

**An Assessment of
Solid Waste Management Practices at
Peguis First Nation**

Application of a Pollution Prevention Initiative

by

Jane Maslowski

**A Practicum
Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements
for the
Degree Master of Natural Resources Management**

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**A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University
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ABSTRACT

Historically, most environmental issues were addressed using a relatively simple "command and control" approach. Regulatory emphasis focused on cleaning-up pollution. While environmental improvements were made, a sense emerged that more was needed. Thought is now given to reducing or ultimately preventing pollution at-source through a concept known as "Pollution Prevention". A Pollution Prevention (P2) initiative can be the key to long term sustainable environmental practices. Application of a pollution prevention model produces a documented management framework that provides an organized approach to environmental management. Once developed, the management framework can assist First Nations in implementing environmental improvements.

Concerned with a potential threat to both human health and the environment, Peguis First Nation issued a Band Council Resolution, dated 1997 February 25, recommending closure of the community's existing waste disposal grounds and the commissioning of a new landfill facility. Site visits were conducted to the existing Peguis waste disposal grounds, operational practices observed and community waste handlers interviewed. The assessment of landfill operating practices provided insight into community waste management practices. Existing landfill operational practices were found to be in need of improvement. The assessment supported the Band Council recommendation for landfill closure.

An opportunity to apply a pollution prevention model to community waste management practices followed. Peguis – in regards to garbage handling - was in transition. The old garbage dump was slated for closure and the process for the establishment of a new landfill facility was being considered. What was needed in the interim was increased public awareness on sustainable waste management practices. The pollution prevention initiative developed a framework for environmental management and focussed heavily on community education, promoting best management practices for solid waste handling.

Several gains were made through the public education program: landfill operators were educated in best management practices, students from the Peguis Summer Employment Program were educated in various aspects of waste management, a recycling survey determined community interest in recycling, a school recycling program was established as was enrollment into the Society, Environment & Energy Studies (SEEDS) Foundation, and environmental awareness material applicable to the community was sourced and obtained.

Recommendations include: modifying and adopting the pollution prevention model, establishing an active community recycling program, assigning a community waste coordinator and strengthening the Manitoba First Nations communication network.

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GLOSSARY OF TERMS

Aboriginal – a term used to refer to Canada's indigenous people. According to the Canadian Constitution of 1982, Aboriginal people include Indian, Inuit and Metis (Winds of Change Cross Cultural Training & Consulting, 1997).

Active area – means a designated trench or berm confined area of a waste disposal ground in which solid wastes are deposited (Manitoba Regulation [MR] 150/91).

Bulky metallic waste – includes but is not limited to derelict vehicles, farm machinery, and large appliances that are capable of being salvaged for recycling or reuse (MR 150/91).

Class 2 waste disposal ground - means a waste disposal ground serving a population in excess of 1000 persons; but less than or equal to 5000 persons (MR 150/91).

Drumlin – a term used in geomorphology. A smooth mound of glacial debris – usually a quarter of a mile to a mile in length and only a hundred feet or so high - with the longitudinal axis parallel to the direction of ice movement; often described as shaped like an upside down teaspoon (Briggs, Smithson & Ball, 1989).

Durable goods – are generally defined as products having a lifetime of three years or more, although there are some exceptions. Durable goods usually include major appliances, furniture and furnishings, rubber tires, lead-acid automotive batteries and miscellaneous durables (e.g.: small appliances, consumer electronics). Durable goods are made up of a variety of materials which include but are not limited to: plastics, rubber, leather, wood, textiles, glass, nonferrous metals (e.g.: copper, lead) and aluminum (United States Environmental Protection Agency [U.S. EPA], November 1994).

Environmental management - that aspect of the overall management function that determines and implements the environmental policy (Canadian Standard Association [CSA], 1994).

Environmental Management Framework (EMF) - the organizational structure, responsibilities, practices, procedures, processes and resources for implementing environmental management. Also known as an Environmental Management System (EMS) (CSA, 1994).

First Nation - is a term used by Aboriginal groups of Native political organizations to refer to themselves. It means first peoples of Canada (Winds of Change Cross Cultural Training & Consulting, 1997).

Garbage – means animal and vegetable wastes, including food packaging material with residual food materials, resulting from the handling, preparation, cooking and serving of foods in households, institutions and commercial concerns and market wastes, resulting from the handling, storage and selling of foods in wholesale and retail stores and markets (MR 150/91).

Hazardous waste – means a substance that is designated a hazardous waste by regulation under The Dangerous Goods Handling and Transportation Act (MR 150/91).

Industrial waste – means any waste product generated by industry other than hazardous waste and liquid industrial waste (MR 150/91).

Liquid waste – means sewage, sewage effluent and sludge from septic tanks, holding tanks and municipal sewage treatment systems and has a slump of more than 150 mm using the slump test method (slump test, CSA Standards Test Method A23.1-5C) (MR 150/91).

Nondurable goods – are defined as those having a lifetime of less than three years. Products made of paper and paperboard comprises the largest portion of nondurable goods. Others examples include: paper and plastic plates and cups, disposable diapers as well as clothing and footwear (U.S. EPA, November 1994).

Operator – means a person, municipality, provincial government agency, Crown Corporation or private corporation who owns or is responsible for a waste disposal ground or waste transfer station (MR 150/91).

Pollution Prevention - the use of processes, practices, or materials and energy that avoid or minimize the creation of pollutants and wastes. Commonly known as P2 (CSA, 1994).

Pollution Prevention Initiative - a practice, process or technology that is implemented to prevent pollution. Often implemented to fulfill a pollution prevention opportunity (CSA, 1994).

Pollution Prevention Opportunity - a set of circumstances that can be modified to prevent pollution (CSA, 1994).

Solid waste – means all discarded waste including dead animals and does not include liquid waste, hazardous waste or bulky metallic waste (MR 150/91).

Waste disposal ground – means a parcel of land that is used for the disposal of solid or industrial waste of for which a site approval is given under subsection 4(5) for use of the land for the disposal of solid or industrial waste (MR 150/91).

CHAPTER I - INTRODUCTION

"These are our times and our responsibilities. Every human being has a sacred duty to protect the welfare of our Mother Earth, from whom all life comes. In order to do this, we must recognize the enemy - the one within us. We must begin with ourselves.

- Leon Shenandoah, (pg. 5; MPPP, 1996)

1.1 PREAMBLE

First Nation communities are concerned with environmental health (WIHC&C Ltd., 1996).

The House of Commons Standing Committee on Environment and Sustainable Development (1995) identified that one of the more common environmental issues of First Nation communities relates to the handling, storage and disposal of solid waste.

"According to the Assembly of First Nations, a study conducted in the late 1980's by the Federal Department of Indian Affairs and Northern Development reported that of the 600 First Nation communities surveyed, over 50 percent had water systems that did not meet Canada's safe drinking water guidelines (74:6) and over 280 communities had inadequate landfill sites (74:7)."

- pg. 179; House of Commons Standing Committee on Environment and Sustainable Development (1995)

Environmental protection for Canadian First Nation lands is often said to be limited as the development and application of environmental regulations and policies of First Nations **often lags behind that applied at other levels of governments** (Environment Canada Officials (a), 1994). Provincial environmental statutes, regulations and permits governing the use of land and people's activities on the land often have no legal force on First Nation land, which falls under federal jurisdiction (Environment Canada Officials (a), 1994).

To improve environmental health, a voluntary pollution prevention approach - often focused on waste management - is now being championed by many sectors both national and international in scope. Pollution Prevention, commonly known as P2, is a practice that leads to reduced wastes or releases to the environment (CSA, 1994). An

environmental protection approach based on pollution prevention is thought to be more effective than the current pollution control approach (Bringer and Benforado, 1994).

