Table IV-1: The DEW Line Cleanup Criteria (DCC)[a]

Substance	Criteria[b] DCC I[c]	DCC II[d]
Inorganic Elements		
Arsenic (As)	--	30
Cadmium (Cd)	--	5.0
Chromium(Cr)	--	250
Cobalt (Co)	--	50
Copper (Cu)	--	100
Lead (Pb)		500
Mercury (Hg)	--	2.0
Nickel (Ni)	--	100
Zinc (Zn)	--	500
Polychlorinated Biphenyls	1.0	5.0

a. These criteria were adapted specifically for the cleanup of Arctic DEW Line sites from the 1991 versions of the Québec Soil Contamination Indicators and the Canadian Council of Ministers of the Environment Interim Canadian Environmental Quality Criteria for Contaminated Sites.
b. Criteria are given in parts per million, ppm, for soils only.
c. Soils containing lead and/or PCBs at concentrations in excess of DCC-I, but less than DCC-II, may be landfilled.
d. Soils containing one or more substances at concentrations exceeding DCC-II must be removed from contact with the Arctic ecosystem.

D. Other Criteria

The Iqaluit sites being considered in the current environmental assessment are subject to influences additional to those affecting the DEW Line Sites. Therefore, a broader contaminant screen was made than that covered by the DEW Line Cleanup Criteria (outlined above), including all Environment Canada and/or United States Environmental Protection Agency (US EPA) priority pollutants. Where applicable the Canadian Council of Ministers of the Environment's Interim Canadian Environmental Quality Criteria for Contaminated Sites (CCME 1991a) were applied to the results of these analyses. In those instances where the CCME criteria did not treat a particular contaminant or types of contaminants, the most stringent provincial criteria available were applied. In the absence of provincial criteria, the contaminant concentrations were compared to foreign criteria included in the CCME document *Review and Recommendations for Canadian Interim Environmental Quality Criteria for Contaminated Sites* (CCME 1991b).

Data from previous studies of the Iqaluit sites reviewed in this study have been compared to the appropriate criteria in instances where this was not done in the original document.

All criteria are outlined in tables at the end of this chapter, and the various criteria are discussed in more detail in the following sections.

1. Background Criteria

In conducting environmental studies, it is important to take into account prevailing, or background, conditions. The Canadian Council of Ministers of the Environment (CCME) Interim Canadian Environmental Quality Criteria include "Assessment Criteria". Assessment criteria are either approximate background concentrations or approximate analytical detection limits which provide a starting point for examining data. In this study, efforts were made to obtain samples from locations that were removed from any direct influence by any of the sites or the town and that were representative of the local geomorphology. Data from these samples were compared to the CCME Assessment Criteria (Table III-1). Results obtained from soil samples collected in proximity to the sites under assessment at Iqaluit were interpreted, in part, in the context of the concentrations observed in background material.

2. Canadian Council of Ministers of the Environment Criteria

CCME criteria (Annex C) exist for most of the compounds included in the broad screen analysis for semi-volatile organic acid/base/neutral extractables (ABNs) and polycyclic aromatic hydrocarbons (PAHs). In addition, polychlorinated dibenzodioxin and dibenzofuran concentrations in soil and water were compared to these criteria. The CCME Freshwater Aquatic Life (FAL) Remediation Criteria (Table A-3, Annex C) were applied to results for water samples collected in or near both inland and marine waters. Use of these criteria for marine waters is extremely conservative due to the dilution factor upon entry of contaminants into the marine system. Concentrations of inorganic elements and PCBs were compared to the CCME Assessment Criteria (Table A-1, Annex C). Inorganic element data for water samples collected from the town's freshwater supply lake, Lake Geraldine, and from taps in a business and residence located in town were compared to the CCME Remediation Criteria for drinking water (Table A-3, Annex C). PCB concentrations in the drinking water were compared to the Canadian Drinking Water Quality Criteria (CCME 1991b).

