environmental investigation reports and related technical documentation submitted to Manitoba Conservation are kept on file at both the Winnipeg office of Manitoba Conservation and at the regional office responsible for the area where the site is situated. The addresses for Manitoba Conservation's offices are listed on page 16.

Remedial action plans for impacted or contaminated sites are required to be submitted to the department in order to assess the technical merit and suitability of the plan for successful site remediation, and compliance with existing regulations, health and safety issues. In addition, the scheduling for site remedial actions must be submitted to the department in order for Manitoba Conservation to provide on-site inspection of remedial activities, where deemed necessary.

Unless otherwise specified in a remedial order, all plans and reports should be directed, in duplicate, to the regional office of Manitoba Conservation in the region where the site is located. The addresses for Manitoba Conservation offices are provided on page 16.

3.2 Manitoba Conservation Approval

Upon completion of the review of an investigation report, Manitoba Conservation will, on request, provide a written response to the submitter. Typically the response will include comments on the investigation, a description of the department's position on the status of the site and an indication of what further action, if any, is required. Formal approval of a site investigation plan is not required unless specified as a condition of a remedial order. The department reserves the right not to provide written responses to reports on investigations which are not conducted in accordance with the principles described in this Guideline or for which insufficient data has been provided.

The concurrence of Manitoba Conservation must be obtained before implementing a Remedial Action Plan at a site. Upon receipt of closure report demonstrating that the remedial work has been completed to the satisfaction of Manitoba Conservation, a certificate of compliance will be issued by the department for designated contaminated sites. For non-designated sites, a closure letter will be issued by the department confirming the completion of the remedial work.

4.0 SITE INVESTIGATION

4.1 Introduction

The purpose of this section is to provide a summary of acceptable investigation approaches and methodologies for conducting site investigations. The methodologies presented in the following discussion are intended mainly for the benefit of stakeholders responsible for ensuring the execution of an appropriate site investigation. Following the procedures will provide a suitable investigative approach for most environmental site investigations conducted in Manitoba.

Although one set of standard investigative methods cannot be developed to fully apply to all situations, the approach and methods described in this document are adequate to meet the requirements for the majority of site investigations. Due to the variability in investigative techniques, specific methodologies are not described in this document. It is assumed that qualified professionals will be engaged to conduct site investigations employing accepted industry practices that conform to procedures published by CCME or other recognized standard setting organizations. Any major variations to generally accepted methods are subject to review and acceptance by Manitoba Conservation, prior to implementation.

In all investigations, qualified professional environmental consultants should be retained in order to design the most effective investigation program for any given situation or site. It is also recommended that the site investigation be conducted by an experienced assessment team with an interdisciplinary scientific approach, in order to ensure an effective investigation/sampling plan, proper collection of representative samples, interpretation of results, and to achieve both the regulatory and scientific objectives outlined in this Guideline document.

Site investigations can be divided into two types: non-intrusive and intrusive investigations.

4.2 Non-Intrusive Environmental Site Investigations

In some cases, a non-intrusive investigation, often referred to as a Phase I Environmental Site Assessment (ESA), may be undertaken at a site to determine the existence or potential for site contamination. A Phase I ESA is not an Environmental Audit, which is intended to address regulatory compliance of facility operations but may include some or all components of an environmental audit.

Further information on non-intrusive site investigations is contained in:

CSA Z768-94	Phase I Environmental Site Assessment
ASTM E1527-97	Standard Practice for Environmental Site Assessment; Phase I Environmental Site Assessment Process

For the purpose of identifying sites which may have been affected by contaminants, a Phase I ESA should consist of the following, as a minimum:

- review of property history through the use of time-lapse aerial photographs, insurance maps, land title searches, regulatory agency records, previous ESA reports, company records, geological and hydrogeological reports/maps
- interviews with present and past site occupants, government officials (federal, provincial and municipal), neighbours, etc.

-
- site visits to inspect site conditions, hazardous materials/dangerous goods storage and handling procedures, and to “ground-truth” assessments made in the historical review.

