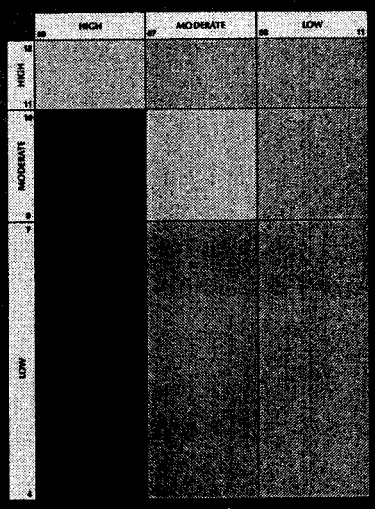
Department of
Indian and Northern Affairs
Northern Program

Northern Environmental Risk Assessment Strategy (NERAS)

USER'S GUIDE

March, 1995



THE NORTHERN ENVIRONMENTAL RISK ASSESSMENT STRATEGY (NERAS) USER'S GUIDE

FINAL REPORT

February 1995

This report outlines an approach, the Northern Environmental Risk Assessment Strategy (NERAS), to help DIAND establish priorities for remediation at waste sites in Northern Canada. The approach is consistent with the objectives of the Action on Waste Program under the Arctic Environmental Strategy. The objectives of the NERAS are:

- Establish an objective and transparent process for setting clean up priorities;
- Rank northern waste sites based on risk; and
- Provide demonstrable evidence of due diligence.

Prepared for:

DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS CANADA
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NORTHERN ENVIRONMENTAL RISK ASSESSMENT STRATEGY (NERAS)
USER'S GUIDE

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EXECUTIVE SUMMARY

This report outlines an approach, the Northern Environmental Risk Assessment Strategy (NERAS), to help DIAND establish priorities for remediation at waste sites in Northern Canada. The approach is consistent with the objectives of the Action on Waste Program under the Arctic Environmental Strategy.

The objectives of the NERAS are:

- Establish an objective and transparent process for setting clean up priorities;
- Rank northern waste sites based on risk; and
- Provide demonstrable evidence of due diligence.

There are five steps to the NERAS process:

Step 1. Describing the Underlying Risk
Step 2. Defining the Nature of the Consequences
Step 3. Assessing and Scoring Risk
Step 4. Assessing the Ability to Manage Risk
Step 5. Preparing the NERAS Matrix

Each site is assessed in Steps 1 through 4. The sites can then be compared within the NERAS Matrix (Step 5), and action plans developed based on the relative degree of risk associated with each site (see Figure 1).

To be effective, the following prerequisites should be met before the NERAS is used:

- Skilled environmental practitioners, familiar with the sites to be evaluated, must be used.
- The evaluation(s) should be done on an annual basis, using a jury process with representation from the Regional offices in the Yukon, the Northwest Territories, and from Headquarters.
- Before a site is formally assessed, a judgement must be made about whether sufficient information is known about it to justify going on with the assessment.
- A flexible approach must be used to ensure that resources are allocated to the remediation of known priority sites, also the investigation of unknown sites.
- As sites are remediated, they should be removed from the NERAS Matrix and placed in a monitoring file.

The NERAS Matrix will be a useful management tool because it explicitly organizes, and sets priorities for all of the sites that have been assessed. The matrix is, of course, only a tool and there may be important mitigating circumstances that cause DIAND to investigate and remediate certain sites in a way other than suggested by the matrix. It should be used as a guide to focus management attention on the following:

- Sites requiring immediate investigation or remedial attention because of the issues present;
- Sites that are candidates for an audit or more detailed assessment;
- Sites that should be monitored to ensure that environmental conditions do not worsen; and
- Sites that should be carefully managed to ensure that DIAND receives value for money.

Quite apart from facilitating the evaluation of DIAND's ability to manage risk at any site, the use of an EMS model points out systemic weaknesses (and strengths) in DIAND's environmental capability. For example, consideration of the scores for each of "purpose," "commitment," "capability" and "learning" at two or more sites will point out whether the Department is consistently weak (or strong) in a particular EMS element. This knowledge is invaluable in the planning and delivery of improvement initiatives to raise overall "ability to manage" scores.

1.0 INTRODUCTION

1.1 Background

Approximately 1,300 waste sites have been identified throughout Northern Canada. These sites included, but are not limited to, abandoned mine sites, military installations, waste dumps, camp sites, and barrel dumps. In view of the range of different sites within this geographic territory, the risk associated with each site varies considerably.

It is important to note that risk refers to:

- The hazards to air, land, or water arising from a particular site and their consequent effects on flora, fauna, or human health and safety; and
- The risk to the Department of Indian and Northern Affairs (DIAND) as legal liability for failure to comply with, for example, federal statutes.

DIAND does not have the funding to remediate all 1,300 sites over a short time-frame. However, public health risks are a high priority, and the Department has a legal obligation to remediate contaminated sites pursuant to the Canadian Environmental Protection Act (CEPA). Moreover, the Department is accountable for:

- Fisheries Act (FA) violations;
- Territorial Lands Acts (TLAs) violations;
- Aboriginal Land Claims Obligations; and
- Public liabilities on territorial land managed by DIAND.

This report outlines an approach, the Northern Environmental Risk Assessment Strategy (NERAS), to help DIAND establish priorities for remediation at waste sites in Northern Canada. The approach is consistent with the objectives of the Action on Waste Program under the Arctic Environmental Strategy.

The NERAS establishes the first risk assessment strategy for DIAND northern waste sites. With increased knowledge and experience the strategy will evolve and improve over time.

It is recognized that an important issue underlying the application of any decision framework is the notion of equity. Each region administered by DIAND must be made to feel that it has been treated fairly. DIAND must have sufficient confidence in the framework that it can show how priority sites were selected and express a clear and concise message to members of the public and other stakeholders. Managerial discretion

must, of course, be accepted in the application of the framework, but DIAND must define the broad limits within which such discretion may be applied.

1.2 Objectives

The objectives of the NERAS are:

- Establish an objective and transparent process for setting clean up priorities;
- Rank northern waste sites based on risk and ability to manage that risk; and
- Provide demonstrable evidence of due diligence.

2.0 THE NERAS PROCESS

There are five steps to the NERAS process:

Step 1. Describing the Underlying Risk
Step 2. Defining the Nature of the Consequences
Step 3. Assessing and Scoring Risk
Step 4. Assessing the Ability to Manage Risk
Step 5. Preparing the NERAS Matrix

Each site is assessed in Steps 1 through 4. The sites can then be compared within the NERAS Matrix (Step 5), and action plans developed based on the relative degree of risk associated with each site.