Manitoba's Peguis First Nation recently became concerned about environmental health, identifying the community's existing garbage handling practices at the local dump as an environmental threat. To action community change, Peguis issued a Band Council Resolution, dated 1997 February 25, recommending: i) closure of the existing garbage dump and ii) the commissioning of a new landfill facility. To aid in the transition between the closure of the old dump and the opening of the new site, Peguis is developing components for a pollution prevention initiative incorporating best-management practices into the community's garbage handling procedures. The following report presents the process by which advancements of pollution prevention principles specifically targeted to community solid waste management within a Manitoba First Nation are currently being made.

1.2 CASE STUDY: PEGUIS FIRST NATION

Peguis First Nation (First Nation No. 269) is situated in Manitoba's Interlake area. There are three Peguis Reserves: No. 1A, 1B, and 1C. Peguis First Nation 1B, the largest Reserve in Manitoba, is located 170 kilometres north of Winnipeg. Figure 1 shows a study area site map for Reserve 1 B and the location of Peguis 1B within a provincial context. Peguis 1B (Photo-frame 1) is accessible by all-weather roads via Provincial Road #224 from Hodgson as well as #17 and #7 from Winnipeg.

Reserve No. 1A, on the western shores of Fisher Bay is used as a summer camp for students. Reserve No. 1C at Tommy's Point is located north of Fisher River and is used as a fishing station. In addition to Reserves No. 1A, 1B and 1C, six parcels of land in Selkirk (approximately 500 acres) were reclaimed from the Federal Government in 1993 and now have Reserve status (INAC, 1998).

Community languages are Cree and Ojibway. According to 1998 December 31 regional population statistics (INAC, 1998), the total Peguis First Nation population is 6940. Peguis has an on-reserve population of 3050 (44% of total) and an off-reserve population of 3890 (56% of total).

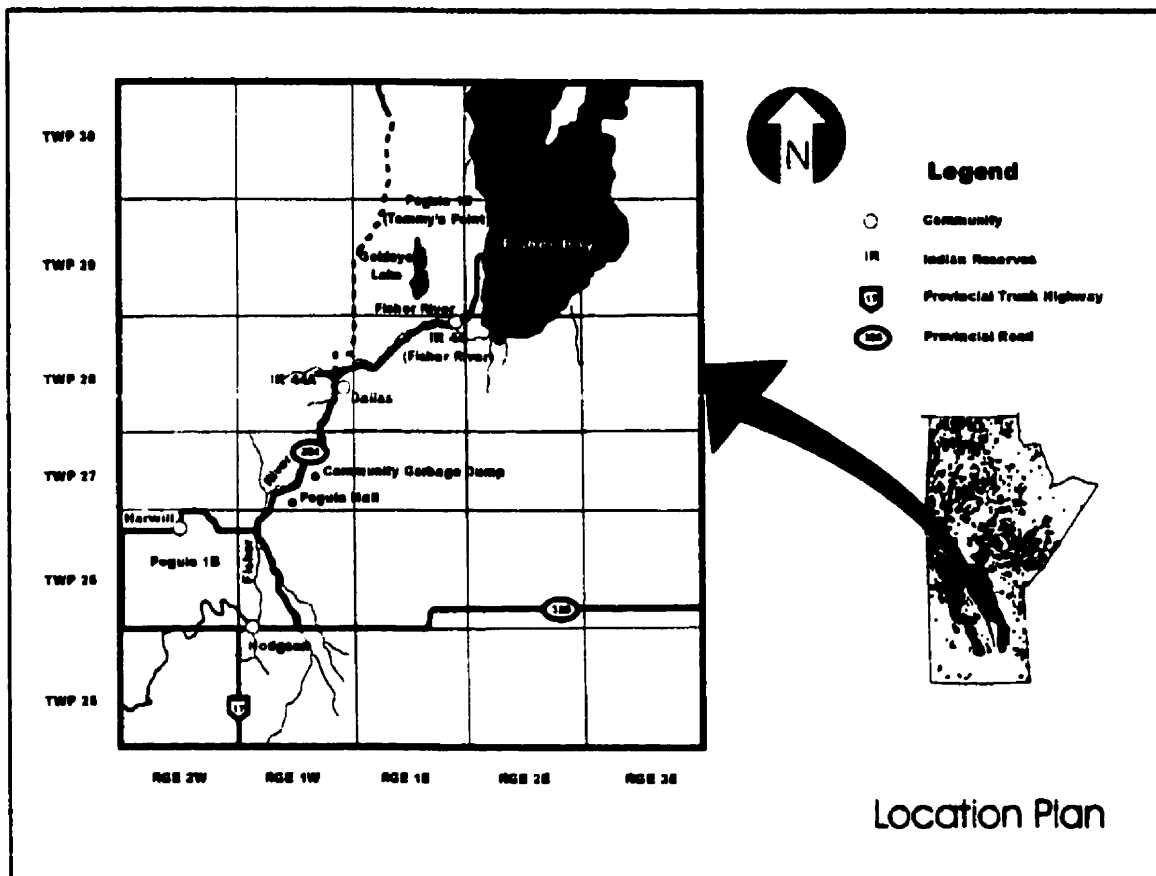


Figure 1: Study area site map
 Source: Manitoba Conservation, 1999

Community services for Peguis residents are housed on Reserve No. 1B and include an on-reserve band office, community centre, arena, outdoor rink, baseball diamond, a fifteen-bed personal care home, a twenty-bed drug and alcohol treatment centre and a health unit. The health unit houses a health office and dental clinic and is staffed by two community health representatives and two nurses. The nearest hospital is located in Hodgson, seven kilometres south of the Peguis community. A volunteer fire department, ambulance service and First Nation constable provide on-reserve protection services. The nearest RCMP detachment is located in Fisher Branch, 19 kilometres south of Peguis. Two schools serve the community. Peguis First School, opened 1998 January, offers Kindergarten to Grade 3. Peguis Central School offers Grades 4 - 12. Both are First Nation operated. Student enrollment for 1996 - 1997 was 811 (INAC, 1998).



Photo-frame 1: Entering Peguis First Nation 1B Reserve

Peguis' economic base is agriculture and commercial business. The Peguis Mall, shown in Photo-frame 2, serves as the "town-square" and houses the Band Office, Health Unit, Band Constable Office, Royal Bank, a restaurant, a foodmart and several small businesses. The Mall also served as the site for several community awareness displays within the course of the project.



Photo-frame 2: The Peguis Mall

Reserve No. 1B - the main reserve - is generally a low relief area with numerous north-south trending drumlins protruding 10 to 25 feet above elevation of the plain. The area is generally characterized by a high water table, imperfect drainage and seasonal flooding, especially along the Fisher River that runs through the community.

Electricity is provided by land-line, postal service is obtainable six days a week and single-party telephone exchange as well as community taxi service is available. Potable running water is obtained from deep wells, chlorinated and piped to users. Sewage disposal for all community homes is via septic fields and a two-cell lagoon (INAC, 1998). Plans are in progress to expand the lagoon to four cells. The community has one waste disposal grounds. The waste disposal grounds is located centrally within the community, one kilometre east of the Fisher River.

1.3 ISSUE STATEMENT

Concerned with potential threat to both human and environmental health caused by operating practices at the community's existing garbage dump, Peguis First Nation issued a Band Council Resolution, dated 1997 February 25, recommending: i) closure of the existing garbage dump and ii) the commissioning of a new landfill facility.