The results of the Phase I ESA should serve to identify areas of potential concern which could be verified during a subsequent detailed intrusive site investigation. The information gathered should be sufficient to identify and evaluate:

- the physical condition of the site and its geology, hydrogeology, facilities and surroundings, operational history, waste disposal practices, etc.
- potential key ecological receptors and pathways of exposure
- potential problem areas and contaminants of concern
- health and safety considerations
- areas requiring immediate or interim action
- a preliminary concept of scope of required site investigations
- adjacent land uses; and
- any proposed changes to the type of use of the subject site.

4.3 Intrusive Environmental Site Investigations

The objective of an intrusive investigation, also referred to as a subsurface investigation or Phase II ESA, is to characterize the contamination (degree, nature, estimated extent and media affected) and site conditions (geological, ecological, hydrogeological, and hydrological). Some of the activities conducted may include:

- sampling of potentially impacted media (soil, soil gas, groundwater, surface water); and
- analysis of potentially impacted media (field tests, lab analyses).

An intrusive investigation generally includes:

- a planning stage
- a field investigation program
- a monitoring program
- a laboratory analytical program
- an interpretation and evaluation stage
- report preparation

It is important that contingency provisions be incorporated into the investigation at each stage as additional site information becomes available.

Further information on intrusive site investigations is contained in:

CCME	Subsurface Assessment Handbook for Contaminated Sites (March 1994, EPC-NCSRP-48E)
ASTM	Standards Relating to Environmental Site Characterization (1997, PCN 03-418297-38)

4.3.1 Investigation Plan

The initial and perhaps most critical element of a contaminated site investigation is the investigation plan. The purpose of the plan is to ensure the collection of all data required to define the extent and relative degree of subsurface contamination. Site specific knowledge is required to design and execute an effective plan. A site reconnaissance is necessary to become familiar with the site and provide information required for plan development and implementation. Site specific factors can include:

- site history and adjacent land use
- site infrastructure

-
- identity of any potential contaminants that have been stored or handled at the site, including the current and past location of storage and handling areas
 - source, type, and estimated volume of any identified contaminant releases
 - site geology, hydrogeology, and hydrology
 - preferential contaminant migration pathways and proximity of receptors
 - underground utilities and services locations
 - presence of any environmentally sensitive areas

An investigation/sampling plan should describe the individual tasks and sampling effort, as well as when and how they will be performed. For the proper interpretation and evaluation of all data collected, the data must be generated by a scientifically effective and valid sampling program.

Key components of the investigation plan should include:

- field equipment requirements
- test hole location patterns for on-site and off-site investigations
- groundwater monitoring location, design, and construction
- soil/sediment sampling strategy and equipment
- groundwater monitoring and sampling strategy
- sample preservation and analytical considerations
- quality assurance and quality control program and data submission
- personnel and public health and safety requirements

Site specific knowledge of contaminant migration pathways, and the influence of geological, hydrological, physical-chemical and other factors, is often far from complete prior to initiation of field investigations. Subsurface assessments generally require a phased approach, regardless of the initially perceived size or scope of the investigation.

4.3.2 Field Investigation Methods

The number and placement of boreholes (test holes) or test pits, and monitoring wells required for an investigation will depend on the physical characteristics of the site and the nature of the potential contaminants. The initial phase of the investigation will concentrate on the areas where contaminants are most likely to be found in soil or groundwater. Typical areas would include fuel and/or chemical storage and handling sites, process tank areas and any areas with visible staining. The extent of the subsurface investigation will then be determined from the evaluation of the conditions encountered during drilling. Where contamination is encountered during a site investigation, the extent of the contaminant plume in soil and in groundwater must be delineated to the CCME Recommended Canadian Soil Quality Guidelines, Canadian Drinking Water Guidelines or Interim Criteria for the applicable land and water use category, unless otherwise agreed to by Manitoba Conservation.

Field investigation methods include:

- test hole drilling and soil/sediment sampling
- field screening/testing and measurements
- groundwater/soil vapour monitoring well installation
- groundwater monitoring and sampling
- field geophysical surveys

4.3.3 Laboratory Analysis

All laboratory analysis submitted to Manitoba Conservation as part of a site investigation report must be undertaken by facilities accredited by the Standard Council of Canada (SCC) or by another accrediting agency recognized by Manitoba Conservation to be equivalent to the SCC, or the analytical facility must be able to demonstrate that it has quality assurance/quality

control (QA/QC) procedures in place equivalent to accreditation based on the Canadian Standard CAN/CSA - Z753, extension of the international standard ISO 9000, Guide 25. Recommended laboratory analytical methods for the analysis of soil, sediment, and groundwater should conform to those cited by U.S.E.P.A., CCME Subsurface Assessment Handbook or approved by Manitoba Conservation. The department may request confirmation on the accreditation of the analytical facility as well as certification of the individual methodology.