The NERAS is a tool to help the comparison and evaluation of different sites. To assist in this regard, Site Summaries should be prepared for each site under consideration. Site Summary Worksheets are enclosed in Appendices I-III.

2.1 Describing the Underlying Risk

The first step is to define and characterize the risk associated with each site. The risk is based on the kind(s) of impact(s) the site has (or might have) on the environment.

Some risks are relatively clear (e.g., for Underground Storage Tanks, the obvious risk centres around potential leaks), for others, such as PCBs, the nature of the risk(s) at a particular site is more complex and require the use of subcategories to facilitate a representative and accurate assessment (e.g., PCB fires, PCB spills, PCB transport, etc.).

Defining and characterizing each risk involves the determination of the environmental impacts that might occur if the event(s) associated with that risk appeared. These potential impacts must be considered for each of: air, water, land and social.

This characterization of the underlying environmental hazard forms the basis upon which the risk(s) and DIAND's obligations can be assessed.

2.2 Defining the Nature of The Consequences

The second step involves evaluating the consequences to DIAND should an event appear.

Four criteria are recommended to evaluate sites. These are:

- Legal;
- Health & Safety;
- Public Concerns; and
- Land Claim Settlement/Other Fee Simple Land Transfer Processes.

(Note: Section 3.0 contains definitions for each criterion)

2.3 Assessing and Scoring Risk

The third step focuses on assigning a score to each criterion identified in Section 2.2. This includes assessing both the **probability** and the **severity** of an event appearing. The probability is an assessment of the likelihood of an event happening and the severity considers how significant the event would be if it happened.

Based on the scores assigned for severity and probability, a numerical risk score can be derived for each site.

The relative importance of each risk category is weighted to adjust the "raw scores" to take account of the higher importance that DIAND places on legal compliance and health and safety. This weighting can, of course, be changed from time to time to reflect shifting priorities. For the initial assessment (January 1995), the following weighting was used:

Legal:	**4**
Health & Safety	**4**
Public Perceptions	**1**
Land Claims	**2**

The risk value R (score) can be written as:

$$
\begin{aligned}
R = {} & (PL * SL * WL) && \text{Legal} \\
+ {} & (PH * SH * WH) && \text{Health \& Safety} \\
+ {} & (PP * SP * WP) && \text{Public Perceptions} \\
+ {} & (PL * SL * WL) && \text{Land Claims}
\end{aligned}
$$

where:

R is the risk score for the site

PL is the probability score for Legal
SL is the severity score for Legal
WL is the weighting for Legal
PH is the probability score for Health & Safety
and so on . . .

2.4 Assessing the Ability to Manage Risk

The next step focuses on the ability of DIAND to manage or reduce environmental risk at each site. The four components of an Environmental Management System (EMS) are used to measure DIAND's capability in this regard. An EMS is a formal, structured mechanism that provides a rigorous framework within which a consistent level of environmental performance can be achieved. The principal components of an EMS, drawn from national and international experience with Total Quality Management, are powerful benchmarks against which DIAND's ability to manage environmental risk can be measured.

2.5 Preparing the NERAS Matrix

The final step in the assessment process is the synthesis of environmental risk profiles and ability to manage ratings to produce the NERAS Matrix (Figure 1). The Matrix presents the environmental risk associated with each site and the current ability of DIAND to manage it. More important, each site is presented compared with all of the other sites for which the Department is responsible.

The distribution of sites within the Matrix should be carefully reviewed by DIAND managers to decide if it makes sense on an intuitive level. Preparation of the NERAS Matrix represents completion of the risk assessment. However, each site will require a specific strategy or action plan (e.g., completion of full site assessment, monitoring, excavation and removal and treatment of soils, preparation of operational procedures, provision of emergency preparedness training).

Northern Environmental Risk Assessment Strategy

RISK

Ability to Manage Risk	HIGH	MODERATE	LOW
HIGH			
MODERATE			
LOW			

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3.0 CRITERIA TO EVALUATE SITES

Four criteria are recommended to evaluate sites. These are:

- Legal;
- Health & Safety;
- Public Concerns; and
- Land Claim Settlement/Other Fee Simple Land Transfer Processes.

3.1 Legal

DEFINITION:

This criterion examines the legislation that might be mobilized against DIAND. There is an array of legislation, rulings and judicial determinations that must be considered (e.g., Sparrow Decision, Inuvialuit Land Claim Arbitration Commission finding on Horton River).

PROBABILITY:

The probability of an incident.

High (3)	A violation has been identified.
Moderate (2)	Moderate chance that a violation will occur.
Low (1)	Unlikely that a violation will occur.

SEVERITY:

A measure of whether the site is in violation.

High (3)	A violation under CEPA, the Fisheries Act, other binding legislation, or other court rulings.
Low (1)	A violation has not occurred.

WEIGHT: 4

3.2 Health & Safety

DEFINITION:

This criterion examines the risk of a particular site to human health and safety. It considers the potential for contact with hazardous materials, contamination of water sources, impacts on the food chain, also human risk through exposure to physical hazards such as open mine shafts and unstable buildings.

PROBABILITY:

The likelihood of a site resulting in a risk to human health and safety through exposure.

High (3)	The site or area is subject to continuous or near continuous human use.
Moderate (2)	The site or area is subject to seasonal human use.
Low (1)	The site is subject to infrequent human use.

SEVERITY:

A measure of the potential human health and safety impact attributable to the site or area.

High (3)	Significant risk to life.
Moderate (2)	There is a moderate risk to life. This would include sites where buildings or infrastructure remains.
Low (1)	No known risk to life.

WEIGHT: 4

3.3 Public Concerns:

DEFINITION:

This criterion examines the extent to which DIAND might be perceived by the public to operate irresponsibly from an environmental perspective, and the potential for a reaction that affects DIAND's ability to conduct its affairs.

PROBABILITY:

The probability of the public becoming concerned over a specific incident or the threat of a specific incident or the emergence of a particular environmental risk.

High (3)	The site is already, or will become, a public concern.
Moderate (2)	Moderate chance that the site will become a public concern.
Low (1)	Very unlikely that the site will become a public concern.

SEVERITY:

The intensity and breadth of the public reaction to an incident, the threat of an incident, or the emergence of a particular environmental risk.

High (3)	Most, if not all, of a Territory very dissatisfied. The site becomes a focus of a national or regional media campaign and impacts on a National or Territorial level.
Moderate (2)	Most, if not all, of a Territory or region moderately dissatisfied, or a segment of a Territory or region very dissatisfied. Regional issue but is not getting widespread attention.
Low (1)	A segment of a Territory or region moderately dissatisfied. Very local reaction.