The recommendation provided an opportunity for developing a pollution prevention initiative. In preparation of a new landfill facility and its anticipated more stringent operating practices, a public education program for the adoption of community-wide, solid waste best-management practices was needed. The pollution prevention model provided the framework for the public education program, as well as serving as a basis for any possible future Environmental Management Framework (EMF) development for Peguis.

1.4 OBJECTIVES

Solid waste handling practices at Peguis are in a state of transition – the old garbage dump is being closed and the community is preparing for a new landfill facility; a landfill facility that is anticipated to have stringent waste handling practices. As such, the primary purpose of the study was twofold.

Firstly was the need to conduct an assessment of solid waste management practices at the existing Peguis First Nation waste disposal grounds. As part of the assessment, a preliminary site visit was conducted to provide an overview of the current state of garbage handling within the community. A literature review was conducted to identify technical waste handling issues, legislation issues and pollution prevention issues.

Secondly, to better introduce residents to the new landfill facility and the anticipated more stringent operating practices, was the need to identify improvements to the existing community waste handling practices and relay the improvements to Peguis residents.

Specific objectives were:

1. to determine the state of solid waste management practices at the existing Peguis First Nation waste disposal grounds;

2. to develop, in preparation for Peguis' new landfill facility, a pollution prevention initiative for community-wide, solid waste best-management practices which reflect the traditional knowledge and values of Peguis First Nation;
3. to assess the pollution prevention initiative amongst community residents and draw conclusions; and
4. to provide recommendations to Peguis First Nation.

1.5 PROJECT LIMITATIONS

The scope of the assessment as defined in Objective 1, was limited to operating practices at the existing Peguis First Nation waste disposal grounds. Waste products of concern are those classed as commonly landfilled solid waste which include: durable goods, nondurable goods, containers and packaging, food scraps, yard trimmings and miscellaneous inorganic wastes from residential, commercial, institutional, and industrial sources (US EPA, November 1994). Hazardous, industrial and liquid wastes are beyond the scope of the study.

Also beyond the scope of the study was all information pertaining to the formal environmental and geo-technical studies related to both the decommissioning of the old waste disposal grounds and the commissioning of a new waste disposal grounds.

1.6 ORGANIZATION OF STUDY

The following report presents the process by which advancements of a pollution prevention initiative within a Manitoba First Nation is being made. Specifically dealing with solid waste management practices in a landfill setting - a topic more thoroughly reviewed in Chapter II - the report discusses, in subsequent chapters, the developmental process of the pollution prevention initiative. Chapter III discusses project methodology while Chapter IV focuses on results and discussion. Project summary, conclusions and recommendations are discussed in Chapter V.

CHAPTER II - REVIEW OF RELATED LITERATURE

"Our society is unlike almost any other in the world in its obsession with convenience and consumption. Many products such as paper towels are designed for convenience and discarded after only one use. But how long can we continue to live like this? What kind of world is envisioned seven generations from now? With the children we always have to think about seven generations to come but yet unborn."

-Janice Sundown Hattel, Seneca (pg. 20; MPPP, 1996)

2.1 TECHNICAL ISSUES

2.1.1 SANITARY LANDFILLING

Landfilling - one of the oldest and perhaps the simplest form of biotechnology - is the most popular waste disposal option as more than 70% of all USA solid wastes are disposed of through landfilling (Sufflita et al., 1992).

Historically, "out of sight; out of mind" generally reflected the human attitude towards garbage handling (Sufflita et al., 1992). Trash was generally dumped in an uncontrolled setting, often in a pit or a ditch, in wooded or hilly locations, or on wasteland conveniently located near a community. The trouble with dumping garbage in an uncontrolled setting is that garbage attracts disease-carrying organisms; piles of old tires become breeding grounds for mosquitoes as well as toxic fire hazards; and contaminants often migrate into groundwater potentially contaminating a source of drinking water. Impacts from improper garbage disposal are discussed in the following section.

Scientific research over the years has increased public awareness about adverse health effects stemming from improper garbage disposal, spurring environmental protection action. Waste disposal is in transition as the old "garbage dump" is being replaced by the new "sanitary landfill".

Sanitary landfilling is an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards and nuisances. A sanitary landfill site is

carefully selected, designed, prepared and licensed by the government (US EPA, September 1994). Although the method of landfill operation is site-specific, the wastes are generally spread in thin layers, compacted to the smallest practical volume, and as designated by local regulations, guidelines or codes of practices, periodically covered with material such as earth which is also then compacted (US EPA, September 1994).

The trench method is one of the most basic methods of landfill disposal operations. The trench method is a cut-and-fill operation with a trench excavated to a specific depth (usually 10 feet). Waste materials are deposited in the trench and are compacted with heavy equipment and periodically covered with a layer of soil. The process is shown in Figure 2. The trench method is often used in flat or gently rolling terrain and where groundwater will not interfere with excavations (Lapp, 1989).

In addition to the sanitary landfill site being carefully selected, designed, prepared and licensed by the government, landfills are often monitored to screen out materials that could create health or environmental hazards. Hazardous waste such as used oil is an example. The sites are usually seeded or sodded over when decommissioned.

Landfilling has been practiced worldwide with design modifications based on site-specific conditions and local regulations. Mounting concern about protecting environmental resources, such as groundwater, has increasingly led to more stringent regulations governing the design and operation of landfill facilities. There is a trend to more technical and managerial sophistication in landfill design, operation and monitoring (US EPA, September 1994), as the era of the local "garbage dump" is coming to an end.

2.1.2 PHYSICAL IMPACTS FROM LANDFILLS

Before the advent of improved waste management regulations and hazardous waste treatment capacities, a large share of accumulated waste now defined as hazardous have been disposed in uncontrolled garbage dumps. The attenuation of contaminants in various phases within and around landfills vary according to the substance and site, reflecting the site's retention and removal mechanisms (Assmuth, 1992). As modern technology has developed systems to monitor environmental parameters, rapidly increasing and accurate scientific information has increased public awareness of the

past mistakes in landfill disposal practices (Assmuth, 1992). Hazards include: i) organic/inorganic contamination from the landfill and ii) landfill gas from the landfill.