Concentrations of inorganic elements and PCBs in marine and estuarine sediments collected as part of the joint ESG/Environment Canada Historical Ocean Disposal Study (Bright et al. 1995) were compared to the Draft Interim Marine Sediment Quality Guidelines Threshold Effects Levels (TELs) which are presented in Annex D.

3. Provincial and Territorial Criteria

PAHs and compounds in the ABN suite of chemicals not covered by the CCME criteria were compared to the Cleanup Criteria Proposed for British Columbia (CCME 1991b) and presented in italics in Table IV-2.

The CCME Interim Remediation Criteria for soil currently do not contain numerical values for most pesticides and their metabolites. Two of the most comprehensive criteria for contaminated soils available in Canada are the BCMOE Proposed Cleanup Criteria and the Soil and Ground Water Guidelines recommended by the Ministère de l'Environnement du Québec (CCME 1991). Both of these criteria use the A, B, C format; soils containing substances in excess of the B level are considered contaminated for residential or recreational use. The Québec B level and the BCMOE B level both suggest a maximum acceptable total concentration of pesticides and metabolites of 2000 ppb (see Table IV-3).

The total concentrations of pesticides in water samples were compared to the BCMOE Assessment and Level B (designated for drinking water) criteria (see Table IV-3).

Data for total suspended solids in leachate collected by the municipality from the Iqaluit municipal dump were compared to the BCMOE Effluent Quality Criteria (see Annex E, Table 2-1) for marine embayed waters.

Total petroleum hydrocarbon (TPH) soil data presented in the Avati Environmental Site Assessment document (1993a) have been compared to the Alberta Draft Tier I Criteria for Contaminated Soil Assessment and Remediation (CCME 1991) and the Guideline for Contaminated Site Remediation in the NWT (GNWT 1994) (see Table IV-4).

4. Foreign Criteria

Criteria developed as part of the Soil Cleanup (Interim) Act of The Netherlands' Soil Protection Act incorporate A, B and C levels much like the aforementioned provincial criteria (CCME 1991b). The Netherlands Cleanup Criteria recommend maximum acceptable levels of 500 ppb for each chlorinated pesticide, 1000 ppb for each non-chlorinated pesticide and 3000 ppb total pesticides in soil (see Table IV-3).

TPH soil data presented in the Avati Environmental Site Assessment document (1993a) were also compared to the less stringent New Jersey Bureau of Environmental Evaluation and Risk Assessment's Interim Soil Action Levels (CCME 1991b, see Table IV-4)

5. Environmental Regulations

The only pieces of legislation governing the cleanup of the sites at Iqaluit are the Storage of PCB Material Regulations under the Canadian Environmental Protection Act (Canada Gazette Extract, Part II, September 9, 1992) and the Fisheries Act. The Storage of PCB Material Regulations govern the amount of PCB material that is in or on a property or a parcel of land; materials containing PCBs at concentrations in excess of 50 ppm must be remedied. The Fisheries Act prohibits the introduction of a deleterious substance into waters frequented by fish; contaminants or potentially hazardous debris entering a water course require remediation. Cleanup actions, therefore, have been proposed in order to prevent contaminants from entering a water course at the Iqaluit sites.

Table IV-2: CCME Interim Criteria for Acid/Base/Neutral (ABNs) Priority Pollutants for Soils