WEIGHT: 1

3.4 Land Claim/Fee Simple Lands

DEFINITION:

This criterion assesses the site's relevance to land ownership and/or land negotiations.

PROBABILITY:

The probability of a site being part of a land settlement, or on other fee simple lands.

High (3)	The site is on a land settlement or on other fee simple lands.
Moderate (2)	Moderate chance that the site will become part of a land settlement or other fee simple land(s).
Low (1)	Very unlikely that the site will become part of a land settlement or other fee simple land(s).

SEVERITY:

The impact of a site being located on land that is part or will potentially become part of a land settlement or other fee simple land.

High (3)	Land claimant (or owners of fee simple land) becomes the sole owner of the land and the Crown's obligation has to be exercised within a specified period.
Moderate (2)	The Crown retains liability
Low (1)	No liability for the Crown

WEIGHT: 2

4.0 ASSESSING THE ABILITY TO MANAGE RISK

It is not enough to evaluate different sites in view of their physical risk; the ability of DIAND to mitigate risk at each site must also be considered. Ultimately, high risk sites that are well-managed are of secondary importance to high risk sites that are not well-known and/or not well-managed.

This component of the NERAS focuses on DIAND's ability, as measured through its EMS, to manage or reduce environmental risk at each site. An EMS is a specific and focused application of internal control practices. It is the process by which an organization's management and personnel obtain reasonable assurance regarding the achievement of objectives in one or more categories:

- effectiveness and efficiency of environmental operations;
- reliability of information relating to environmental activities; and
- compliance with applicable environmental laws and regulations.

The extent to which DIAND's EMS provides reasonable assurance in any of these categories can be measured through comparison with emerging national (CSA Z750) and international (ISO 14000) EMS standards. The basic elements of these standards are:

- Purpose;
- Commitment;
- Capability; and
- Learning

Brief descriptions of these elements, and some key questions to ask to measure ability are outlined below.

Quite apart from helping the evaluation of DIAND's ability to manage risk at any site, the use of the EMS model points out systemic weaknesses (and strengths) in DIAND's environmental capability. For example, consideration of the scores for each of "purpose," "commitment," "capability" and "learning" at two or more sites will point out whether the Department is consistently weak (or strong) in a particular EMS element. This knowledge is invaluable in the planning and delivery of improvement initiatives to raise total "ability to manage" scores.

4.1 Purpose

DIAND must know what needs to be done at each site - it must have purpose. Purpose is shown by having:

- environmental policies;
- risk assessments; and
- environmental objectives and targets.

KEY QUESTIONS TO MEASURE PURPOSE:

DEPARTMENTAL	SITE SPECIFIC
Primary Question	**Primary Question**
1. Does DIAND have a policy with respect to environmental management in the North?	1. Have specific environmental objectives at each site been defined because of the risk assessment process?
Supporting Questions	**Supporting Questions**
1. Does the policy state DIAND's commitment to meet or exceed legal requirements and the expectations of its stakeholders, and encourage improvement in environmental performance?	1. Does a site profile exist?
	2. Is there a system in place to identify and assess environmental risks at each site?
	3. How is progress against these objectives being measured?
2. Is the policy effectively communicated to both internal and external stakeholders?	4. How much progress has been achieved at this site?

SCORING:

High (3)	Clearly defined objectives for the site.
Moderate (2)	Objectives in development.
Low (1)	Awareness of the issues at the site, but no action yet on establishing objectives.

4.2 Commitment

DIAND must have the commitment to take appropriate actions in support of its environmental objectives at each site. Commitment is shown by having:

- shared values;
- alignment and integration; and
- accountability and responsibility.

KEY QUESTIONS TO MEASURE COMMITMENT:

DEPARTMENTAL	SITE SPECIFIC
Primary Question 1. Does senior DIAND management (in Ottawa) integrate environmental management at Northern sites into its normal business activities (i.e., is environmental management at Northern sites recognized to be important)?	**Primary Question.** 1. Are the responsibilities and accountability of key DIAND personnel who manage, perform and verify environmental work in the North defined and documented?
Supporting Questions 1. Has the appropriate authority been identified to oversee management of environmental issues at Northern sites? 2. To what extent do DIAND employees understand their responsibilities and potential contributions to improve environmental conditions at Northern sites? 3. Is commitment reflected in: • internal priority statements; • public or employee notice-boards; • vision and mission statements; • codes of conduct; or • other visible documentation.	**Supporting Questions** 1. Do these personnel: • Act appropriately in emergencies? • Understand the consequences of non-compliance? • Understand their accountability?

SCORING:

High (3)	Clearly defined authority and accountability.
Moderate (2)	Ad hoc authority and accountability.
Low (1)	No or small commitment to authority and accountability.

4.3 Capability

DIAND must have the capability to continuously support its environmental objectives at each site. Capability is displayed by having:

- human, physical and financial resources;
- knowledge, skills and training; and
- information management.

KEY QUESTIONS TO MEASURE CAPABILITY:

DEPARTMENTAL	SITE SPECIFIC
Primary Question 1. Is there a process within DIAND to identify and evaluate environmental management resource requirements in the North?	**Primary Question** 1. To what extent are resources (money, equipment, people) available for environmental initiatives at this site?
Supporting Questions 1. Is there a process within DIAND to manage the training and development of personnel? 2. Has the Northern Program been able to identify and track key variables of environmental performance at each site?	**Supporting Questions** 1. What equipment is available to respond to the needs at this site? 2. What equipment is needed to respond to the needs at this site? 3. In view of the risks at this site, is Northern DIAND staffs appropriately trained (e.g., soil chemistry, toxicology, site investigation and remediation, project management)? 4. Are sufficient people available (or can they be mobilized) to manage the risk(s) at this site? 5. Is there sufficient information to deal with problems at this site? 6. Do contingency plans exist in case of a local emergency? 7. Are the mix and level of resources adequately planned for to meet the objectives for this site?

SCORING:

High (3)	Adequate; resources (human and financial) are available or are made available.
Moderate (2)	Some uncertainty as to the availability of resources.
Low (1)	Low to no resources is available.

4.4 Learning:

DIAND must continuously learn how to perform better in the pursuit of its environmental objectives. An organization that is continuously learning will have:

- measuring and monitoring tools and procedures;
- communication and reporting; and
- continuous improvement.