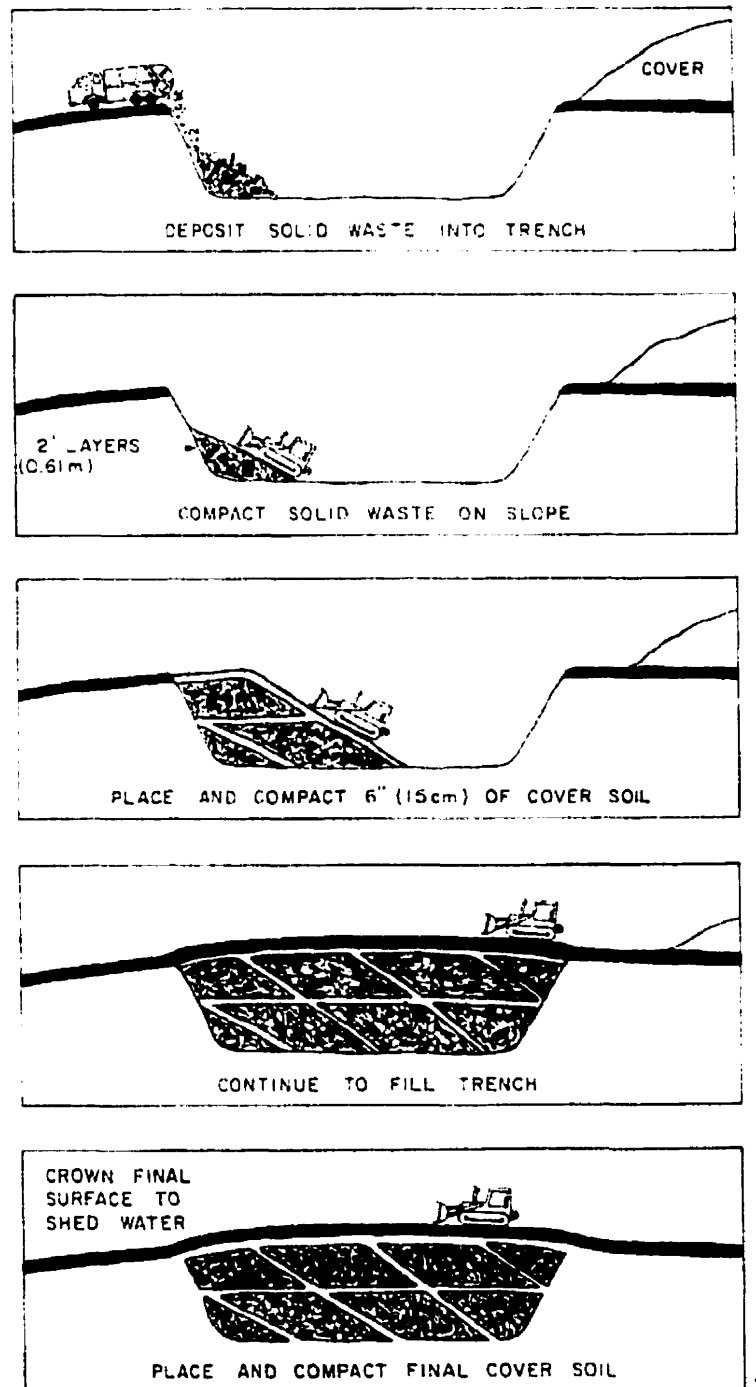


Figure 2: The Trench Method of Sanitary Landfilling.
Source: pg. 10; Lapp, 1989

2.1.2.1 ORGANIC/INORGANIC CONTAMINATION FROM LANDFILLS

Garbage is rich in numbers and varieties of microorganisms because of a heterogenetic nature. Generally, the largest generators of infectious waste are the healthcare sector, academic and industrial research laboratories, the pharmaceutical industry, veterinary facilities and the food, drug and cosmetic industries (Fedorak and Rogers, 1991). Household discards that may contribute large numbers of microorganisms include facial tissues, pet feces, soiled disposable diapers and decaying food (Fedorak and Rogers, 1991).

Over recent years, the scientific community has progressively devoted more attention to researching the patterns of microbial dissemination and chemical leachate from the landfill. The three mechanisms of dissemination from a landfill site are via: i) aerosol, ii) disease-carrying organisms and iii) water movement that includes both surface and groundwater.

Contamination via aerosol

The first mechanism of contamination is via aerosol movement. Primarily microbial in nature, movement is by a suspension of fine particles containing viable microorganisms that can remain airborne for an appreciable length of time. Some air-borne particles that contain viable microorganisms experience adverse conditions that reduce their survival in the atmosphere as sunlight has a strong germicidal effect on bacterial cells (Fedorak and Rogers, 1991). Others such as bacterial and fungal spores are particularly suited to survive the airborne state; thick walls prevent desiccation, pigment protects against harmful radiation and a relatively low density makes them more buoyant lengthening the airborne time (Fedorak and Rogers, 1991).

The operating practices at sanitary landfills result in microbial aerosols being generated mainly during the day when dumping and bulldozing are occurring at the active face. It has been demonstrated that barriers, such as trees or berms will minimize possible movement of airborne microorganisms from the landfill site (Fedorak and Rogers, 1991; US EPA, September 1994).

Contamination via disease-carrying organisms

A second mechanism of contamination is via disease-carrying organisms, also known as vectors - higher life forms that consume or pick-up microbes and carry them away from the landfill. Southern Manitoba's most common disease carrying organisms are insects, rodents and gulls. For example, large numbers of gulls arrive in Southern Manitoba early Spring and depart late Fall, making the nuisance activities of gulls at landfill sites seasonal. As gulls feed on a wide variety of animal and vegetable matter, the species readily become adapted to feeding on urban wastes and scavenge for food at landfills carrying microorganisms from the landfill site (Fedorak and Rogers, 1991). Gulls are most abundant when uncovered wastes are available and virtually absent when the working face has been layered with cover material (Fedorak and Rogers, 1991).

Contamination via water movement

Contaminates via water movement is primarily through groundwater action; surface runoff acts as a lesser mechanism. For example, organic contaminants often generated from local agricultural practices or community hygiene practices, are carried by surface water runoff under certain meteorological conditions such as rain. Surface water pollution, particularly drinking water contamination, is often an issue of public health concern (Chilton and Chilton, 1992). Case in point is the increase of parasitic diseases such as *Cryptosporidium parvum* in Manitoba's drinking water (Popplow, 1998). The increase is especially prevalent in the far North where sanitation is often poor (Popplow, 1998).

Water percolating through the soil transports contaminants from the landfill as leachate. Leachate toxins are harmful organic and inorganic components that can seep or "leach" into the groundwater and potentially threaten public health (Assmuth, 1992). Leachate production is enhanced by: i) exposure of uncovered wastes to precipitation and surface run-off percolating into the soil, ii) deposition of solid wastes into bodies of ground or surface waters, and iii) use of sites having direct hydrologic connection to underlying groundwater. Proper site planning and site selection, combined with good engineering and operating practices can normally minimize the possibility of either ground or surface water pollution.

Natural processes also aid in minimizing pollution. Environmental conditions produced within a sanitary landfill, such as elevated temperature and natural antimicrobial characteristics of the leachates, may exhibit significant adverse effects on survival of pathogenic agents (Fedorak and Rogers, 1991).

The impact of groundwater leaching within existing older landfill sites may still be relatively unconfirmed. In a 1984 U.S. EPA census – the most current census available - which aggregates data collected by individual states, Chilton and Chilton (1992) noted that only 25% of 9284 surveyed solid waste US landfill facilities monitored groundwater purity.

The landfill census suggests that older landfills may present the highest proportion of environmental difficulties. Many old landfill sites contain a cocktail of hazardous substances that may act synergistically to produce adverse health effects. While data may be available for individual chemicals, the presence of a combination of substances and “new” compounds found within the dump site generate significant problems for researchers and public alike (Assmuth, 1992).

2.1.2.2 GAS EMISSIONS FROM LANDFILLS

Landfill gas, typically composed of 45-55% methane, 40-50% carbon dioxide and trace organics, represents a potential environmental hazard (Hirshfeld, et al., 1992). In some incidences, methane migrating from landfills has caused explosions, resulting in loss of life and property. Landfill methane also makes measurable contribution to atmospheric methane (a green house gas) and both methane and carbon dioxide cause damage to vegetation. The non-methane organic compounds contained in landfill gas may be considered toxic and potentially carcinogenic (Hirshfeld, et al., 1992). Trace components in landfill gas, such as hydrogen sulfide and organosulfur compounds, can cause the unpleasant odors associated with sanitary landfills.

2.2 LEGISLATIVE ISSUES

2.2.1 SEPARATION BETWEEN REGULATORY POWERS

Under Section 91 (24) of the Constitution Act (1867), the federal government has authority to legislate waste generated on First Nation land (House of Commons Standing Committee on Environment and Sustainable Development, 1995). However, some First Nations – Alberta's Alexander First Nation serves as an example - have recognized that federal legislation, such as the Indian Act or Canadian Environmental Protection Act do not provide strong statutory foundations for environmental protection and that more is needed.

