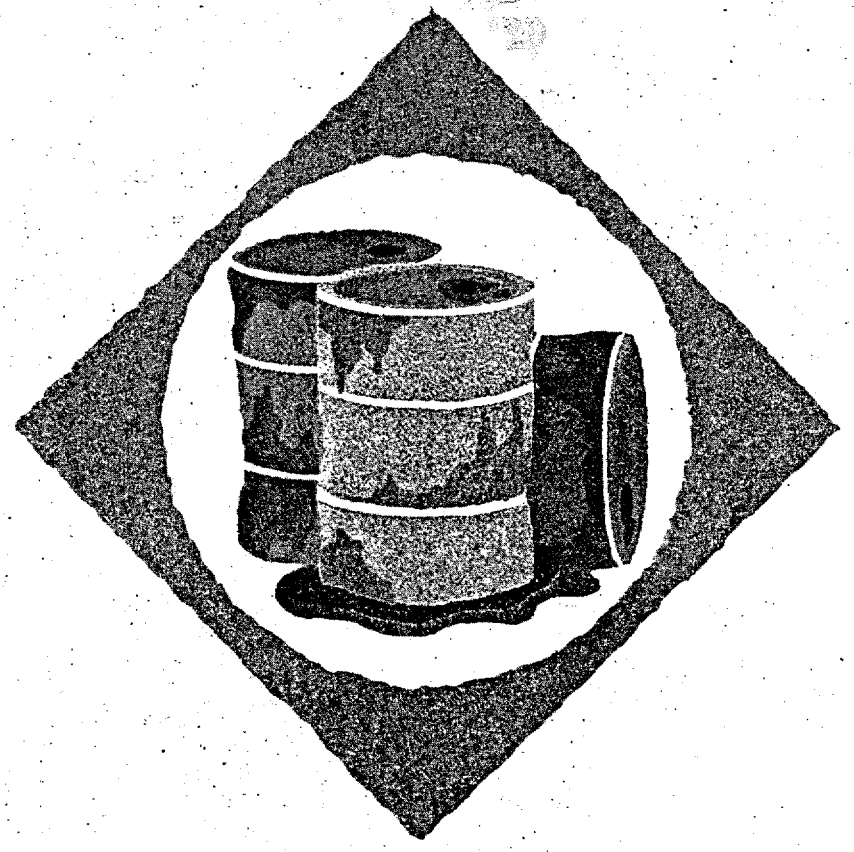
ENVIRONMENTAL GUIDELINE *for* SITE REMEDIATION



Northwest Territories Resources, Wildlife & Economic Development

September 1994

Guideline for Contaminated Site Remediation in the N.W.T.

1 Introduction

The purpose of this guideline is to help you solve a contamination problem on your property by setting standards for site remediation. This guideline will focus on hydrocarbons because they are the most common type of contaminant in the N.W.T. However, the principles outlined here can be applied to other types of site contamination. Section 2.2 of the *Environmental Protection Act* gives the Minister of Renewable Resources the authority to develop, coordinate and administer these guidelines (see Appendix).

1.1 Definitions:

CCME	• Canadian Council of Ministers of the Environment
Commissioner's lands	• Lands in the N.W.T. that have been transferred by Order-in-Council to the Government of the Northwest Territories. This includes highways, block land transfers and most lands within municipalities.
Contaminant	• (see Appendix)
Contaminated site	• Areas of land, water, ground water, or sediments that have levels of contaminants exceeding the remediation criteria. Contaminant sources can include on-site burial of wastes, non-point chemical releases (small, frequent drips and spills), stockpiling and storage of materials, major spills, and releases during fires. Contamination may also be due to illegal dumping of contaminated soil. Contaminated sites may have short or long term consequences to people or the environment.
Remediation	• The management of the contaminant at a site so as to prevent, minimize, or mitigate damage to human health, property, or the environment. Remediation is a broader term than clean-up in that remediation options can include physical actions such as removal, destruction, and containment, as well as the use of institutional controls such as zoning designations or orders.
T.P.H.	• Total petroleum hydrocarbons, (includes total purgable and total extractable hydrocarbons).