KEY QUESTIONS TO MEASURE LEARNING:

DEPARTMENTAL	SITE SPECIFIC
Primary Question	**Primary Question**
1. To what extent is information communicated internally (both within the Yukon and NWT, and to HQ)?	1. Does the Northern Program collect data on each site and conduct trend analysis to assess the impact of changes that may alter the risk profile (and therefore the need for action) of that site?

Supporting Questions	Supporting Questions
1. Is progress in achieving objectives regularly monitored?	1. What quantitative data has been collected for this site? 2. Is the available information being distributed and used by the responsible officials? 3. In view of experiences with this site, are other sites being screened for the same kinds of problems? 4. How is information on this (and other) site(s) collected, stored and retrieved? Are there standard protocols that ensure the same questions are asked for each site? 5. Are new technologies being investigated?

SCORING:

High (3)	Good information exchange; follow-up, assessment and pooling of experiences.
Moderate (2)	Inconsistent information exchange.
Low (1)	No follow-up; low to no information exchange.

5.0 BUILDING AND USING THE NERAS

5.1 Building the NERAS

CALCULATING SITE SCORES

At the end of Step 4 of the NERAS process each site has been:

- The risk has been assessed and scored; and
- The ability to manage risk has been scored.

For each site the NERAS SITE SCORING WORKSHEET will have been completed. Examples of the completed worksheets are shown in Appendix V for the following sites:

- Sarcpa;
- Haines Junction Refinery; and
- Contact Lake.

The following table summarizes the scores for each site.

Site	Site Risk Assessment Score	Ability to Manage Risk
Sarcpa	68	8
Haines Junction Refinery	30	8
Contact Lake	61	5

POSITIONING THE SITES INTO THE NERAS MATRIX

The dimensions of the NERAS Matrix are defined as follows:

Site Risk: **High** - score of 68 or greater.
Moderate - score of between 36 and 67.
Low - score of 36 or less.

Ability to Manage Risk: **High** - score of 11 or greater.

Moderate - score of between 8 and 10.
Low - score of 7 or less.

Each site is positioned in the NERAS Matrix based on its two scores. The following page shows the NERAS Matrix with the sites positioned into it.

The second matrix shows the sites with the following breakdown of Site Risk used:

Site Risk:

High - score of 68 or greater.
Moderate - score of between 24 and 67.
Low - score of 24 or less.

Northern Environmental Risk Assessment Strategy

RISK

Ability to Manage Risk	HIGH (99)	MODERATE (67)	LOW (36–11)
HIGH (12–11)	Bar E. Horton River (76/12)	Pearce Point (42/11) Coral Harbour (39/11)	Old Mayo (16/12) Dawson (16/12) Choutia (22/11)
MODERATE (10–8)	Jqaliut (89/8) Venus (80/8) Discovery (74/8) Snag (71/8) Aishsihik (70/8) Sarcpe (68/8) Resolution (68/8)	Atinkinson Point (37/10) Peel River (54/8) Clifton Point (40/8)	Haimes Refinery (35/8)
LOW (7–4)	Ray Rock (71/6) Cape Christian (68/6) Watson Lake (68/6)	Dawson NE (54/7) Fox 1 (50/7) Contact Lake (61/5) Indore (61/5) Smallwood (57/5) Hope Bay (57/5) Norex (57/5) Northina (57/5) Canol Road (57/5) Big Thing (57/5) Silver Bear (57/5) Alaska Highway (38/5) Canol Road (38/5) Port Burwell (30/5) Baay Island (57/4) Barnard Harbour (49/4) Kivitoo (45/4) Ross Point (37/4)	Pumping Stations (34/6) Silver Seven (29/6) Laforme (25/6) Union (21/6) Wernecke (21/6) Tom Mine (21/6) Hope Bay (21/6) Plata & Inca (17/6) PEG (21/5) Matheson Point (19/5) Hidden Lake (17/5) West Bay (17/5) Pensive (17/5) Beaver Crow (13/5) Thompson (33/4) Ruth (33/4) Keith (30/4) Bear Island (30/4) Simpson Lake (29/4) Hat Island (29/4) Cape Peel (29/4) NAD (29/4) Ekalugak (29/4) Durban Island (29/4) Stuart Point (17/5) Tanunuk (15/4)

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Northern Environmental Risk Assessment Strategy

RISK

Ability to Manage Risk

	HIGH (99)	MODERATE (67)	LOW (24–11)
HIGH (12–11)	Bar E. Horton River (76/12)	Pearce Point (42/11) Coral Harbour (39/11)	Old Mayo (16/12) Dawson (16/12) Choutia (22/11)
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5.2 Using the NERAS Matrix

The matrix provides a way of deciding which particular type (and intensity) of remediation is appropriate for a particular site. The Matrix should most properly be interpreted in the following way:

- **Sites Located in RED Area:** Sites in this area are obvious candidates for immediate managerial attention. The specific nature of the action will be situation specific. Sometimes, further investigation of the nature, breadth and root of exposure may be needed before any remedial action can be taken. In other cases, the nature of the needed "fix" will be self-evident, and action can be taken without further review.

- **Sites Located in ORANGE Area:** Sites in this area are also candidates for action. The options are to reduce the risk or increase DIAND's ability to manage the risk. This would suggest that if the highest risk factors for the site can be identified and remediated then the level of risk will be reduced. Alternatively DIAND can improve its ability to manage the risk by carrying out appropriate programs.

- **Sites Located in the YELLOW Area:** Sites in this area are candidates for periodic review. DIAND has, or perceives that it has in place good plans and activities to manage the sites, so the key is to monitor the ongoing status of the sites and ensure that the risk associated with them is not worsening.

- **Sites Located in the GREEN Area:** Sites ranked in this area should be monitored. There is no priority need to improve on the actions and plans here, because the exposure is low. However, this is likely the area from which most "new risk sites" will emerge. Sites that are low risk and high ability to manage should be aggressively managed to ensure that DIAND receives value for money. Current resources allocated to management of these sites should be periodically reviewed in view of their low risk to the Department.

There are, of course, many definitions of remediation. The development of policies and procedures for both people and property is, for example, an important aspect of good site management. These policies and procedures transcend cleanup and include emergency preparedness, contingency planning, education and training also investigation, treatment, in situ bioremediation and encapsulation.

6.0 CONCLUSION

The NERAS will help DIAND establish priorities for remediation at waste sites in Northern Canada. The approach is consistent with the objectives of the Action on Waste Program under the Arctic Environmental Strategy.

The NERAS will help DIAND managers and staff to:

- Establish an objective and transparent process for setting clean up priorities;
- Rank northern waste sites based on risk and the ability to manage risk; and
- Provide demonstrable evidence of due diligence.