First Nation lands fall under federal jurisdiction and as such, provincial laws often have no legal jurisdiction on First Nation land (House of Commons Standing Committee on Environment and Sustainable Development, 1995). For example, provincial environmental statutes such as Manitoba Waste Disposal Grounds Regulation 150/91, which governs the use of land and people's activities on that land related to municipal solid waste disposal is not enforceable on Manitoba First Nation lands. Regulation 150/91, officiated under The Manitoba Environment Act, classifies waste disposal grounds based on population served and sets out conditions which eliminate or control certain problematic operational practices such as open burning.

The separation between regulatory powers has created a legal jurisdictional circumstance referred to by the House of Commons Standing Committee on Environment and Sustainable Development (1995) as a "regulatory gap". Although impact of the regulatory gap is beyond the scope of this study, one can argue that the gap could be filled with by federal regulation. Conversely, one can argue that gap recognition in some cases, provides an opportunity for pursuing land stewardship and obtaining more administrative responsibility from the federal government as well as providing a window for developing environmental protection strategies to fit the community's site-specific needs.

2.2.2 FEDERAL STATUTES

There are three main federal statutes that involve environmental stewardship initiatives, the: i) Indian Act, ii) Canadian Environmental Protection Act and iii) Canadian Environmental Assessment Act.

2.2.2.1 INDIAN ACT

Although the Indian Act authorizes the federal government to make various sorts of regulations, some of which may have incidental effect on environmental issues, under the precise terms of the Act the federal government has no specific authority to regulate environmental protection (House of Commons Standing Committee on Environment and Sustainable Development, 1995).

Section 81 of the Indian Act allows Band Council to enact by-laws that potentially may provide implications for environmental protection, but does not constitute clear authority for preventative measures. Other aspects of the Act that preclude it from serving as a basis of a comprehensive environmental protection regime is a lack of authority to designate environmental enforcement officers and inadequate penalty provisions for violations. For example, The Indian Reserve Waste Disposal Regulation (C.R.C. 1978, c.960) is rather toothless in that the maximum penalty for a waste disposal violation is a \$100 fine or an imprisonment of 3 months.

2.2.2.2 CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)

During the 1995 House of Commons CEPA Review, First Nation people told the committee that CEPA was not responsive to their needs (House of Commons Standing Committee on Environment and Sustainable Development, 1995). Many wanted improvements to CEPA while others favored the development of their own environmental protection regimes as part of self-government arrangements.

The Parliamentarians who created CEPA in 1988 added Part IV to the Act to specifically govern federal lands as well as activities on those lands. The original intention of Part IV was to address the separation of regulatory powers that exists for First Nation lands (House of Commons Standing Committee on Environment and Sustainable Development, 1995). It does so by Section 54, the regulation-making authority under Part IV. Regulations can be made under Section 54(1) where no other federal law

explicitly gives authority to make regulations to protect the environment. Section 54(2) establishes limits on the release of effluents and emissions and prescribes waste handling and disposal practices for federal departments, boards, agencies and Crown corporations. These provisions, however, do not apply to either federal or reserve lands (House of Commons Standing Committee on Environment and Sustainable Development, 1995). To date, no regulations have been made under Part IV with respect to reserve lands and the regulatory gap remains.

CEPA is also limited in direction for development of environmental quality objectives, guidelines and codes of practice. Although Section 8 requires the Minister of the Environment develop these instruments, Section 53 of Part IV refers only to guidelines with no reference to environmental quality objectives or codes of practices. Some argue that developmental authority is unclear in that since Section 8 is of general application, is adequate authority for the development of additional objectives and codes of practices for First Nations provided for? (House of Commons Standing Committee on Environment and Sustainable Development, 1995).

2.2.2.3 CANADIAN ENVIRONMENTAL ASSESSMENT ACT

The Canadian Environmental Assessment Act requires environmental assessments for all projects that are proposed or funded by the federal government, authorized by a federal license or permit, or will take place on federal lands. For example, facilities for the treatment or disposal of waste usually has an environmental assessment prepared as a prerequisite for approval. Projects on First Nation lands often do not undergo the assessment process.

2.2.3 PROVINCIAL STATUTES

The *Alberta Code of Practice for Landfills* outlines the minimum requirements for construction, operation and reclamation of landfills that accept 10,000 tonnes or less of non-hazardous and inert waste, as well as promoting environmentally sound management practices at those landfills (Alberta Environmental Protection, 1996). The Code is incorporated by the Waste Control Regulation (A.R.192/96), under the authority of Section 36 of the *Alberta Environmental Protection and Enhancement Act*.

Manitoba Regulation 150/91, proclaimed July 1991 and mandated under the *Manitoba Environment Act* determines landfill operational practices based on population served. A Class 1 site serves an area with a catchment greater than 5000 residents; a Class 2 site serves between 1000 and 5000 residents and a Class 3 site serves an area with a catchment of less than 1000 residents.

2.3 POLLUTION PREVENTION ISSUES

2.3.1 DEFINITION

Environmental management over the past 40 years has relied upon a philosophy of pollution control. Wide ranges of control technologies have been developed and it is now technically possible to reduce or entirely eliminate some pollutant discharges. However, it is often argued that the pollution control approach is yielding decreasing benefits per unit expenditure and that pollution control divert resources from more productive, reduction at-source uses (World Bank, 1997; Bringer and Benforado, 1994).

A pollution preventative approach, often voluntary in nature, is often used to promote environmental stewardship and encourage sustainable development principles. (Jonasson, personal communication, 1999). The new approach, designed to be flexible to fit individual user needs, has the potential to alter an approach to environmental protection from the traditional "react and cure" approach to a new, proactive "anticipate and prevent" approach (CCME, 1996; CSA 1994). Commonly known as Pollution Prevention (P2), the concept can be best described as practices that lead to reduced wastes or releases to the environment. The CCME (1996) adopted the following P2 definition:

The use of processes, practices, materials, products or energy that avoid or minimize the creation of pollutants and wastes, at the source.

Pollution prevention promotes continuous improvement through operational and behavioral changes. Pollution prevention is a shared responsibility among governments and individuals, industrial, commercial, institutional, and community sectors. It focuses on areas such as:

- *substances of concern,*
- *efficient use and conservation of natural resources,*
- *operating practices,*
- *clean production processes which create less waste,*
- *training,*
- *equipment modification,*

- *process changes,*
 - *material and feedstock substitution,*
 - *product design and reformulation,*
 - *product life-cycle, and*
 - *purchasing practices.*
- pg. 2; CCME, 1996

The objective of pollution prevention is a healthy ecosystem as well as the conservation of materials and resources for more equitable distribution to current and future generations (House of Commons Standing Committee on Environment and Sustainable Development, 1995). Pollution prevention is Manitoba's 4th principle of Sustainable Development.

For all practical purposes the 3M corporation first formulated the pollution prevention concept. In the early 1970s, 3M became concerned that the increasing number of environmental laws and regulations - and associated costs - would adversely affect the corporation's competitiveness. In 1975, 3M became the first company to formulate a comprehensive environmental policy and voluntarily initiate an organized, company-wide application of the pollution prevention concept. The goal of the application, known as the Pollution Prevention Pays Program, was to shift the mindset of company operating practices from the traditional "pollution control" approach to the newer "anticipating pollution and not generating at-source" approach.