1.2 Roles and Responsibilities

The Department of Renewable Resources, Environmental Protection Division (EPD), is the main contact concerning remediation of contaminated sites on Commissioner's Land. EPD determines the required level of remediation using the remediation criteria cited in these guidelines. EPD also reviews your remediation plan and monitors the progress of the project. It is your responsibility to remediate the site to acceptable levels. As there may be health or safety concerns to consider, we recommend you also contact the Department of Health, the Office of the Fire Marshal, the municipality and the landowner. If either surface or ground water has become contaminated you must contact the Water Resources Division of Indian and Northern Affairs Canada.

> ***EPD will provide advice on remediation measures, but it is the sole responsibility of the polluter and land owner to provide adequate site remediation. (See Environmental Protection Act, Appendix.)***

2 Defining The Problem

If you think you have contamination on your property, the first step is to do a thorough site investigation. A thorough investigation may avert unnecessary remediation costs. Depending on the degree and complexity of the contamination, you may require the assistance of a qualified environmental consultant or engineer.

Ask yourself the following questions:

2.1 What is the History of the Site?

Thorough historical research will aid in identifying and locating the contaminant(s). It may also aid in assessing responsibility for the contamination. Consider the following:

- Is the site near an existing tank farm, fuel storage area or other contaminant storage site?
- Is it near where a tank farm or fuel storage site previously existed?
- Has there ever been a spill on or near the property?

2.2 What is the Contaminant?

It is essential to identify the contaminant, in order to determine suitable remediation options.

- Common contaminants in the N.W.T. are diesel fuel, turbo fuel, gasoline and used oil.
- You should take representative samples with the assistance of an accredited laboratory.

2.3 What is the Degree of Contamination?

Consider the following:

- What is the length, width and depth of the contaminated area?
- What is the soil type?
- Where is the surface and ground water?
- What is the type of permafrost, if any? Is it saturated, unsaturated, continuous or discontinuous permafrost?

2.4 What are the Possible Impacts?

Remember that this contaminated site may affect many people and other living organisms. Determine both the pathway of contamination and all possible receptors of contamination. Consider the following:

- How did the contamination enter the site?
- Did it enter the ground water?
- Will it affect people through either toxic vapours or soil contamination?
- Could there be any effects on vegetation, wildlife or domestic animals?
- How will the contamination affect adjacent sites?
- What will the site be used for in the future?
- Are there any special factors relating to public use of the area?
- Is it commercial, agricultural or residential land? (section 2.4.1)

2.4.1 Land Use:

Identifying the type of land use will help you assess the extent of human and ecological exposure to contaminants in the soil, and is essential for planning practical remediation programs. The specified land uses considered in this guideline are: agricultural, residential/parkland and commercial/industrial.

Agricultural: All uses of land where the activity is primarily related to the productive capability of the land or facility (e.g. greenhouse) and is agricultural in nature, or is related to the feeding and housing of animals such as livestock.

Residential/Parkland: Residential: all uses of land in which dwelling on a permanent, temporary or seasonal basis is the primary activity. Institutions, hospitals, schools, daycare and playgrounds are also indicated under this land use. Residential/Parkland is often readily accessible to the public.
Parkland: all land uses in which the primary activity is recreational in nature and requires the natural or human designed capability of the land to sustain that activity.

Commercial/Industrial: Commercial: all uses of land in which the primary activity is related to the buying, selling or trading of merchandise or services.
Industrial: all land uses in which the primary activity is related to the production, manufacture or storage of materials. The public does not usually have uncontrolled access to this type of land. This does not include institutions (e.g. schools, hospitals, playgrounds).

Always confirm the required level of remediation with EPD. The type of land found adjacent to the contaminated site may affect the remediation criteria levels that you have to follow.

3 Remediation

Once the problem has been defined (section 2) , you can decide on the appropriate remediation options. If you have hired a qualified contractor, they may recommend remediation options to you. General remediation categories include:

On-site/off-site	• Will your remediation be on or off-site? Techniques will vary accordingly.
On-site treatment	• The soil must meet the remediation criteria (section 4).
Off-site treatment	• Merely moving the spill to a landfill facility is not acceptable. After moving the soil to an acceptable location, you must contain the contaminants, and then treat the soil or water to reduce the contamination to an acceptable level (section 4).
Groundwater	• Contaminated groundwater may require treatment. A qualified contractor can advise you on the available options.

The following should be considered when making your final decision:

Criteria	• CCME interim criteria (section 4).
Permission	• You must obtain permission from the local municipality or landlord before using any of their facilities, such as the landfill site or the sewage lagoon.
Time required	• How long will the remediation take?
Cost	• Is your remediation plan cost efficient?
Aesthetics	• Does your plan restore the area to an acceptable level of aesthetic quality?
Technology	• How effective is the technology being considered?