5.0 COMPARISON OF INVESTIGATION RESULTS TO GUIDELINES AND CRITERIA

After sufficient data has been compiled to determine the degree of contamination on the site, the next step is a decision making process based on the results of the field work. Initially the site is classified, using established criteria, as to the priority for further action. Then the investigation results are used to establish remediation target levels based on the risk to public health and safety and the physical environment.

5.1 Site Classification

Site classification is the process whereby the findings of the site investigations are used to establish the priority for remedial action at the site. This is generally a reiterative process which can be applied several times as data from the site investigation is refined.

Based on the information provided by the Site Assessment, the site should be classified as to the relative risk to human health and the environment. Site classification can be undertaken employing "The National Classification System for Contaminated Sites" (CCME, 1992) or by employing similar evaluative processes such as the "Risk-Based Corrective Action Applied at Petroleum Release Sites" (ASTM E 1739-95).

Site classification must be undertaken as part of the site investigation process.

5.2 Tier 1 Evaluation (Criteria Based)

Initially, contaminant concentrations found in the site investigation will be compared to published Environmental Quality Guidelines (EQG). For contaminants in soil, the default EQG will be the CCME Recommended Canadian Soil Quality Guidelines. EQG for surface and groundwater will be dependent on the potential usage of the water resource. In most cases either the Guidelines for freshwater aquatic life or the Canadian Drinking Water Standards will apply. This initial comparison will be used to determine the site classification and possible designation under the CSRA. Where a Tier 2 or Tier 3 evaluation is not conducted as outlined below, the EQG will also be the default remediation levels.

It should be noted that default EQG generally include very conservative risk estimates and the use of these criteria may result in decisions on remedial action which are more stringent than the actual site conditions require. Before a decision is made to use the EQG as the default remediation criteria, consideration should be given to site specific conditions and comparison of the pathways and receptors at the site to those used in the development of the EQG.

The use of alternative generic EQG for Tier 1 evaluation requires prior authorization by the department. Where specific EQG are not available, or detailed site specific information should be applied, or where human health and/or environmental risks cannot be effectively quantified, the Tier 2 or Tier 3 evaluation processes would be applied.

5.3 Tier 2 Evaluation (Site Specific Objectives)

The Tier 2 Evaluation essentially involves limited modifications to existing EQG for use as site specific remediation objectives. In cases where there are no specific remediation criteria

Guidelines available, other environmental quality criteria may be evaluated with respect to site specific conditions. In situations where site conditions, land use, receptors, or exposure pathways differ from those assumed in the protocol used to establish the EQG for various land use scenarios, the Tier 2 Evaluation can be employed.

Additional site assessment work is likely required for this evaluation. Both direct and indirect exposure scenarios would be addressed. Simplistic modelling based on descriptions of relevant physical/chemical phenomena would be applied. Modification to the EQG will be based on the measured and predicted attenuation of the contaminant(s) of concern. As in the case with Tier 1 Evaluation, an evaluation is made with respect to the sources, concentration and distribution of the contaminants, transport mechanisms, exposure pathways, and current and future land use, by applying the information from the Site Assessment and Site Classification, and the additional information obtained from the Tier 2 site assessment. It should be noted that only the Canadian Environmental Soil Quality Guidelines may be modified. The modified guidelines must consider both human health and environmental pathways and receptors, and be based on the most conservative estimate.

5.4 Tier 3 Evaluation (Risk Assessment)

The criteria-based approach may not be suitable for a site when pathways of exposure, contaminants, receptors, or other site characteristics vary significantly from those used to establish the EQG. Site Specific Remediation Objectives should be developed using risk assessment when:

- EQG are not available for the contaminants of concern and/or data needed to derive such Guidelines are not available
- site conditions, receptors, and/or exposure pathways differ significantly from those assumed in the derivation of Guidelines
- there are significant ecological concerns (e.g. critical or sensitive habitats for wildlife; rare, threatened or endangered species; parkland or ecological reserves; hunting or trapping resources); and
- there are unacceptable data gaps (e.g. contaminants for which little published information is available; unpredictable or uncertain exposure pathways or partitioning of a contaminant; uncertainty about hazard level or other pertinent information).