3M's work is often cited as a foundation in proactive environmental work. The pollution prevention concept has become part of a global approach to reshape tactics for addressing environmental problems (World Bank, 1997; CCME, 1996). A challenge emerges however, as to how to effectively shift societal thinking to anticipate and prevent pollution rather than react to pollution (Jonasson, personal communication, 1999). Figure 3 shows the shift in societal thought. The paradigm shift requires the redirection of human and financial resources and a change in emphasis in environmental protection policies and programs.

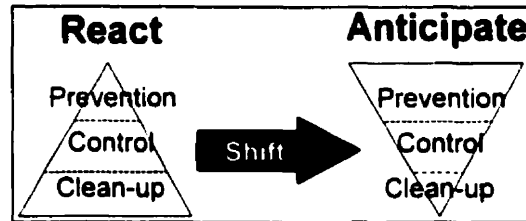


Figure 3: Reacting to pollution vs. anticipating pollution (CSA, 1994)

Adding to the challenge is the constant evolution of the proactive preventative concept. The concept of pollution prevention and its mechanisms for implementation have evolved so rapidly over the past few years that, for example:

“...even if CEPA was seen as a pollution prevention law in 1988, it must be re-examined in light of the current understanding of pollution prevention.”

- pg. 1; Environment Canada Officials (b), 1994

Some policy makers have incorporated pollution prevention into legislative framework as a strategy for environmental protection. The US *Pollution Prevention Act of 1990* establishes pollution prevention as the first priority in a hierarchy of options in reducing risks to human health and the environment. The Ontario Ministry of Environment and Energy also adopted the hierarchical approach to environmental protection with pollution prevention as the strategy of first choice. Manitoba regulators are incorporating a pollution prevention mandate in *The Sustainable Development and Consequential Amendments Act*. The Act establishes and gives statutory basis to the Manitoba Round Table for Sustainable Development as well as defining “sustainable development”, identifying a set of guiding principles and requiring public sector operations to consider sustainable development principles in all planning and decision-making. With the exception of Part 3 (Principles and Guidelines) in which pollution prevention is referenced in Schedule A (4), the Act was proclaimed 1998 July 1. It is unclear as to when Part 3 will come into force. Currently there is no clear direction on positioning pollution prevention as a strategy within CEPA.

2.3.2 TRADITIONAL ABORIGINAL BELIEF IN REGARDS TO POLLUTION

In accordance to traditional Aboriginal belief, the Creator gave all people a way of life to live in harmony with all creation of life.

"All things are connected like the blood which unites one family. Man did not weave the web of life; he is merely a strand in its. Whatever he does to the web he does to himself."

- Chief Seattle, Duamish Tribe (pg. 3; MPPP, 1996)

First Nation people for centuries have seen themselves as part of nature, not separate from nature. First Nations do not restrict citizenship in the community to only human beings; plants and animals also have their place within the circle of creation and cannot be treated simply as commodities. Elders stress the importance of the circles of life and the interconnectiveness of all things created. Circles have a fundamental place in Aboriginal life as they holistically view that everything in nature strives to be round - the sun comes forth and goes down again in a circle; the moon does the same thing. As such, pollution within a natural ecosystem is interconnected. Dan Coyhis states:

"If we poison any part of the Earth, the poison moves through the environment. A poisoned plant is eaten by a bird, which is eaten by a human. The human may be babies born with defects because of these poisons. When we have too much pollution, we are out of harmony with Mother Earth; it means we have lost the balance."

- Coyhis, (pg.v; MPPP, 1996)

The Pollution Prevention Wheel shown in Figure 4 stresses the interconnectiveness between humankind and nature. Four intrinsic values are identified for inclusion in the wheel metaphor:

- 1. Awareness: Finding out about the potential and existing environmental problems in your community.*
- 2. Understanding: Knowing how to prevent pollution by recognizing the nature of polluting activities.*
- 3. Conservation: A genuine belief that less is more. Buy only what you need, and buy things that last.*
- 4. Respect: An appreciation for Mother Earth's natural systems that sustain us and a desire to protect them.*

- pg. 13; MPPP, 1996

The elements are put together in the wheel metaphor with the words "Pollution Prevention" embodied in the central hub. Representing humankind, the wheel shows

that the actions of the individual directly affect the environment (MPPP, 1996). The inside of the wheel represents:

"the environment: the land, water, air and resources. The results of pollution prevention make up the 'rim' of the wheel: healthy ecosystems, clean air, energy conservation, clean water, plentiful resources, sustainable agriculture. The spokes of the wheel represent the connection between the individual and the environment: community esteem, Reservation pride, traditional culture, spiritual values. The arrows indicate that the wheel is always in motion and forever changing character and direction - yet everything remains connected throughout."
- pg. 14; MPPP, 1996

Pollution Prevention Wheel

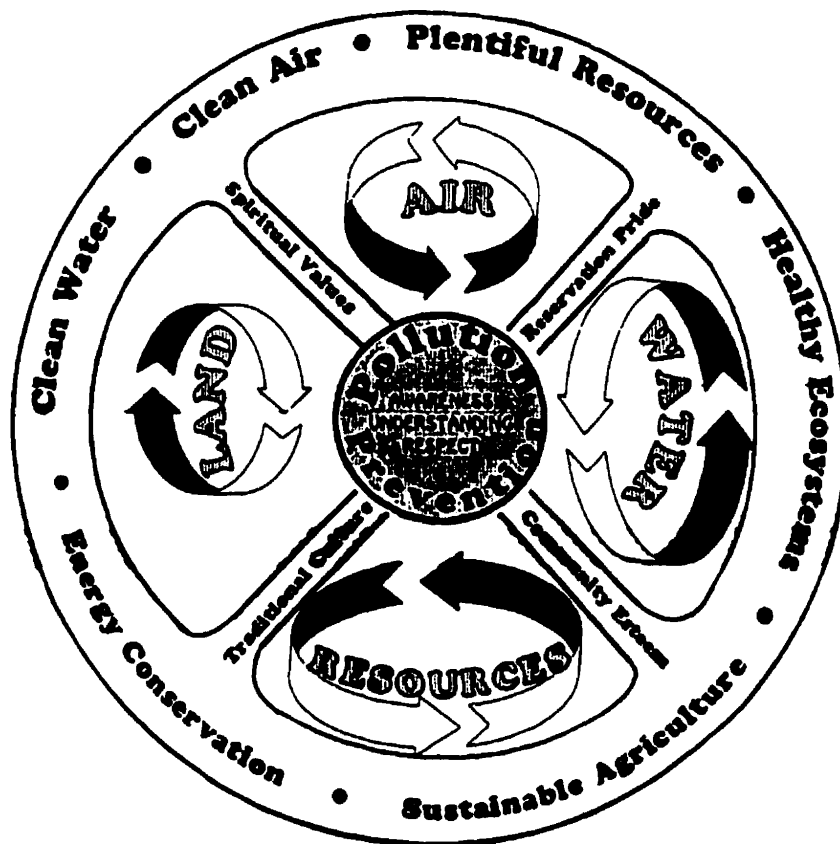


Figure 4: The Native American Pollution Prevention Wheel stressing the interconnectiveness between humankind and nature.
Source: pg. 13, MPPP, 1996

The importance of the circles was incorporated into Peguis' community education program as discussed in Chapter IV.

Land stewardship was traditionally based upon necessity as First Nation people depended upon the Earth's resources for subsistence and personal identity. Although non-Aboriginal influence for a time tried to stymie traditional beliefs, respect for Mother Earth through the teaching of Elders has grown considerably over the past few years (WCCCT&C, 1997; WIHC&C. Ltd., 1996; MPPP, 1996).