Substance	Assessment Criteria	Remediation Criteria		
		Agricultural	Residential/ Parkland	Commercial/ Industrial
	ppb or ng/g dry weight			
Monocyclic Aromatic Hydrocarbons				
1,3-Dichlorobenzene	100	100	1000	10000
1,4-Dichlorobenzene	100	100	1000	10000
1,2-Dichlorobenzene	100	100	1000	10000
Polycyclic Aromatic Hydrocarbons (PAHs)				
Naphthalene	100	100	5000	50000
Acenaphthylene	*100*	*10000*	*10000*	*100000*
Acenaphthene	*100*	*10000*	*10000*	*100000*
Fluorene	*100*	*10000*	*10000*	*100000*
Phenanthrene	100	100	5000	50000
Anthracene	*100*	*10000*	*10000*	*100000*
Fluoranthene	*100*	*10000*	*10000*	*100000*
Pyrene	100	100	10000	100000
Benz(a)anthracene	100	*1000*	*1000*	*10000*
Chrysene	*100*	*1000*	*1000*	*10000*
Benzofluoranthenes	*100*	*1000*	*1000*	*10000*
Benzo(a)pyrene	100	100	1000	10000
Dibenz(a,h)anthracene	100	100	1000	10000
Indeno(1,2,3-c,d)pyrene	100	100	1000	10000
Benzo(ghi)perylene	--	--	--	--
Phenolic Compounds				
2,4-Dimethylphenol	100	100	1000	10000
4,6-Dinitro-o-cresol	100	100	1000	10000
2,4-Dinitrophenol	100	100	1000	10000
2-Nitrophenol	100	100	1000	10000
4-Nitrophenol	100	100	1000	10000
Phenol	100	100	1000	10000
2-Chlorophenol	50	50	500	5000
4-Chloro-3-methylphenol	50	50	500	5000
2,4-Dichlorophenol	50	50	500	5000
2,4,6-Trichlorophenol	50	50	500	5000
2,4,5-Trichlorophenol	50	50	500	5000
Pentachlorophenol	50	50	500	5000

Table IV-2: Continued

Substance	Assessment Criteria	Remediation Criteria		
		Agricultural	Residential/ Parkland	Commercial/ Industrial
	ppb or ng/g dry weight			
Phthalate Esters				
Dimethyl phthalate	30000	30000	--	--
Diethyl phthalate	30000	30000	--	--
Dibutyl phthalate	30000	30000	--	--
Butyl-Benzyl phthalate	30000	30000	--	--
Bis(2-ethylhexyl)phthalate	30000	30000	--	--
Di-N-Octyl phthalate	30000	30000	--	--
Chlorinated Hydrocarbons				
Hexachlorobenzene	100000	50000	2000	10000
Hexachlorobutadiene	--	--	--	--
Hexachlorocyclopentadiene	--	--	--	--
Hexachloroethane	--	--	--	--
1,2,4-Trichlorobenzene	50000	50000	2000	10000
2-Chloronaphthalene	--	--	--	--
Halogenated Ethers				
Bis(2-chloroethoxy) methane	--	--	--	--
Bis(2-chloroethyl) ether	--	--	--	--
Bis(2-chloroisopropyl) ether	--	--	--	--
4-Bromophenyl phenyl ether	--	--	--	--
4-Chlorophenyl phenyl ether	--	--	--	--
Nitroaromatics, Cyclic Ketones and Other Compounds				
Nitrobenzene	--	--	--	--
2,4-Dinitrotoluene	--	--	--	--
2,6-Dinitrotoluene	--	--	--	--
Isophorone	--	--	--	--
N-Nitrosodi-n-propylamine	--	--	--	--
N-Nitrosodiphenylamine	--	--	--	--
3,3-Dichlorobenzidine	--	--	--	--

a. Figures in italics are equivalent values from "Criteria for Managing Contaminated Sites in British Columbia", BC MOE); CCME criteria are yet to be established.
b. No criteria are available for the substances with a "--" symbol.