There are two basic types of risk assessment: Human Health Risk Assessment and Ecological Risk Assessment. One or both of these types of assessment may be required to be utilized for the development of Site Specific Remediation Objectives. The risk assessment would apply sophisticated statistical and contaminant fate and transport analysis, using site-specific input parameters for both direct and indirect exposure scenarios.

6.0 REPORT FORMAT

Site investigation reports that are forwarded to Manitoba Conservation for review should conform to the following format and provide the information specified below (as a minimum):

A) Introduction

- proponent's name and address
- investigator's name and address
- site legal description and municipal address

B) Background

- site occupants or business, relevant site history, previous investigations, and identified contaminant releases

C) Site Description

- subject site and surrounding land use

-
- on-site and adjacent infrastructures
 - applicable site and surrounding land use maps showing site location, infrastructures, and underground structures and services

D) Field Investigations

- rationale for investigation/sampling plan
- detailed procedures used for investigations conducted including QA/QC
- test hole, sample, and monitoring well location plan at an appropriate scale
- test hole logs and monitoring well completion drawings and details
- field screening/testing results
- site monitoring data (field measurements, vapour concentrations, depth to groundwater, product thickness, etc.)
- site topography
- principal groundwater flow direction
- visual evidence of surficial contamination
- contour plans of the site clearly illustrating contaminant concentrations in all phases and impacted media (i.e. soil/sediments, groundwater, surface water, dissolved phase, vapour phase, immiscible liquid phase). Diagrams will clearly indicate if “zero” contaminant closure is attained on-site or if off-site contamination is present/assumed.

E) Laboratory Investigations

- contaminant compound(s) identified
- analysis rational (i.e. number of samples and analytical parameters)
- soil/sediment and groundwater analytical results with supporting documentation
- laboratory QA/QC procedures and QC sample results

F) Data Evaluation

- site geological and hydrogeological conditions
- subsurface contaminant type(s) encountered
- field analytical and field monitoring data
- interpretation of laboratory analyses
- evaluation of impacted/contaminated media

G) Site Investigation

- site classification and conclusions
- extent and degree of severity of contamination identified
- contaminant(s) concentrations in relation to applicable regulatory criteria and/or risk-based derived criteria
- environmental conditions and health/safety concerns

H) Conclusions and Recommendations

- interpretation of site investigation
- immediate response requirements if required
- potential remedial action options/technologies if required
- additional investigative work, as required

7.0 MANITOBA CONSERVATION OFFICES

Red River Region Winnipeg - 945-7100

Manitoba Conservation
123 Main Street, Suite 160
Winnipeg MB R3C 1A5

Red River Region Steinbach - 346-6060

Manitoba Conservation
P. O. Box 2019
5, 284 Reimer Avenue
Steinbach MB R0A 2A0

Red River Region Winkler - 325-1750

Manitoba Conservation
Main Plaza, 555 Main Street
Winkler MB R6W 1C4

Red River Region Portage la Prairie - 239-3187

Manitoba Conservation
25 Tupper Street North
Portage la Prairie MB R1N 3K1

Interlake Region Selkirk - 785-5030

Manitoba Conservation
Lower Level, 446 Main St.
Selkirk MB R1A 1V7

Eastern Region Lac du Bonnet - 345-1486

Manitoba Conservation
Lac du Bonnet Health Centre
P.O. Box 4000
Lac du Bonnet MB R0E 1A0

Western Region Brandon - 726-6064

Manitoba Conservation
1129 Queens Ave.
Brandon MB R7A 1L9

Sub-Office (Virden) - 748-2321
Sub-Office (Dauphin) - 622-2030

Northwest Region The Pas - 627-8307

Manitoba Conservation
Provincial Building
P.O. Box 2550
The Pas MB R9A 1M4

Sub-Office (Flin Flon) - 687-1625

Northeast Region Thompson - 677-6703

Manitoba Conservation
59 Elizabeth Dr. Provincial Bldg.
P.O. Box 32
Thompson MB R8N 1X4