

## Demonstration Trial Guidance Hazardous Waste Regulation

### Purpose of this document

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This document is intended to assist applicants and their agents in preparing a demonstration trial for the treatment of hazardous waste under the Hazardous Waste Regulation. By providing complete and accurate information in accordance with the Ministry of Environment and Climate Change Strategy (ENV) guidance documents, your application is less likely to experience delays or rejection.

### How to use this document

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Applicants should develop documents for submission to the ministry using guidance and templates and following site-specific application instructions provided during the structured application process.

Within the template, text in *green italics* is for your information only and should be removed prior to submission. Text framed by square brackets “[ ]” indicate it may be necessary to insert text. Black text and tables are recommended by the ministry. Template text can be modified if equivalent information is included with adequate rationale.

The ministry expects submissions to be written in a manner that allows them to be implemented with certainty and consistency. Avoid the use of language that is ambiguous, vague or qualitative such as: appropriate, reasonable, general, suitable, and regularly. Provide clarity by stating what will be done and include a specific frequency and method where relevant. The HWR provides an opportunity for a person to apply for a change in requirements under section 51 by proposing a substitution to a specific requirement.

#### **Disclaimer**

*The guidance provided in this document helps to clarify ministry policy and the provisions of the Environmental Management Act (the Act) and the Hazardous Waste Regulation (HWR). This is not a legal document and the information in it does not constitute legal advice or impose any legally binding requirements. Guidance provided in this document does not replace the Act, the HWR or any other applicable law. Any amendments to the Act, the HWR and other legislation referred to in this document may affect provisions of the guidance; in the event of an inconsistency, the Act, HWR or other applicable legislation will prevail.*

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## DEMONSTRATION TRIAL OVERVIEW

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This section contains general, overarching guidance on demonstration trials. Guidance specific to the demonstration template follows.

### What is a Demonstration Trial?

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A demonstration trial is a test designed to prove the effectiveness of each process intended to treat or destroy hazardous waste. Demonstration trials may cover different kinds of tests. For proven technology, the demonstration trial may test the expected outcomes of a commissioning period for the full-scale process. In other cases, a demonstration trial may be needed at bench or pilot scale to test specific treatment conditions, or to show whether a treatment process is viable. Demonstration trial requirements are listed in sections 18(2) through 18(4) of the HWR, and section 20(2) includes requirements specific to thermal treatment and incineration.

### When is Demonstration Trial Approval Required?

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An approved demonstration trial is required before beginning operation of a hazardous waste treatment facility. The proposed design of the trial must be submitted to the ministry for consideration and requires approval before the trial is run.

A demonstration trial is required for all proposed hazardous waste treatment processes. Within the HWR, treatment is defined as the handling or processing of hazardous waste in such a manner as to change the physical, chemical or biological character or composition of the hazardous waste.

The requirement for an approved demonstration trial is separate and independent of whether hazardous wastes and associated residues are intended for delisting. There is, however, an exemption from the requirement for a demonstration trial for on-site treatment facilities if the process is used only for volume reduction, as per HWR section 2(6).

### Demonstration Trial Report

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Following completion of an approved demonstration trial, a report that documents the findings of the trial must be submitted to the ministry, as per HWR section 18(4) and 20(2)(b). The demonstration trial report does not require ministry approval and submission of the report does not authorize any activities at the facility. The demonstration trial report may be used to support other HWR applications, such as:

- Approval of a new or amended operational plan and/or plans and specifications, as per HWR section 4(1), and/or
- Approval of a delisting protocol to exempt hazardous waste and treatment residues from the requirements of the HWR, as per section 53(2).

## Plan Approvals

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Facilities are required to be built, installed and operated in accordance with approved operational plans and plans and specifications. Demonstration trials may be approved before or after these plans are approved. A test for whether plan approvals are required first is whether the facility requires new or updated plans to store the waste before the trial can be run. In this case, plan approvals will be required before, or concurrently with the demonstration trial approval. If approval to store the waste already exists or is not needed for the purposes of the trial, applicants may be able to run the trial prior to or during the application process for plan approvals. Site-specific details will be communicated to applicants during preliminary application phase of the ministry's [structured application process](#).

## GUIDANCE FOR USING THE TEMPLATE

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Refer to the guidance sections below in conjunction with the corresponding sections of the demonstration trial template.