Table IV-3: List of Criteria for Pesticides

Criteria		Pesticides[a] (ppm)		
		Level A	Level B	Level C
British Columbia Cleanup Criteria[b]:	Total Pesticides in Soil	0.10	2.0	20
	Total Pesticides in Water	0.00005	0.10	
MENVIQ Soil Guidelines[c]:	Total Pesticides	0.10	2.0	30
Netherlands Soil Guidelines[d]:	Total Pesticides	-	3.0	30
	Individual Chlorinated Pesticides		0.50	5.0
	Individual Non-Chlorinated Pesticides		1.0	10

a. Pesticides analyzed include:

Hexachlorobenzene	o,p'-DDE	Mirex
alpha BHC	p,p'-DDE	Heptachlor Epoxide
beta BHC	trans-Nonachlor	alpha-Endosulphan
gamma BHC	cis-Nonachlor	Aldrin
Heptachlor	o,p'-DDD	Dieldrin
Oxychlordane	p,p'-DDD	Endrin
trans-Chlordane	p,p'-DDT	Methoxychlor
cis-Chlordane		

b. From "Criteria for Managing Contaminated Sites in British Columbia, Ministry of Environment, Waste Management Program, November 1989". Level A represents background levels or achievable detection limits; Level B is the remediation criteria for residential, recreational and agricultural land use; and Level C represents significant soil contamination and is the remediation criterion for commercial or industrial land use.

c. Ministère de l'Environnement du Québec (MENVIQ), 1988. "Contaminated Sites Rehabilitation Policy". Prepared by the Direction des Substances Dangereuses. Level A indicates background concentrations or analytical detection limits; concentrations between A and B are slightly contaminated. Site investigation is needed if concentrations exceed Level B. Concentrations between B and C are considered to be contaminated; concentration above C indicate serious contamination.

d. From "Review and Recommendations for Canadian Interim Environmental Quality Criteria for Contaminated sites". The National Contaminated Sites Remediation Program, Scientific Series No.197. The A level marks the boundary between contaminated and uncontaminated soil; B level indicates the relative extent of contamination and potential seriousness of the risk that the contamination might pose; and C level represents the concentration above which a soil was considered to be polluted to such an extent that all potential exposure routes present an intolerable risk to humans or the environment.

Table IV-4: List of Criteria for Total Hydrocarbons in Soils

Criteria[a]	Total Hydrocarbons (ppm or μg/g)
Draft Tier I Soil Criteria Proposed by Alberta Environment	40[b]
Guideline for Contaminated Site Remediation in the NWT, Residential/Parkland Criteria	500[c]
New Jersey Interim Soil Action Levels	100[c]

a. From "Review and Recommendations for Canadian Interim Environmental Quality Criteria for Contaminated Sites", The National Contaminated Sites Remediation Program, Inland Waters Directorate, Water Quality Branch, Environment Canada, Scientific Series No. 197, 1991.

b. Total extractable hydrocarbons (TEH).

c. Total petroleum hydrocarbons (TPH).

Annex A: DEW Line Clean Up (DLCU) Protocol

DEW LINE CLEAN UP PROTOCOL

The DEW Line Clean Up (DLCU) Protocol was originally endorsed by various government agencies including Environment Canada, Indian and Northern Affairs, Government of the Northwest Territories and Fisheries and Oceans at a meeting in Victoria, B.C. in October 1991. This revised version (April 1994) has been slightly modified as a result of:

- Presentations (1992, 1993, 1994) to the Legislative Assembly of the Northwest Territories;
- Community consultations at ten northern communities in 1992 and twelve in 1993;
- Further scientific studies including analytical field testing, leachate testing and barrel sampling;
- Engineering designs for a landfill leachate control system and a contaminated soil containment facility in permafrost;
- Continuing discussions with regulatory agencies, including a second major workshop held in March 1993; and,
- Changes in staffing requirements at the North Warning System sites.

The DLCU Protocol, which is divided into three main areas, provides a strategy for dealing with chemical contamination and physical debris at the DEW Line sites.

Contaminated Soils

Remediation is to be applied to soils and sediments where inorganic elements and/or PCBs have been found to be present at concentrations in excess of the DEW Line Cleanup Criteria (DCC); this includes soils contaminated by sewage in outfall areas and lagoons. The

DCC (Table 1) are a combination of the CCME R/P[1] and Quebec B[2] criteria and were determined, on the basis of site specific investigations, to be protective of the Arctic ecosystem.