The connectiveness of Aboriginal people and sustainable development was recognized at the 1992 United Nations Conference on Environment and Development. Indigenous people from around the world provided input into Agenda 21's Chapter 26, entitled *Recognizing and Strengthening the Role of Indigenous People and their Communities*. The Minister of Public Works and Government Services Canada (1997) reports that Chapter 26:

"encourages governments to pursue sustainable development initiatives that accommodate, promote and strengthen the role of Indigenous people and their communities; advocates arrangements to strengthen the active participation of Indigenous peoples and their communities in the national formulation of policies, laws and programs relating to resource management and other development processes that may affect them; and calls for Indigenous people to participate at the national and local levels in resource management and conservation strategies and other relevant programs established to support and review sustainable development strategies."

- pg. 13; Minister of Public Works and Government Services Canada, 1997

Several North American initiatives encouraging environmental protection amongst Native Americans are currently underway. A sampling of initiatives from the United States and Canada follows:

from the United States

- Sixty-two tribes from 28 states and Canada gathered in Montana for the 1995 National Tribal Pollution Prevention Conference; the first tribal conference on exploring pollution prevention initiatives for Native American land. One important theme throughout the workshop was that pollution prevention

involves a change in behavior, and that any change must be preceded by a vision, the "seed" from which actions germinate (Todd MacFadden, personal communication, 1997). Representatives from the Montana group opted to work together to action behavioral change. As of June 1999, the US EPA was soliciting proposals from Tribes interested in hosting the Fifth National Tribal Conference on Environmental Management, tentatively scheduled for May 2000. The 1999 conference, which attracted more than 700 participants, representing more than 200 Tribes and Alaska Native villages focused on a number of topics, such as community capacity-building to manage environmental programs, solid waste management and pollution prevention.

- **The US EPA Tribal Solid Waste Management Program encourages municipal solid waste and hazardous waste management practices on Native American lands that protect human health and the environment. The EPA produces two newsletters specifically relevant to the work conducted at Peguis First Nation. The *Native American Network* newsletter provides information to help interested parties stay abreast of solid waste issues affecting Native Americans. The Office of Pollution Prevention and Toxics Tribal newsletter *Working together* is published quarterly to provide information on programs and projects to safeguard the environment from toxic hazards and to promote pollution prevention on Aboriginal lands.**
- **The Tribal Association on Solid Waste and Emergency Response (TASWER) was formed in July 1997 to ensure that Tribes are more actively involved in EPA's policy and regulatory decision-making process. Tribes are kept abreast of current and pending regulations, which assists them in more effectively implementing waste management programs. Training is provided on all aspects of solid waste management. Work done by TASWER is often in collaboration with the National Tribal Environmental Council (NTEC) which is a group of over 130 Tribes and Alaska Native villages dedicated to the protection and preservation of the reserve ecosystem. Under its solid waste program, NTEC provides Tribes with volunteer mentors who assist them with specific needs, such as developing solid waste management plans and**

establishing pollution prevention processes. For example, environmental codes and ordinances submitted by the Mid-Western Omaha, Santee Sioux, and Winnebago Tribes to ensure that they include solid waste requirements are currently being reviewed. Additionally, funding is provided through the EPA's Solid Waste Management Assistance Program. A 1997 \$23,000 grant to the Catawba Tribe of South Carolina for the development of a solid waste management plan and initiation of a program to remediate and prevent open dumps on Tribal lands serves as an example.

from Canada

- **Solid waste management has generally been taken for granted and is often a low priority among issues facing Chief and Council (WIHC&C. Ltd., 1996).** However, scientific research has increased public awareness about health effects generated from improper solid waste management practices. The heightened awareness has often advanced environmental protection through increased regulations but as modern life generates more and more wastes of different kinds, there is a widespread societal belief that a better system is needed (Bringer and Benforado, 1994). First Nation people support the belief (WIHC&C. Ltd., 1996). The development of the Walpole Island Heritage Centre and Chreod Ltd.'s (WIHC&C. Ltd.) *Waste Management Manual for First Nations* (1996) demonstrates the support.
- **Although several Canadian First Nations are incorporating pollution prevention initiatives into their daily operating practices, Alberta's Alexander First Nation is often noted as a pioneer.** Since 1965, Alexander First Nation has been actively involved in the administration of their land and resources, pursued land stewardship and increased the environmental awareness associated with the responsibility (Clendenan, 1996). As part of the continuing process for pursuing stewardship, Alexander is currently implementing an Environmental Management Framework (EMF), incorporating pollution prevention initiatives.

- Indian and Northern Affairs Canada (INAC) through regional offices facilitates a variety of capacity-building initiatives for First Nation peoples. For example, over the last 5 years, INAC's Saskatchewan Region has undertaken several initiatives (Wilf Nordic, personal communication, 1999):
 - pollution prevention training sessions on the handling of underground/above ground fuel storage tanks have been conducted;
 - site-specific First Nations solid waste management strategies are being developed with on-site training being provided; and
 - three Environmental Management Frameworks (EMFs), with a strong focus on developing and adopting Band environmental by-laws and the prohibition of certain operational practices, are currently being developed and implemented.

2.3.3 IMPORTANCE OF A P2 INITIATIVE TO PEGUIS FIRST NATION

To fill the regulatory gap, protect environmental resources and promote environmental stewardship, voluntary preventative approaches such as pollution prevention and EMFs are now being championed.

Several North American First Nations are in various states of considering or developing EMFs. An EMF is a management framework whose intent is to provide organizations - or in our case, a First Nation - with a management structure to ensure that operational process are consistent, effective and promote environmental stewardship. EMFs provide the criteria for Chiefs and Councils to begin to implement the principles of sustainable development with respect to environmental management on First Nation lands. Pollution prevention is one principle of sustainable development and the P2 initiatives are tools in the EMF structure. The basic principles that form the foundations of an EMF such as life-cycle planning, are transferable to community operational structures as well as to community and economic development, all of which can be rolled into a comprehensive sustainable development plan.

The voluntary preventative approach is based on the belief that most communities and organizations are responsible and want to do the "right" thing - in this case, reducing and

ultimately stopping environmental insult and protecting human health (CSA, 1994; Bringer and Benforado, 1994).

So why is a pollution prevention initiative so important to Peguis First Nation?

Reasoning is threefold:

1. Knowledge of a potential threat to human health first triggered Peguis to examine the community's garbage handling practices. To protect environmental resources and promote environmental stewardship, the voluntary pollution prevention approach supplements weak legislation;
2. The step-wise pollution prevention model can serve as a basis for any future EMFs;
and
3. The Native American movement of returning to traditional values and the holistic belief of the interconnectiveness of Mother Earth is spurring the adoption of preventative action at-source.

CHAPTER III - METHODS

3.1 PROJECT INITIATION

Consultations were undertaken with Peguis First Nation 1997 January. Consultation goals were to review existing solid waste management practices specific to the community waste disposal grounds and recommend actions for change. The review was in anticipation of the closing of the existing community garbage dump and the opening of a new community landfill facility. Further discussions identified the review as an opportunity for an application of a pollution prevention initiative.

Following discussions with Indian and Northern Affairs Canada (INAC) integrated the development of the pollution prevention initiative into the Natural Resources Institute (NRI) Masters Degree process, thereby forming a joint Peguis First Nation, INAC and NRI project. The Master's candidate offered consultative services to the project in exchange that the project serve as partial fulfillment to the Degree Masters of Natural Resources Management. The candidate's consultative service experience drew from knowledge gained as the Environmental Protection Specialist for the Health Sciences Centre, Winnipeg, Canada.