The NERAS Matrix can be a useful management tool because it explicitly organizes, and sets priorities for, all of the sites that have been assessed. The matrix is, of course, only a tool and there may be important mitigating circumstances that cause DIAND to investigate and remediate certain sites in a way other than suggested by the matrix. It should be used as a guide to focus management attention on the following:

- Sites requiring immediate investigation or remedial attention because of the issues present;
- Sites that are candidates for an audit or more detailed assessment;
- Sites that should be monitored to ensure that environmental conditions do not worsen; and
- Sites that should be carefully managed to ensure that DIAND receives value for money.

APPENDIX 1

NERAS SITE SUMMARY WORKSHEET

NERAS SITE SUMMARY WORKSHEET

Author:	Title:
Original Assessment (Y/N): Date:	Amendment (Y/N): Date:
1. SITE LOCATION	
Site Name:	Location:
Territory:	District:
Land Ownership/Status:	Land Use(s):

2. PHYSICAL DESCRIPTION	
Historic Land Use(s):	
Visual Impact:	
Distance to nearest community:	Size:
Distance to nearest water:	Type and size:

3. WORK DONE TO DATE:			
Assessments Done:	**Date:**	**Public Consultation ?**	**Date:**
(i) Inventory			
(ii) Env. Audit			
(iii) Eng. Design			
(iv) Clean-up Protocol			

NERAS SITE SUMMARY WORKSHEET

Non-Hazardous Materials Present:	**Amount:**	**Condition:**
Barrels Construction Equipment Vehicles Solid Waste Other Other Other		

4. IMPACT ON ENVIRONMENT			
Type of Wildlife, Vegetation, etc.	**Impact**	**Endangered**	**Part of Food Chain**
1. 2. 3. 4. 5.			

NERAS SITE SUMMARY WORKSHEET

5. ENVIRONMENTAL ASSESSMENT
Summary of Environmental Assessment:

NERAS SITE SUMMARY WORKSHEET

Issue:	Form:	**Quantity:**	**Risk:** **(e.g. CEPA or Fisheries Act violation)**
1. Chemicals PCBs Dioxins Pesticides Other **2. Inorganic Elements** Arsenic Cadmium Chromium Cobalt Copper Lead Mercury Nickel Zinc Silver Other **3. Past Waste Disposal** Sewage Landfills Dumps Fuel Spills USTs ASTs Other **4. In or Adjacent to Water?** Haz. Mat'ls. Non-Haz. **5. Radio-Activity** **6. Physical Hazards** Mine Shafts Buildings Other **Form:** **Quantity: Risk:** **(e.g. CEPA or Fisheries Act Violation)**			

APPENDIX II

NERAS SITE ASSESSMENT WORKSHEET

NERAS SITE ASSESSMENT WORKSHEET

1. SITE LOCATION

Site Name: Location:

Territory: District:

2. PROBABILITY High (3) Moderate (2) Low (1)

2.1 Legal Probability Score:
Reason:

2.2 Health & Safety Probability Score:
Reason:

2.3 Public Probability Score:
Reason:

2.4 Land Claim Probability Score:
Reason:

3. SEVERITY High (3) Moderate (2) Low (1)

3.1 Legal Severity Score:
Reason:

3.2 Health & Safety Severity Score:
Reason:

3.3 Public Severity Score:
Reason:

3.4 Land Claim Severity Score:
Reason:

APPENDIX III

NERAS ABILITY TO MANAGE RISK WORKSHEET

NERAS ABILITY TO MANAGE RISK WORKSHEET

1. SITE LOCATION

Site Name: Location:

Territory: District:

2. RATING **High (3)** **Moderate (2)** **Low (1)**

3.1 Purpose Score:

Reason:

3.2 Commitment Score:

Reason:

3.3 Capability Score:

Reason:

3.4 Learning Score:

Reason:

APPENDIX IV

NERAS SITE ASSESSMENT WORKSHEET

NERAS SITE ASSESSMENT WORKSHEET

SCORE	Probability	Severity	Weight	Total Score	Comments
Legal			4		
Health & Safety			4		
Public			1		
Land Claim			2		
TOTAL SITE SCORE					

ABILITY TO MANAGE RISK	High (3)	Moderate (2)	Low (1)	Total
Purpose				
Commitment				
Capability				
Learning				
OVERALL RATING				

Jury Members:

Name: Title: Signature:

(a)

(b)

(c)

APPENDIX V

EXAMPLES

SARCPA
NERAS SITE ASSESSMENT WORKSHEET

SCORE	Probability	Severity	Weight	Total Score	Comments
Legal	3	3	4	36	
Health & Safety	2	3	4	24	
Public	2	2	1	4	
Land Claim	1	2	2	4	
TOTAL SITE SCORE				68	

ABILITY TO MANAGE RISK	High (3)	Moderate (2)	Low (1)	Total
Purpose		X		2
Commitment		X		2
Capability			X	1
Learning	X			3
OVERALL RATING				8

Jury Members:

Name: Title: Signature:

(a)

(b)

(c)

HAINES JUNCTION REFINERY
NERAS SITE ASSESSMENT WORKSHEET

SCORE	Probability	Severity	Weight	Total Score	Comments
Legal	2	0	4	0	
Health & Safety	2	2	4	16	
Public	2	1	1	2	
Land Claim	3	2	2	12	
TOTAL SITE SCORE				30	

ABILITY TO MANAGE RISK	High (3)	Moderate (2)	Low (1)	Total
Purpose		X		2
Commitment		X		2
Capability			X	1
Learning	X			3
OVERALL RATING				8

Jury Members:

Name: Title: Signature:

(a)

(b)

(c)

CONTACT LAKE
NERAS SITE ASSESSMENT WORKSHEET

SCORE	Probability	Severity	Weight	Total Score	Comments
Legal	3	3	4	36	
Health & Safety	2	2	4	16	
Public	1	1	1	1	
Land Claim	2	2	2	8	
TOTAL SITE SCORE				61	

ABILITY TO MANAGE RISK	High (3)	Moderate (2)	Low (1)	Total
Purpose			X	1
Commitment			X	1
Capability			X	1
Learning		X		2
OVERALL RATING				5

Jury Members:

Name: Title: Signature:

(a)

(b)

(c)

Environmental Management Systems - General Guidelines on Principles, Systems and Supporting Techniques

Committee Draft

Prepared by
ISO/TC207/SC1/WG2

February, 1995

TABLE OF CONTENTS

Appendix

0 INTRODUCTION

0.1 Overview

As concern grows for maintaining and improving the quality of the environment and protecting human health, organisations of all sizes are increasingly turning their attention to the potential impacts of their activities, products and services. The environmental performance of an organisation is of increasing importance to internal and external interested parties. Achieving sound environmental performance requires organisational commitment to a systematic approach and to continual improvement.