Qualified professionals are expected to prepare certain sections of the demonstration trial, as indicated below. For the definition of a qualified professional and information on the ministry's professional reliance model, please refer to the ministry's [Professional Accountability Policy website](#).

### 1.0 Purpose of the Trial

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This section of the demonstration trial addresses HWR sections 18(2) and 20(2)(a). State the overall goal of the treatment process and the specific objectives designed to demonstrate treatment effectiveness.

The overarching goal of the treatment process provides context for the trial objectives. The treatment goal should state:

- The name of the hazardous waste to be treated, using terminology consistent with the HWR and the facility's operational plan, and
- The treatment process that is under trial.

Specific objectives of the demonstration trial must be stated in clear language. The objective(s) should relate to:

- Scale of trial (e.g. full, pilot or bench scale);
- Parameters of interest in the waste;
- Characteristics of the treatment residues; and/or,
- Operational conditions of the treatment process.

Examples of language that could be used in a demonstration trial objective is provided in Table 1 below. These examples are provided for contextual purposes only. The combination of phrases needed to compile an objective will be unique to the purpose of the trial.

*Table 1 Example: Treatment goals and demonstration trial objectives*

Treatment goal	Demonstration trial objective
Sterilization of biomedical waste (waste sharps)	To show that the autoclave [model] as installed in the facility reduces indicator bacteria [type] within the waste to [level] when operated at [temperature, pressure, time], for the range of wastes proposed for treatment.
Physical stabilization of waste oil (catch basin sludge)	To establish procedures and the type of amendment materials that when utilized, result in an angle of repose of [angle] that can be maintained for [time].
Neutralization of TDG class 8 corrosive waste (acidic process effluent)	To determine at bench scale: <ol style="list-style-type: none"> <li>1) The dosing of neutralizing agent [specify] required to bring pH to HWR schedule 1.2 levels for input into an industrial treatment system.</li> <li>2) The maximum dosing of neutralized hazardous waste the industrial effluent treatment system can assimilate, while meeting permitted effluent discharge limits [specify limits].</li> </ol>
Incineration/destruction of waste oil (hydrocarbon contaminated soil)	To determine, in accordance with HWR section 20(2)(a): <ol style="list-style-type: none"> <li>1) The operating conditions [list] and associated destruction removal efficiency and combustion efficiency that maximize treatment and minimize pollutant loading, and</li> <li>2) The ambient concentrations of principal organic hazardous constituents and products of incomplete combustion when operating at the conditions determined via objective 1.</li> </ol>

## 2.0 Treatment Process

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This section provides context for the demonstration trial to allow the reader to fully conceptualize the proposed treatment process. Reference plans and specifications for the treatment works if available at the time of the trial and/or provide supporting information for the treatment process in Appendix A.

Describe all process components, inputs, outputs and controls. Include, and reference, a treatment process diagram if there is more than one step in the treatment process. The description in the text and the process diagram should identify:

- Individual components and configuration of the treatment system.
- Treatment system inputs (hazardous wastes, reagents, etc.).
- Treatment system outputs including:
  - Treatment residues including liquid and solid end products and byproducts of the treatment process, and
  - Emissions / air contaminants as defined in the (Environmental Management Act) generated through the treatment process.
- Points of operational control.
- Points of waste and/or system monitoring.

### 2.1 Waste Characteristics

This section addresses HWR section 18(3)(b) and 20(2)(a)(i). Provide a qualitative and quantitative description of the expected range of physical, chemical and biological properties of:

- The hazardous waste to be treated,
- Treatment residues, including liquid and solid end products and byproducts of the treatment process, and
- Emissions to the atmosphere resulting from the treatment process.

Identify and describe expected parameters of interest in each of these wastes in terms of hazardous waste definitions, HWR standards and/or other relevant criteria. Show each waste described in this section in the treatment process diagram.

Describe variability that is expected or predicted in the characteristics of each of the various wastes associated with the proposed treatment process. Also describe the factors that influence the quality of the wastes. Provide justification for the assumed variability and identify data gaps.

Prior to running the trial, the amount of information available regarding waste characteristics will vary with the degree of pre-existing information available on the treatment system and the hazardous waste. If relying on pre-existing information to describe waste characteristics, speak to the confidence that pre-existing information can be relied upon for the site-specific situation and provide rationale. In all cases, monitoring will be required in the trial to establish or confirm the waste characteristics. The degree of confidence in pre-existing information should inform the scope of the demonstration trial monitoring program.