Table 1 : DEW Line Cleanup Criteria

Substance	Units	DCC Tier I	DCC Tier II
Arsenic	ppm	-	30
Cadmium	ppm	-	5.0
Chromium	ppm	-	250
Cobalt	ppm	-	50
Copper	ppm	-	100
Lead	ppm	200	500
Mercury	ppm	-	2.0
Nickel	ppm	-	100
Zinc	ppm	-	500
PCBs	ppm	1.0	5.0

- Soils containing contaminants above the DCC Tier II level should be excavated and removed to a Northern Disposal Facility.

- Soils containing PCBs and lead at concentrations between the DCC Tier I and Tier II levels may be placed in an on-site engineered landfill.

[1] Interim Canadian Environmental Quality Criteria for Contaminated Sites as of 1991 produced for the Canadian Council of Ministers for the Environment (CCME).

[2] Quebec Soil Contamination Guidelines as of 1991.

- Special attention should be given to soils that act as sources of contaminants to nearby aquatic environments - even if the concentrations of contaminants are below the DCC criteria.

- Soils containing PCBs above the 50 ppm level in contravention of the Canadian Environmental Protection Act (CEPA) must be treated as per the regulation.

- Confirmatory testing will be limited to known, but unstained, contaminated areas and will be to the DCC Tier II criteria; visibly stained soils will be excavated to a distance extending a minimum of 0.5m beyond the boundary of the stain.

Landfills

These fall into one of three categories:

- Those located in an unstable, high erosion area must be relocated. Contents should be treated as per the procedures for contaminated soils and physical debris.

- Those located in a suitable location with no evidence of contaminated leachate may remain as is; additional granular fill may be required to ensure erosion protection and proper drainage.

- Those located in a suitable location but which are acting as a source of contaminated leachate must be stabilized by the installation of a suitably engineered containment system.

Physical Debris

Visible debris should be sorted into hazardous and non-hazardous components. This includes all unburied material and debris resulting from building demolition.

- Hazardous debris should be dealt with according to appropriate regulations.

- Non-hazardous materials should be buried in an engineered landfill on-site provided that there is a suitable location and sufficient gravel is available.

Hazardous debris may include but not necessarily be limited to: radioactive materials, batteries, wastes containing toxic chemicals at potentially harmful levels, and ash produced by the combustion of waste material -such materials should be shipped south for disposal. Asbestos can be suitably wrapped and buried in an on-site engineered landfill.

POL tank sludge, waste oil, petroleum products, antifreezing agents, solvents and barrels are treated as per the DLCU Barrel Protocol.

Annex B: DEW Line Clean Up (DLCU) Barrel Protocol

DEW LINE CLEAN UP PROTOCOL FOR BARRELS

Initial proposals for the methodology for dealing with barrels and their contents at the DEW Line sites were put forward at a meeting in Victoria in March 1993. The general approaches were discussed by representatives of the government agencies present which included Indian and Northern Affairs, Department of National Defence, Environment Canada and the Government of the Northwest Territories. At a follow up meeting in April 1994, the group endorsed the protocol. The protocol was employed during the decommissioning of the Horton River site and in further field investigations at Resolution Island during the summer of 1994. The following, outlines procedures for the cleanup of barrels on the DEW line.

A flow diagram of the methodology for the processing, cleanup and disposal of barrels is attached.

A. Inspection:

1 The area around the barrels should be tested with a VOC meter to ensure safe working conditions. If the VOC levels exceed 20% of the Lower Explosive Limit (LEL), then all work shall be conducted in accordance with appropriate sections of the NIOSH Guidelines, the National Fire Code of Canada and the TDGA for flammable and combustible materials.

2 All barrels are to be inspected to address the following items which shall be recorded and used as a guide when opening barrels (section B.3).

2.1 Symbols, words, or other marks on the barrel that identify its contents, and/or that its contents are hazardous: e.g. radioactive, explosive, corrosive, toxic, flammable.