The general purpose of this Guideline is to provide assistance to organisations implementing or improving an Environmental Management System (EMS). It is consistent with the goal of "Sustainable Development" and is compatible with diverse cultural, social and organisational frameworks.

An EMS provides order and consistency for organisational efforts to address environmental concerns through the allocation of resources, assignment of responsibilities, and ongoing evaluation of practices, procedures and processes.

This Guideline outlines the elements of an EMS and provides practical advice on implementing or enhancing such a system. It also provides organisations with advice on how to effectively initiate, improve or sustain an environmental management system. Such a system is essential to an organisation's ability to anticipate and meet growing environmental performance expectations and to ensure ongoing compliance with national and/or international requirements.

Environmental management is an integral part of an organisation's overall management system. The structure, responsibilities, practices, procedures, processes and resources for implementing environmental policies, objectives, and targets should be co-ordinated with existing efforts in other areas (e.g., operations, finance, quality, occupational health and safety). The design of an EMS is an ongoing, interactive process that consists of defining, documenting and continually improving on the required capabilities.

Key principles for managers implementing an Environmental Management System include, but are not limited to the following:

- Recognise that environmental management is among the highest corporate priorities.
- Establish and maintain communications with internal and external interested parties.
- Determine the legislative requirements and environmental aspects associated with the organisation's activities, products and services.
- Develop management and employee commitment to the protection of the environment, with clear assignment of accountability and responsibility.

- Encourage environmental planning throughout the product or process life cycle.

- Establish a disciplined management process for achieving targeted performance levels.

- Provide appropriate and sufficient resources, including training, to achieve targeted performance levels on an ongoing basis.

- Evaluate environmental performance against appropriate policies, objectives and targets and seek improvement where appropriate.

- Establish a management process to review and audit the Environmental Management System and to identify opportunities for improvement of the system and resulting environmental performance.

- Encourage contractors and suppliers to establish an EMS.

ISO 14001 includes the core elements of the EMS to be used for certification/registration. ISO 14000 includes additional principles and elements that an organisation may consider. ISO 14010-12 and ISO 14031 support both ISO 14000 and ISO 14001. This relationship is shown in figure 1.

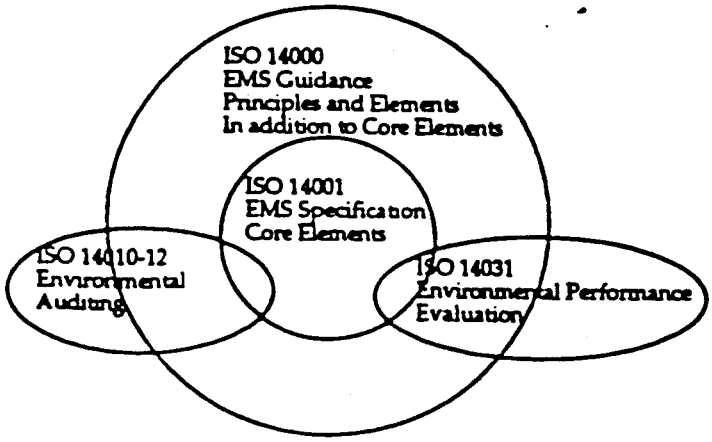

Figure 1 Relation of Some ISO 14000 Documents

Organisations can consider different uses of the ISO 14000 series.

- Using this ISO 14000 Guideline to Environmental Management Principles, Systems and Supporting Techniques, or parts of it, to initiate and/or improve its environmental management system. ISO 14000 is not intended for use by registration bodies.

- Using the ISO 14001 Environmental Management System Specification to achieve third party certification. ISO 14001 is intended for use by registration bodies.

- Using this ISO 14000 Guideline or the ISO 4001 Specification for second party recognition between contracting parties, which may be suitable for some business relationships.

- Using related ISO documents.

The choice will depend on factors such as:

- organisation policy;

- level of maturity of the organisation: whether there is already systematic management in place that can facilitate the introduction of systematic environmental management;

- possible advantages and disadvantages, influenced by such things as market position, existing reputations, external relations;

- size of the organisation.

This guideline can be used by organisations of any size. None-the-less, the importance of small and medium-sized enterprises (SMEs) is being increasingly recognised by governments and business. This guideline acknowledges and accommodates the needs of SMEs.

0.2 Benefits of Having an Environmental Management System

An organisation should implement an effective environmental management system in order to help protect human health and the environment from the potential impacts of its activities, products and services; and to assist in maintaining and improving the quality of the environment.

Having an EMS can help an organisation provide confidence to its interested parties that

- policies, objectives, and targets are met;
- emphasis is placed on prevention rather than corrective action;
- evidence of reasonable care and regulatory compliance can be provided; and
- the systems design incorporates the concept of continual improvement.

An organisation whose management system incorporates an EMS has a framework to balance and integrate economic and environmental interests. An organisation that has implemented an EMS can achieve significant competitive advantage.

Economic benefits can be gained from implementing an environmental management system. These should be identified in order to demonstrate to interested parties, especially shareholders, the value to the organisation of good environmental management. It also provides the organisation with the opportunity to link environmental objectives and targets with specific financial outcomes and thus to ensure that resources are made available where they provide the most

benefit in both financial and environmental terms.

The potential benefits associated with an effective EMS include:

- meeting customers' environmental expectations;
- maintaining good public/community relations;
- satisfying investor criteria and improving access to capital;
- obtaining insurance at reasonable cost;
- enhanced image and market share;
- meeting vendor certification criteria;
- improving cost control;
- liability limitation;
- demonstration of reasonable care;
- conservation of input materials and energy;
- facilitate obtaining permits and authorisations;
- technology development and transfer; and
- improved industry-government relations.

1. SCOPE

This International Standard provides guidance on the development and implementation of environmental management systems and principles, and their co-ordination with other management systems.

The guidelines are applicable to any organisation, regardless of size, type, or level of maturity, that is interested in developing, implementing and/or improving an environmental management system.

The guidelines are intended for use as a voluntary, internal management tool and are not intended for use by EMS Certification/Registration bodies as a specification standard.

The guidelines build on the core elements of the EMS specification found in ISO 14001 and include additional elements important to a comprehensive Environmental Management System.