Regardless of the method used, you maintain responsibility for the contaminated site.

4 Remediation Criteria

Remediation in the N.W.T. is criteria based. The required degree of remediation is determined by CCME interim criteria.

Remediation Criteria for Soil

	Agricultural	Residential/Parkland	Commercial/Industrial
Benzene	0.05	0.5	5
Toluene	0.1	3	30
Ethylbenzene	0.1	5	50
Xylene	0.1	5	50
Total Petroleum Hydrocarbons (tph)	-	500*	2500*
Lead	375	500	1000
PCB	0.5	5	50

Note: All values are in µg/g or parts per million (ppm). These are the more commonly required parameters. The type of contamination at the site may require analysis for additional CCME parameters.

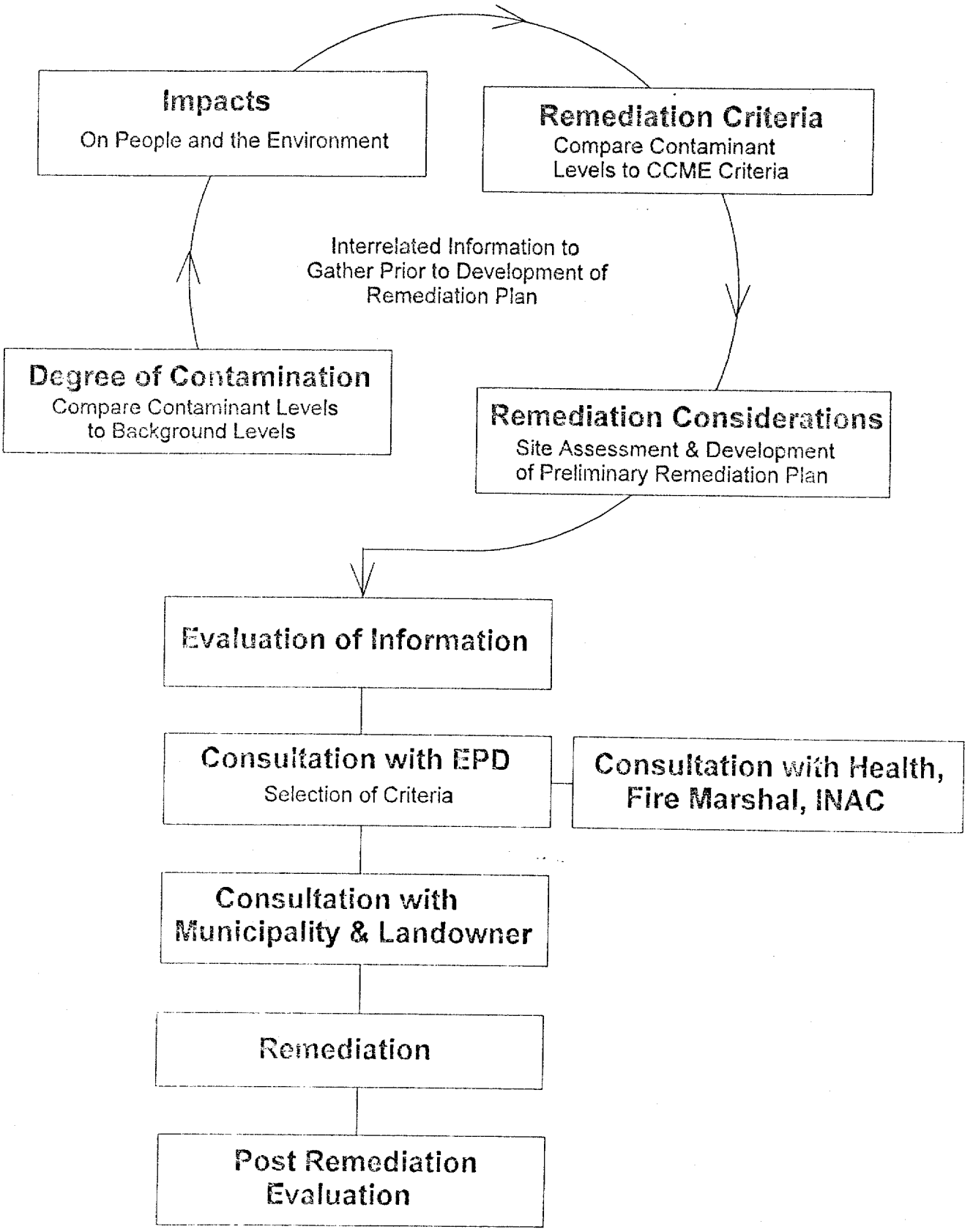
* The TPH criteria were developed by the GNWT.

