

Guideline 97 - 01

**GUIDELINE
FOR THE DESIGNATION
OF
CONTAMINATED SITES
IN MANITOBA**

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1.0 INTRODUCTION

Historical practices, most of them environmentally unacceptable today, have created current conditions that could potentially harm human health and the environment. These activities include the improper use, handling, storage and disposal of materials containing chemicals with the potential to cause toxicity. In many cases, release of these chemicals into the environment has resulted in “unsafe” exposures to humans and the environment.

Manitoba’s Contaminated Sites Remediation Act (CSRA) defines a site as contaminated if, “having regard to any current, permitted or foreseeable use of a site, that the site is contaminated at a level which poses or may pose a threat to human health or safety or to the environment”. However, throughout North America, many sites with contamination that would not pose a threat to human health or safety, or to the environment have been remediated for economic reasons and land transaction purposes. Although remediation for these reasons is not discouraged by Manitoba Conservation, emphasis should be placed on sites that pose risks to human health and the environment. The CSRA embodies the risk-based principle to designate contaminated sites in Manitoba. This document has been developed to outline the evaluative process that applies risk-based protocol to designate contaminated sites in Manitoba.

1.1 Scope

This document is consistent with, and applies, the scientific protocols described in the “Guidance Document on the Management of Contaminated Sites in Canada” (Canadian Council of Ministers of the Environment [CCME]) and the “Risk-Based Corrective Action Applied to Petroleum Release Sites” (ASTM E 1739-95). Similar risk-based approaches are used in other Canadian and American jurisdictions for assessment and management of contaminated sites.

The Designation/Evaluation Process consists of a Site Assessment, Site Classification and a three tier Evaluation component to designate and manage contaminated sites in Manitoba (Figure 1). The first tier of the Evaluation component applies existing Environmental Quality Guidelines (EQG) in the determination of possible site Designation and appropriate remediation criteria. The second tier provides for the modification of EQG or other appropriate environmental quality criteria in the determination of site Designation and appropriate remediation criteria. The third tier provides for the application of a site specific risk assessment to establish appropriate EQG and determine the site Designation and appropriate remediation criteria. The selection and application of the appropriate site evaluation methodology, Tier 1, Tier 2 or Tier 3, is made by the responsible party(ies).

2.0 DESIGNATION/EVALUATION PROCESS

2.1 Site Assessment

The initial step in determining whether a site should be designated as a contaminated site is to conduct a site assessment. The first phase of this assessment may begin with the review of all available historical and current site information. This work includes the reviewing of all data gathered for legal, transactional or environmental reasons.

The review can also include site inspections and discussions with personnel and local residents informed about the site and its history. The following three broad areas are covered in conducting the first phase of a site assessment:

- **Facility Characteristics**

This includes a historical description of the site and its facilities, and past and present contaminant sources and discharge points. Visual inspection, reviewing of facility records and discussions with informed personnel are also employed.

- **Contaminant Characteristics**

Contaminants that may be present on the site are identified and their quantities and concentrations are estimated.

- **Physical Site Characteristics**

The geology, hydrology, hydrogeology, and geomorphology are examined using a number of sources to conduct a literature review of any available data about the site.

The information gathered should be sufficient to identify and evaluate the following:

- physical condition of the site, 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;
- preliminary concept of scope of required site investigations; and
- proposed future land use and adjacent land uses.

The second phase of the assessment is to characterize the contamination (degree, nature, estimated extent and media affected) and site conditions (geological, ecological, hydrogeological, and hydrological conditions) so an effective remedial plan can be developed (if necessary) or to identify the need for more detailed investigations. Further study may be necessary to determine risks to public health, safety or the environment. This may take the form of human health and ecological risk assessments using investigation data obtained in the site assessment step.

This phase of the assessment may include some or all of the following:

- field screening;
- sampling program;
- hydrogeological investigations;
- groundwater flow and contaminant transport models; and

- bioassessment.

2.2 Site Classification

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).

2.3 Tier 1 Evaluation (Criteria Based)

Applying the information from the Site Assessment and Site Classification, an evaluation is made with respect to the sources, concentrations and distribution of contaminants, transport mechanisms, exposure pathways, receptors, and current and future land use. Where contaminant concentrations exceed the existing EQG, and potential risk to human health and/or the environment, the site will be designated as a contaminated site. Designation requires both exceeding the EQG and identification of potential risk to human health and/or the environment. Although the EQG provide the default basis for designation and remediation levels for the site, particular consideration is given to site specific conditions and comparison of the pathways and receptors at the site, to those used in the development of the EQG. It should also be noted that these guidelines provide a conservative estimation of risk, designed to capture the maximum number of sites for evaluation.

Where a site is designated as a contaminated site under this evaluation process, development of a Remedial Action Plan would be based on achieving the EQG criteria. 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.

2.4 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 modeling 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.

Where contaminant concentrations exceed the modified EQG and potential risks to human health and/or the environment, the site will be designated as a contaminated site. Development of a Remedial Action Plan would be based on achieving the modified EQG. Where appropriate environmental quality criteria are not available, site specific characteristics vary considerably from the criteria approach (EQG), and/or human and environmental health risks are cannot be adequately assessed, the Tier 3 evaluation process would be applied.

2.5 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 than 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.

Where contaminant concentrations exceed the Site Specific Remediation Objectives determined by the risk assessment, and potential risk to human health and/or the environment, the site will be designated as a contaminated site. Development of a Remedial Action Plan would be based on achieving the Site Specific Remediation Objectives established by the risk assessment.

3.0 REMEDIAL ACTION PLAN

When site remediation is determined to be appropriate to minimize or eliminate the hazards associated with both designated contaminated sites and sites where contamination exists, or where the director issues a remediation order, a Remedial Action Plan proposal is to be forwarded to Manitoba Conservation pursuant to Information Bulletin No. 96-02E.

4.0 TRACKING

Sites that are impacted with contaminants that exceed the lowest established EQG criteria, but are determined through the Designation/Evaluation Process not to be designated contaminated sites, will continue to be tracked by Manitoba Conservation. These sites will be entered on the Manitoba Sites Database and tracked to ensure that in the event that residual contamination results in some form of exposure concern in the future, the sites will be re-evaluated for possible designation and remediation.

FIGURE 1
GUIDELINE
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