2.2 Symbols words, or other marks on the barrel that indicate that it contains discarded laboratory chemicals, reagents, or other potentially dangerous materials in small-volume containers.

2.3 Signs of deterioration or damage such as corrosion, rust, or leaks at seams, rims, and V grooves.

2.4 Spillage or discoloration on the top and sides of the barrel.

2.5 Signs that the barrel is under pressure such as bulging and swelling.

B. Opening and Sampling:

1 Pressurized barrels are extremely hazardous and shall be opened with extreme caution. Only non-sparking equipment shall be used to open barrels. All personnel responsible for opening barrels shall be provided with appropriate safety equipment and clothing. Procedures outlined in NIOSH USEPA 1988 Safety and Health Compliance for Managers (165.8) USEPA-29-CFR, 1910-1920, shall be followed.

2 If the bungs can readily be moved, then the barrels shall be opened slowing allowing time for any pressure in the barrel to be released before the bung is fully removed.

3 If the bungs are not readily moved, or inspection suggests that opening of the barrel presents a special hazard, then the barrels shall be vented remotely to relieve any internal pressure that may be present prior to opening. Remote venting shall be conducted using a suitable device such as, a sharp spear weighted and dropped from an appropriate height or released from a tube housing a spring to penetrate the barrel. The remote venting operation shall be conducted from a safe distance from other site operations and from behind suitable walls or barricades. After sampling, the spear opening shall be plugged.

4 Samples of the contents of all barrels shall be extracted using a drum thief. All barrels shall be clearly numbered using spray paint or other suitable marker.

5 Barrels shall not be transported until it has been determined that they are not under pressure, do not leak, and are sufficiently sound for transport.

6 Barrels containing less than 50 mm of liquid may be combined with compatible material prior to sampling; samples inferred to contain only water on a visual examination shall be tested prior to this consolidation. Barrel contents which consist of black oil shall not be consolidated.

7 Consolidation of barrel contents shall take place in a secure barrel processing area. At many DEW Line sites several caches of barrels are present and, therefore, it may be desirable to establish several secure sorting areas; barrels scattered on the tundra may be vented, then closed, and then transported to a barrel sorting area for sampling and possible consolidation.

C. Testing:

1 Liquid samples shall be inspected and classified as either containing water or organic materials. Samples thought to contain water shall be analyzed on-site to confirm that they are indeed water, and contain less than 2% glycols or alcohols by fourier transform infrared spectroscopy (FTIR).

2 The contents of barrels containing organic materials, including aqueous samples which contain more than 2% glycols or alcohols, shall be tested for PCBs, total chlorine, cadmium, chromium and lead, in addition to identification of the major components e.g. fuel oil, lubricating oil. Samples containing greater than 1000 ppm chlorine shall be further tested to identify the chlorinated compounds present.

3 Contents of barrels which contain two or more phases shall have all phases analyzed; the organic phases as described above and the aqueous phases to ascertain whether it contains less than 2% organics. In addition, the aqueous phases shall be tested for any components found in the organic phases above the criteria described below.

D. Disposal of Barrel Contents:

1 Barrels containing only rust and sediment shall be treated as empty barrels.

2 Barrel contents comprising water only (less than 2% glycols or alcohols) shall transferred to an open vessel such as a utility tub or half-barrel and any organic material removal by agitation with a pillow or segment of oil absorbent material. The water may then be discarded on to the ground that is a minimum of 30 meters

distance from natural drainage courses. Used oil absorbent material shall be treated as described in section D.5.

3 Barrel contents which are composed of water with glycols and/or alcohols or organics phases, and which contain less than 2 ppm PCBs, 1000 ppm chlorine, 2 ppm cadmium, 10 ppm chromium, and 100 ppm lead, may be disposed of by incineration. Alternatively these contents may be disposed of off-site at a licensed disposal facility. The solid residual material resulting from incineration shall be subjected to a leachate extraction test. Material found to be not leachate toxic shall be disposed of as DCC Tier II contaminated soil. Leachate toxic material shall be treated as hazardous waste, packaged in accordance with TDGA and/or IATA regulations as required, and disposed of off-site at a licensed disposal facility.