The chart below may help you to visualize the amount of contaminant it would take to create a level of 1000 PPM. Remember that 1000 PPM is a much greater level than many of the acceptable remediation criteria levels listed above.

Amount of Soil and Gasoline Creating a Level of 1000 PPM

Volume of Soil	Volume of Gasoline
5 g (typical amount used for chemical analysis) / 1 tsp.	.005 ml / 1/1000 tsp.
4.5 litres / 1 gallon bucket	7.5 ml / 1.5 tsp.
205 litres / 45 gallon drum	400 ml / 1 3/4 cups
18,5976 kg / 410,000 LB (or 140 yd^3, enough to fill a living room that is 10x19x19 ft.)	205 litres / 45 gal drum

Steps Used In Site Remediation



5 Conclusion

This is a brief introduction to the process of contaminated site remediation.
For more information :

- read Interim Canadian Quality Criteria for Contaminated Sites report, see references.
- contact the Environmental Protection Division, Department of Renewable Resources, Yellowknife, N.W.T., X1A 3S8 phone 403-873-7654 fax 403-873-0221

Remember that this document is intended to inform you about some of the basic issues involved in contaminated site remediation. Once you have read this document and verified that you have a contaminated site, you must contact the Environmental Protection Division. You should work with EPD before proceeding through the site remediation process.

6 References

CCME Subcommittee on Environmental Quality Criteria For Contaminated Sites. Interim Canadian Environmental Quality Criteria For Contaminated Sites - Canadian Council of Ministers of the Environment. Winnipeg, Manitoba ,CCME EPC-CS34, (1991).

Angus Environmental Limited. Review and Recommendations for Canadian Interim Environmental Quality Criteria for Contaminated Sites. Don Mills, Ontario, Minister of Supply and Services Canada ,(1991).

(g) the contaminant was discharged for the purposes of combating a forest fire;

(h) the contaminant is a soil particle or grit discharged in the course of agriculture or horticulture; or
(i) the contaminant is a pesticide classified and labelled as "domestic" under the Pest Control Products Regulations (Canada).

(4) The exceptions set out in subsection (3) do not apply where a person discharges a contaminant that the inspector has reasonable grounds to believe is not usually associated with a discharge from the excepted activity. R.S.N.W.T. 1988,c.75(Supp.),s.5;c.117(Supp.),s.8.

5.1 Where a discharge of a contaminant into the environment in contravention of this Act or the regulations or the provisions of a permit or license issued under the Act or the regulation occurs or a reasonable likelihood of such a discharge exists, every person causing or contributing to the discharge or increasing the likelihood of such a discharge, and the owner or the person in charge, management or control of the contaminant before its discharge or likely discharge, shall immediately
(a) subject to any regulations, report the discharge or likely discharge to the person or office designated by the regulations;
(b) take all reasonable measures consistent with public safety to stop the discharge, repair any damage caused by the discharge and prevent or eliminate any danger to life, health, property or the environment that results or may be reasonably expected to result from the discharge or likely discharge; and
(c) make a reasonable effort to notify every member of the public who may be adversely affected by the discharge or likely discharge. R.S.N.W.T. 1988, c.75(Supp.),s.5;c.117 (Supp.),s.9

6. (1) Where an inspector believes on reasonable grounds that a discharge of a contaminant in contravention of this Act or the regulations or a provision of a permit or license issued under this Act or the regulations has occurred or is occurring, the inspector may issue an order requiring any person causing or contributing to the discharge or the owner or the person in charge, management or control of the contaminant to stop the discharge by the date named in the order.

7. (1) Notwithstanding section 6, where a person discharges or permits the discharge of a contaminant into the environment, an inspector may order that person to repair or remedy any injury or damage to the environment that results from the discharge.

(2) Where a person fails or neglects to repair or remedy any injury or damage to the environment in accordance with an order made under subsection (1) or where immediate remedial measures are required to protect the environment, the Chief Environmental Protection Officer may cause to be carried out the measures that he or she considers necessary to repair or remedy an injury or damage to the environment that results from any discharge.