## **2.2 Operating Conditions**

This section of the demonstration trial addresses HWR sections 18(3)(c) and 20(2)(a)(iv). Provide a description of operating conditions in the treatment process including but not limited to temperatures, pressures, and residence times. Other conditions critical to operation of the system should also be included.

Identify the optimal and proposed conditions required to achieve effective treatment. Describe how fluctuations of the ambient environment and/or the hazardous waste will affect these conditions. State any measures planned to prevent impacts to the effectiveness of treatment.

For thermal treatment or incineration facilities, also describe the expected destruction and removal efficiency and combustion efficiency in this section, as outlined in HWR sections 20(2)(a)(ii-iii).

## **3.0 Methods**

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HWR sections 18(3)(a) and 20(2)(a) require a demonstration trial to provide an adequate test of the proposed treatment process. In section 3.0, describe the design of the trial as test of the trial objectives. Specify all operational targets. Include a diagram if useful.

State the hazardous waste sources and amounts. Describe the scale of the test compared to full scale proposed or assumed operations. Provide a timeline for completion.

Provide justification for the test methods used in the trial. Speak to the scope of the trial and its ability to capture variability representative of proposed or assumed full-scale operations and real-world conditions.

### **3.1 Monitoring Program**

Describe the monitoring program designed to test the objectives of the demonstration trial. Monitoring should assess characteristics of hazardous waste, liquid and solid treatment residues and emissions to

the atmosphere. As stated above, the scope of the monitoring program should be scaled based on the amount and reliability of pre-existing information.

Summarize the monitoring program for the trial in tabular format as shown in section 3.2 of template.

### **3.2 Data Analysis**

Describe any analysis planned for the data from the trial, including the purpose of the analysis, statistical methods, etc. Describe the criteria that the data will be compared against. Include HWR standards and any other relevant parameters and comparative criteria. Data manipulation, assumptions and data gaps should be identified and discussed as part of the trial.

### **3.3 Quality Assurance / Quality Control**

Describe the QA/QC program designed to inform reliability of the trial.

## **4.0 Detrimental Effects**

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This section addresses HWR section 18(3)(d) and 20(2)(a)(v). Provide a description of any conditions which may cause a detrimental effect on human health or the environment. Indicate what the condition is and the level at which it becomes a concern. Describe the nature of the detrimental effect including comparison to ambient criteria and/or discharge limits if relevant. Should detrimental effects be related to worker safety, refer to WorkSafe BC for further information.

Describe any mitigation activities that will be employed to reduce the detrimental effects identified in this section (e.g. emissions treatment, operational controls).

In some cases, a demonstration trial may include an effects assessment within the receiving environment. For incinerators and thermal treatment facilities, the trial must assess the local meteorological conditions and ambient concentrations of parameters of potential concern from air emissions, in accordance with HWR section 20(2)(a)(v). Other types of hazardous waste treatment processes may also warrant an effects assessment, either in ambient air or water.

Monitoring programs for effects assessments must be presented in tabulated format (see template). Effects assessments are expected to be developed by appropriately qualified professionals and accompanied by a description of the objectives, methods and rationale. Rationale should describe assumptions, data gaps and an evaluation of the ability of the effects assessment to capture variability expected during full-scale operations.



## 5.0 Demonstration Trial Report

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This section addresses HWR sections 18(4) and 20(2)(b). Specify that a report will be submitted that includes all the information outlined above. Indicate the timeline for submitting the report to the ministry.

In some cases, a qualified professional may be necessary to assess and confirm the results and reliability of the trial and sign off on the demonstration trial report. This will be communicated during the preliminary application phase of the ministry's structured application process.

## 6.0 Certification

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The demonstration trial should be certified by the author, which may be the facility owner/operator or an agent of the owner /operator. Having a qualified professional certify the trial may reduce application processing time but is not required in all cases. Expectations regarding qualified professionals will be communicated during preliminary application phase of the ministry's structured application process.

## 7.0 Supporting Documentation

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Supporting documentation should be provided in appendices. The content of the appendices should be scaled to the complexity of the treatment system and the proposed demonstration trial.