2. NORMATIVE REFERENCES

The following standards contain provisions which, through reference in the text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 14001:199X Environmental Management Systems – Specification with Guidance for Use

ISO 14010.2:199X Guidelines for Environmental Auditing – General Principles of Environmental Auditing

ISO 14011.1:199X Guidelines for Environmental Auditing – Audit Procedures – Part 1: Auditing of Environmental Management Systems

ISO 14012:199X Guidelines for Environmental Auditing – Qualification Criteria for Environmental Auditors

3. DEFINITIONS

The following definitions apply in this Guideline:

3.1 continual improvement – process of enhancing the environmental management system, with the purpose of achieving improvements in overall environmental performance, not necessarily in all areas of activity simultaneously, resulting from continuous efforts to improve in line with an organisation's environmental policy.

3.2 environment – surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation. The environment in this context extends from within an organisation to the global system.

3.3 environmental aspect – elements of an organisation's activities, products and services which are likely to interact with the environment.

3.4 environmental impact – any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities products and services.

3.5 environmental management – parts of the overall management function of an organisation that develop, implement, achieve, review and maintain the environmental policy.

3.6 environmental management system – organisational structure, responsibilities, practices, procedures, processes and resources for implementing and maintaining environmental management.

3.7 environmental management system audit – systematic and documented verification process to objectively obtain and evaluate evidence to determine whether an organisation's environmental management system conforms to the EMS audit criteria. **(align with SC2)**

3.8 environmental objectives – overall environmental goals, arising from the environmental policy and significant impacts, that an organisation sets itself to achieve, and which are quantified wherever practicable.

3.9 environmental performance – measurable outputs of the environmental management system, relating to the organisation's control of the impact of its activities, products and services on the environment, based on its environmental policy, objectives and targets. **(align with SC4)**

3.10 environmental policy – statement by the organisation of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets.

3.11 environmental target – detailed performance requirement, quantified wherever practicable, applicable to the organisation or parts thereof, that arise from the environmental objectives and that need to be set and met in order to achieve those objectives.

3.12 interested party – individual or group concerned with or affected by the performance of an organisation.

3.13 organisation – company, operation, firm, enterprise, institution, or association, or part thereof, whether incorporated or not, public or private, that has its own functions and administration.

4 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) PRINCIPLES AND ELEMENTS

The environmental management system model (see Figure 2) follows the basic view of an organisation which subscribes to the following principles:

Principle 1

An organisation should focus on what needs to be done -- it should ensure commitment to the EMS and define its policy.

Principle 2

An organisation should formulate a plan to fulfil its environmental policy.

Principle 3

For effective implementation an organisation should develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets.

Principle 4

An organisation should measure, monitor and evaluate its environmental performance.

Principle 5

An organisation should review and continually improve its environmental management system, with the objective of improving its overall environmental performance.

With this in mind, the EMS is best viewed as an organising framework that should be continually monitored and reviewed to provide effective direction for an organisation's environmental activities in response to changing internal and external factors. Every individual in an organisation should accept responsibility for environmental improvements.

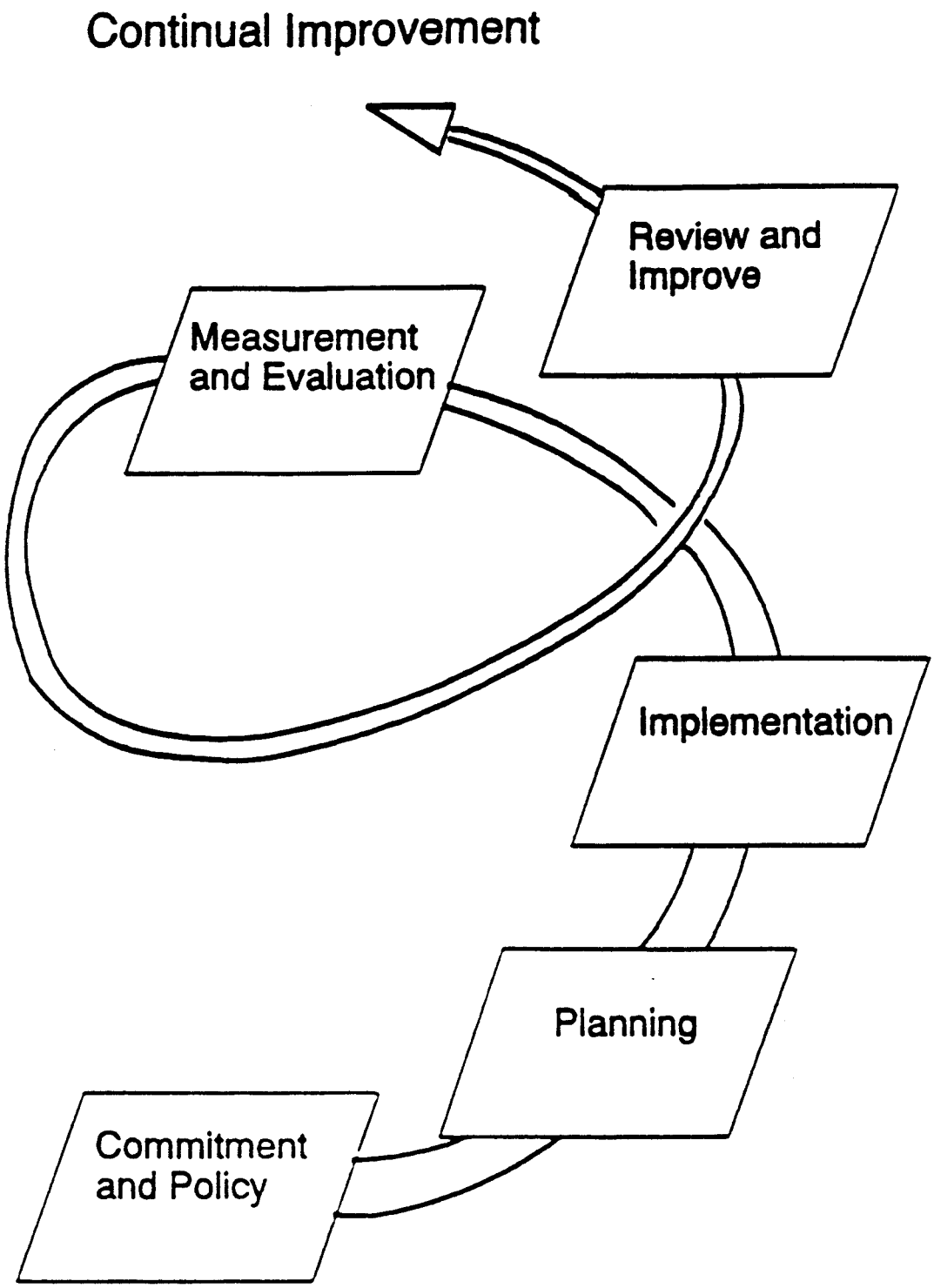

Figure 2 EMS Model

4.1 HOW TO START: COMMITMENT AND POLICY

Principle 1

An organisation should focus on what needs to be done -- it should ensure commitment to the EMS and define its policy.