4 Barrel contents which contain greater than 2 ppm PCBs, 1000 ppm chlorine, 2 ppm cadmium, 10 ppm chromium or 100 ppm lead shall be disposed of off-site at a licensed disposal facility. Contents may be combined with compatible materials for shipping purposes (note section E.1). Flash point may be required to be determined if they cannot be inferred from the product identification.

5 Used oil absorbent material should be treated as hazardous waste and disposed of off-site at a licensed disposal facility, unless it is shown to be uncontaminated with PCBs (< 2 ppm), chlorine (< 1000 ppm) cadmium (< 2 ppm), chromium (< 10 ppm) and lead (< 100 ppm), in which case it may be incinerated on-site.

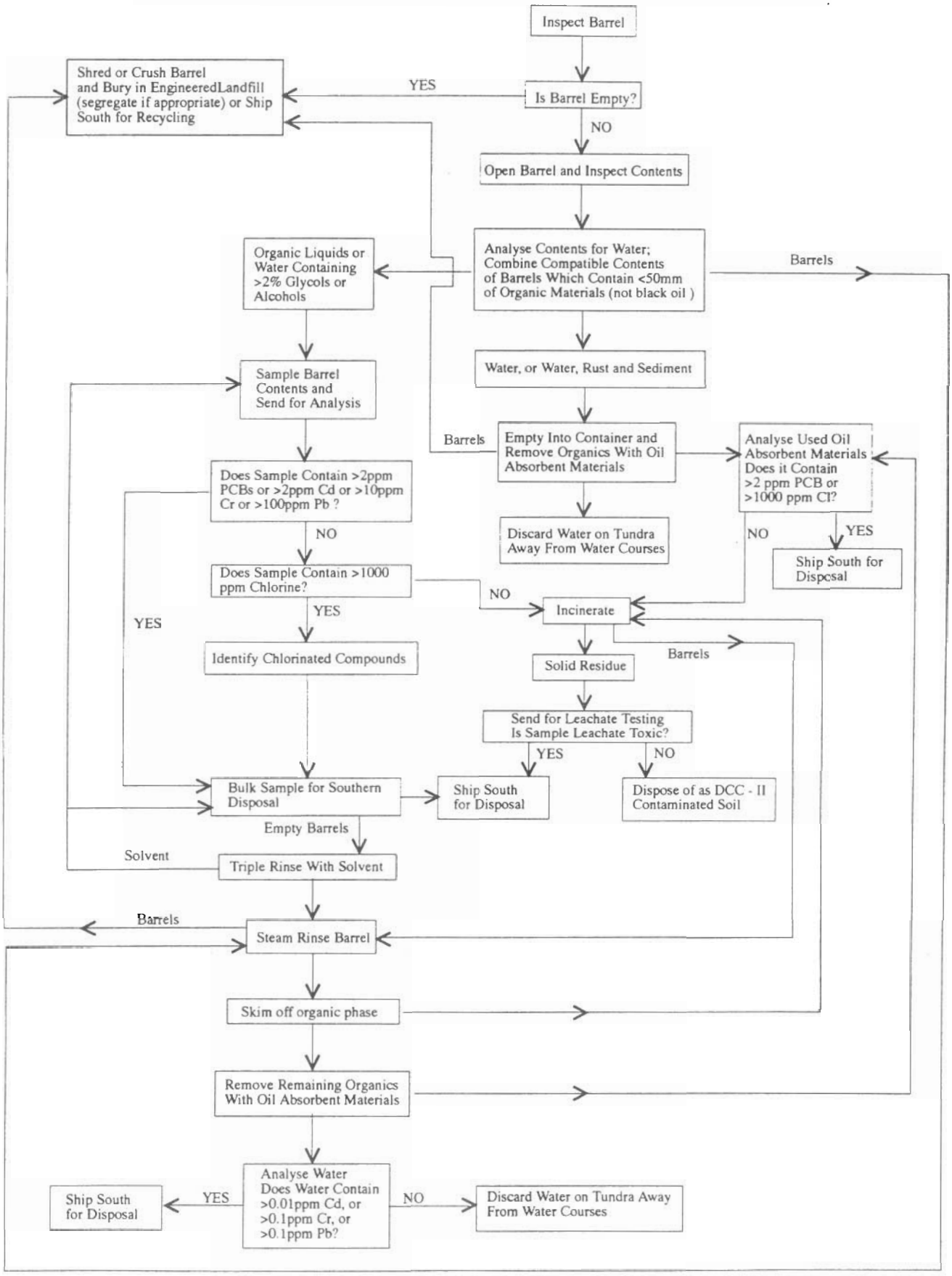
E. Cleaning and Disposal of Barrels:

1 Empty barrels resulting from consolidation of contaminated material (section D.4) shall be triple rinsed with solvent (varsol, diesel etc.) prior to steam cleaning; solvent washings shall be added to the bulked contaminated products unless analyzed separately and shown to be suitable for incineration. Alternatively, the empty barrels may be shipped off-site and labeled appropriately (TDGA).

2 Only empty barrels resulting from consolidation of small volumes (section B.6) , from incineration (section D.3) and from solvent washing (section E.1) require steam cleaning; after cleaning they shall be treated as described in E.3. Recycling of rinsate is permitted. The resulting wash water shall have any organic material removed by agitation with a pillow or segment of oil absorbent material. The water shall then be analyzed for cadmium, chromium and lead. If these metals are present at less than 0.01, 0.10 and 0.10 ppm respectively, then the water may be discarded on land that is a minimum of 30 meters from natural drainage courses, but if not then it shall be disposed of off-site at a licensed disposal facility. Alternatively, the wash water may be shipped off-site without testing for disposal at a licensed disposal facility. Used absorbent material shall be disposed of as described in section D.5

3 Empty barrels may be crushed or shredded and be landfilled on-site as non-hazardous wastes. The barrels shall be crushed in such a manner so as to reduce their volume by a minimum of 75%. Shredded barrels may be disposed of off-site as recycled metals.

FLOW CHART FOR THE DEW LINE CLEAN UP BARREL PROTOCOL



Annex C: Canadian Council of Ministers of the Environment (CCME) Assessment and Remediation Criteria for Soil and Water

Excerpts from Canadian Council of Ministers of the Environment (1991) Interim Canadian Environmental Quality Criteria for Contaminated Sites. Prepared by the CCME Subcommittee on Environmental Quality Criteria for Contaminated Sites, September 1991.

Assessment and Remediation Criteria Tables

Table A-1. Interim Assessment Criteria for Soil and Water

	Soil	Water
General Parameters		
pH	6 to 8	—
conductivity	2 dS/m	---
sodium adsorption ratio	5	---
Inorganic Parameters		
antimony	20[1]	---
arsenic	5	5
barium	200	50
beryllium	4	---
boron (hot water soluble)	1	—
cadmium	0.5	1
chromium (+6)	2.5	---
chromium (total)	20	15
cobalt	10	10
copper	30	25
cyanide (free)	0.25	40
cyanide (total)	2.5	40
fluoride (total)	200	---
lead	25	10
mercury	0.1	0.1
molybdenum	2	5
nickel	20	10
selenium	1	1

Notes: All values in µg/g dry weight or µg/L unless otherwise stated.

Interim assessment criteria are largely based on ambient or background concentrations for most general and inorganic parameters and on analytical detection limits for most organic parameters.

--- value not established.

See page 7 for numbered footnotes.