In some cases, treatment system design information is complete prior to running the demonstration trial and is provided in plans and specifications, submitted concurrently with or prior to submission of the demonstration trial. In these cases, reference the plans and specifications in the trial. In other cases, the treatment system design is conceptual at the time of the demonstration trial and plans and specifications are not ready for submission prior to running the trial. In these cases, provide conceptual design information to support the demonstration trial application in appendices.

*Note:* Government discloses information in accordance with the *Freedom of Information and Protection of Privacy Act* (FOIPPA). Information harmful to business interests is restricted from disclosure as per FOIPPA section 21. Should an applicant have concerns about release of information contained within the demonstration trial, the applicant may store the information in a dedicated appendix, with reference to FOIPPA section 21. In this case, please provide rationale as to how section 21 applies in order to assist in any potential future harms assessment by government.

## DEMONSTRATION TRIAL TEMPLATE

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**Hazardous Waste Regulation**  
**Section [18 or 20(2)] Demonstration Trial for**  
**[specify treatment process and waste type]**

*E.g. Section 18 Demonstration Trial for Neutralization of TDG Class 8 Corrosive Waste Liquids*

**Company Legal Name:** *as registered with the B.C. Corporate Registry*

**Doing Business As:** *if applicable*

**Facility Address:**

[Civic Address], [Municipality], [Postal Code],

*If the facility does not have a civic address, provide alternative location information (latitude and longitude), and driving directions to the facility. P.O. Box numbers are not acceptable for the facility address.*

**Ministry Registration Number(s):** [RS# and/or BCG#]

**Document Version Number:** [##] *most recently updated version number*

**Document Date:** [YYYY-MM-DD] *date of most recent approved plan*

**Demonstration Trial**  
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- 4.0 DETRIMENTAL EFFECTS
- 5.0 DEMONSTRATION TRIAL REPORT
- 6.0 CERTIFICATION

Appendices – Supporting Documentation

## 1.0 PURPOSE OF THE TRIAL

*Specify the treatment goal and the objective(s) of the demonstration trial.*

## 2.0 TREATMENT PROCESS

*Describe the treatment process tested by the trial, including all process components, inputs, outputs and controls. Include a diagram of the treatment process.*

### 2.1 Waste Characteristics

*Describe the nature of all hazardous wastes, treatment residues and emissions.*

### 2.2 Operating Conditions

*Describe temperatures, pressures, residence times and other relevant conditions to ensure effective treatment.*

## 3.0 METHODS

*Describe the test (methods) used in the trial. Include the source of the waste, the scale of the trial and the timeframe for completion. Provide rationale for the scope and design of the trial. Describe how variability is accounted for.*

### 3.1 Monitoring Program

*Describe and tabulate the monitoring programs to be carried out during the trial for hazardous waste, treatment residues, emissions and operational conditions.*

Table 1: Waste Characteristics Monitoring Plan

Waste Type	Waste Description	Monitoring Method	Monitoring Frequency	Parameters Analyzed

*Table 2: Operational Conditions Monitoring Plan*

<b>Process Monitored</b>	<b>Monitoring Method</b>	<b>Monitoring Frequency</b>	<b>Parameters Analyzed</b>

**3.2 Data Analysis**

*Describe any analysis planned for the data from the trial.*

**3.3 Quality Assurance / Quality Control**

*Describe the QA/QC program designed to inform reliability of the trial.*

**4.0 DETRIMENTAL EFFECTS**

*Describe detrimental effects that may occur to either the environment or human health as a result of the trial and/or full-scale treatment as well as the conditions that may lead to the effects. Describe how potential detrimental effects will be mitigated and assessed during the trial.*

**5.0 DEMONSTRATION TRIAL REPORT**

*Specify the reporting that will be conducted following completion of the trial. Include a timeframe for submission of the report.*

## 6.0 CERTIFICATION

This demonstration trial was prepared in accordance with and meets the requirements of the Hazardous Waste Regulation. The information is true and complete to the best of my knowledge.

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Name of Author

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Signature

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Title

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Stamp, if applicable

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Name of Company

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Date and Stamp

## APPENDICES – SUPPORTING DOCUMENTATION

REVISION HISTORY			
Approval Date	Effective Date	Document Version	Notes
March 27, 2020	n/a	Ver. 1	Guidance document created
May 13, 2020	May 2020	Ver. 2	Content updates and enhancements
June 22, 2020	June 22, 2020	Ver. 3	Title updated