4.1.1 General

The organisation should begin where there is obvious benefit, for example, by focusing on regulatory compliance, by limiting sources of liability or by making more efficient use of materials.

As the organisation grows in experience, and its EMS starts to take shape, procedures, programs and technologies can be put in place to further improve environmental performance. Then, as the EMS matures, environmental considerations can be integrated into all business decisions.

4.1.2 Top Management Commitment and Leadership

To ensure success, the first step in developing or improving an Environmental Management System is obtaining commitment from the top management of the organisation to improve the environmental performance of the organisation in managing its activities, products and services. The ongoing commitment and leadership of the top management is crucial.

4.1.3 Initial Environmental Review

The current position of an organisation with regard to the environment can be established by means of an initial environmental review. The initial review can cover the following areas:

- identification of legislative and regulatory requirements;
- identification of environmental aspects, significant environmental impacts and liabilities;
- evaluation and documentation of significant environmental issues;
- evaluation of performance compared with relevant internal criteria, external standards, regulations, codes of practice and sets of principles and guidelines;
- existing environmental management practices and procedures;
- identification of the policies and procedures dealing with procurement and contracting activities;
- feedback from the investigation of previous incidents of non-compliance;
- opportunities for competitive advantage;
- the views of interested parties; and

- functions or activities of other organisational systems that can enable or impede environmental performance.

In all cases, consideration should be given to the full range of operating conditions, including possible incidents and emergency situations.

The process and results of the initial environmental review should be documented and opportunities for EMS development should be identified.

Practical Help **Initial Environmental Review**

An important first step is to develop the list of areas to be reviewed. This can include organisation activities, specific operations or a specific site.

Some common techniques for conducting a review include:

- questionnaires
- interviews
- checklists
- direct inspection and measurement
- records review
- benchmarking

Organisations, including SMEs, can look to a number of outside sources such as:

- enforcement agencies in relation to laws and permits
- local or regional libraries or databases
- other organisations for exchange of information
- industry associations
- larger customer organisations
- manufacturers of machinery in use
- business relations (e.g., with those who transport and dispose of waste)
- professional help

4.1.4 Environmental Policy

An environmental policy establishes an overall sense of direction and sets the parameters of action for an organisation. It sets the overarching goal as to the level of environmental performance required of the organisation, against which all subsequent actions will be judged.

A growing number of international organisations including government, industry associations and citizens groups have developed guiding principles (see Appendix A). Such guiding principles have helped organisations define the overall scope of their commitment to the environment. They also help to give different organisations a common set of values. Based on these comprehensive principles, any organisation can then develop its policy, which can be as individual as the organisation for which it is written.

The responsibility for setting environmental policy rests with those with proprietary interest in the organisation, or with their delegates, (e.g., a board of directors or another governing body). The organisation's management is responsible for implementing the policy and for providing input to the formulation and modification of the policy.

An environmental policy should consider the following:

- the organisation's mission, vision, core values and beliefs;
- requirements of and communication with interested parties;
- continual improvement;
- guiding principles;
- alignment with other organisational policies (e.g., Quality, Health & Safety); and
- specific local or regional conditions.

Issues to be Considered in Environmental Policy

1. Does the organisation have an environmental policy?
2. Does the policy reflect the organisation's values and guiding principles?
3. Has the environmental policy been approved by the Board of Directors or other governing body and has someone been identified and given the authority to oversee and implement the policy?
4. Does the policy drive the setting of environmental objectives and targets?
5. Does the policy guide the organisation towards monitoring best available technology and management practices?
6. Does the policy support continual improvement?
7. Does the policy state the organisation's commitment to monitor, and meet or exceed legal requirements and to consider the expectations of its interested parties?

Practical Help Environmental Policy

All activities, products and services can give rise to impacts on the environment. The environmental policy should recognise this.

A detailed review of the guiding principles in Appendix A can help in drafting an appropriate policy. The issues addressed in the policy depend on the nature of the organisation. In addition to compliance with environmental regulations, the policy can state commitments to:

- minimise the environmental impacts of new developments through the use of the integrated environmental management procedures and planning
- development of environmental performance evaluation procedures and associated indicators
- embody life cycle thinking
- design products in such a way as to minimise their environmental impacts in production, use and disposal
- prevent pollution, reduce waste and the consumption of resources (materials, fuel and energy),and commit to recovery and recycling, as opposed to disposal where feasible
- education and training
- technology transfer
- effective involvement of and communication with interested parties
- work towards the achievement of sustainable development
- encourage the use of EMS by suppliers and contractors

4.2 PLANNING

Principle 2

An organisation should formulate a plan to fulfil its environmental policy.

4.2.1 General

The environmental management system elements relating to planning include: identification of environmental aspects and evaluation of associated environmental impacts; environmental policy; internal criteria; environmental objectives and targets, and environmental plans and management program.

4.2.2 Identification of Environmental Aspects and Evaluation of Associated Environmental Impacts

Before an organisation can establish its policies and prioritise its objectives and targets, it should identify the environmental aspects and significant environmental impacts associated with its activities, products and services. The purpose of doing so is to ensure that the significant environmental impacts associated with these aspects are taken into account in setting the environmental objectives.

The identification of the environmental aspects is an ongoing process that determines the past. current and potential impact (positive or negative) of an organisation's activities on the environment. This process also includes the identification of the potential regulatory, legal and business exposure affecting the organisation. It can also include identification of impacts on the health and safety of people, and environmental risk assessment.

Issues to be Considered in Identification of Environmental Aspects and Evaluation of Environmental Impacts

1. Have potential environmental aspects of the organisation's activities, products, and services been identified?
2. Do the organisation's activities, products or services create any change (positive or negative) to or in the environment?
3. Does the location of the organisation require special environmental consideration?
4. Will any intended changes or additions to activities, products

or services alter the environmental aspects and impacts?

5. How significant or severe are the potential environmental impacts should a process failure occur?

6. How frequently will the situation arise that could lead to the impact?

7. What are the significant environmental impacts, considering aspects, likelihood, severity and frequency?