A solicitation of interest proposal was sent to Mr. Martin Egan, Director, Land Trusts; Indian and Northern Affairs Canada. Mr. Egan confirmed interest in the project. An *INAC Environment Officer and also a Peguis First Nation resident approached the Peguis Environment Committee on behalf of the Master's candidate inquiring of potential interest. Interest was confirmed. Subsequent meetings with the Peguis Environment Committee secured project interest.*

3.2 LITERATURE REVIEW

A literature review provided project reference material. Issues reviewed include documentation regarding: solid waste management on First Nation lands; the state of solid waste management activities within the Provincial and National context; landfill operational practices for a waste disposal grounds with a catchment area of less than 5000 residents; and pollution prevention initiatives for First Nation lands.

The study continued with personal consultation with: government and non-government organizations, representatives from the waste management industry and corresponding professional associations, INAC, Native American Reserves and several rural Manitoba municipalities. Methods used included Internet, telecommunications, personal correspondence and site visits.

3.3 SITE VISITS

Site visits to the Peguis dump provided the information necessary to fulfill the project's first objective:

1. to determine the state of solid waste management practices at the Peguis First Nation waste disposal grounds;

Documentation on annual tonnage discharged to the Peguis waste disposal grounds was found not to be available. As such, estimates were used. Using data from Figure 5 and INAC's current on-reserve population of 3050, it is estimated that the Peguis waste disposal grounds receives between 1835 – 2745 tonnes annually.

<i>Community type</i>	<i>Population</i>	<i>Tonnes/person yr</i>
Rural residents	Any	0.45 – 0.50
Town(s)/village(s)	Under 1,000	0.51 – 0.55
Town(s)/village(s)	1,000 – 2,000	0.56 – 0.60
Town(s)/village(s)	2,000 – 5,000	0.61 – 0.90
Town(s)/village(s)	Over 5,000	0.91 – 1.00

Figure 5: Standard estimated waste generation rates in rural areas, villages and towns.
Source: pg. 2; Aziz and Rounds, 1995

3.3.1 SITE VISIT ASSESSMENT CRITERIA

Regulatory material and associated information on best practices for waste management disposal operations was reviewed and assessed for applicability to Peguis. The literature search identified two pieces of regulations applicable to landfill operating practices at Peguis: the *Alberta Code of Practice for Landfills* and Manitoba Regulation 150/91 Waste Disposal Grounds Regulation.

The *Alberta Code of Practice for Landfills* outlines the minimum requirements for construction, operation and reclamation of landfills that accept 10,000 tonnes or less of non-hazardous and inert waste. Information is transferable to the project as it is estimated that the Peguis dump receives between 1835 – 2745 tonnes annually. Manitoba Regulation 150/91 defines a Class 2 site as one that serves between 1000 and 5000 residents. Landfill operational practices for a Class 2 site is applicable to Peguis with a population of 3050 residents.

Applicable excerpts from Section 7 Landfill Operating Requirements of the *Alberta Code of Practice for Landfills* and from Schedule C Waste Disposal Ground Operational Requirements from the Manitoba Regulation 150/91 are found in Appendix A.

Excerpts of the two regulations, provided the criteria for best-management practices for landfill operations at Peguis. A Landfill Operations Checklist, compiled from the regulatory material and modified to fit a Class 2 Manitoba landfill, was prepared. The Checklist served as the basis for the Peguis waste disposal grounds assessment. Figure 6 shows the Checklist.

Several site visits to the Peguis garbage dump were conducted. A discussion of the site visit findings is found in Section 4.1.

LANDFILL OPERATIONS CHECKLIST

	Y	N	N/A
Is all solid waste deposited in an active area within the waste disposal grounds?	o	o	o
Is all solid waste compacted and covered with a layer of earth to a thickness of at least 15 centimeters once each month, or at such other intervals required by an environment officer or community directive?	o	o	o
Is water that accumulates in a landfill trench and in contact with the waste removed on a regular basis?	o	o	o
Is the active area enclosed with a fence at least 1.8 metres in height?	o	o	o
• If so, is the fence constructed in such a manner as to contain the solid waste within the active area?	o	o	o
Is there signage at the landfill entrance providing the following information:			
• Name of the person responsible for operations?	o	o	o
• Landfill class?	o	o	o
• Hours of operation?	o	o	o
• Any waste restrictions?	o	o	o
• Telephone number for landfill operator?	o	o	o
• Telephone number for local emergency response personnel?	o	o	o
Is the discharge of liquid wastes and liquid industrial wastes prohibited?	o	o	o
Is there a program for detecting and preventing the disposal of hazardous wastes?	o	o	o
Is there a designated burn pit area?	o	o	o
Are there designated areas for the sorting, recovery, conditioning or storage of:			
• Empty pesticide containers?	o	o	o
• Bulk metal?	o	o	o
• Used tires?	o	o	o
• Used oil?	o	o	o
• Household recyclables?	o	o	o
• Demolition waste?	o	o	o
Is there a written standard operating plan for litter control?	o	o	o
Is there a written standard operating plan for pest control?	o	o	o
Is there a written standard operating plan for the management of landfill gas, which may include detection, interception, venting or recovery?	o	o	o
Is there a written standard operating plan for implementation of a remediation program if groundwater quality fails to meet performance standards?	o	o	o
Is there a written standard operating emergency response plan covering:			
• Fires?	o	o	o
• Fugitive releases?	o	o	o
• Medical needs?	o	o	o
• Others?	o	o	o
Is there a written standard operating plan for decommissioning the landfill?	o	o	o

Figure 6: Landfill Operations Checklist

3.4 DEVELOPMENT OF THE POLLUTION PREVENTION INITIATIVE

The literature search identified several pollution prevention models that provided guidance in developing a method to satisfy the second and third objective:

2. to develop, in preparation for Peguis' new landfill facility, a pollution prevention initiative for community-wide, solid waste best-management practices which reflect the traditional knowledge and values of Peguis First Nation;
3. to assess the pollution prevention initiative amongst community residents and draw conclusions;

Two models were selected: the 1994 Canadian Standards Association (CSA) *Guideline for Pollution Prevention* and the Pollution Prevention model used in the 1995 National Tribal Pollution Prevention Conference. The CSA standard was chosen for its benchmark reference ability; the latter for its association with Native Americans. A pollution prevention model, heavily focussed on community education and community capacity-building and specific to the needs of Peguis, was adapted from the two models.

Educational tools, entitled *Pollution Prevention and Cultural Preservation in Native American Communities – An Educational Tool Kit for Tribal Colleges (1996)*, developed by the Montana Pollution Prevention Program (MPPP), post hosting of the 1995 National Tribal Pollution Prevention Conference, served as a foundation for the Peguis community education program within the pollution prevention initiative. Community involvement work was primarily in conjunction with the Peguis Environment Committee and Peguis First School.

Participation in an Aboriginal Cultural Awareness Training Program, offered at the Health Sciences Centre, Winnipeg Manitoba, strengthened the Masters candidate's knowledge of Aboriginal culture. The Program was delivered by the Winds of Change Cross Cultural Training and Consulting (WCCCT&C).

The following chapter discusses the developmental process of a pollution prevention initiative for community-wide, solid waste best-management practices.

CHAPTER IV - RESULTS AND DISCUSSION

Most communities generate a substantial amount of garbage (Aziz and Rounds, 1994; Suflita et al., 1992) and proper disposal methods are being sought. Work conducted in 1996, by Walpole Island Heritage Centre and Chreod Ltd. (WIHC&C. Ltd.) for the *Waste Management Manual for First Nations* found that:

“Solid waste management is normally taken for granted; it is a low priority among the problems and issues facing Chief and Council. On many Reserves, however, the waste dump is an eyesore and a health hazard. There is a widespread feeling among First Nations that a better system is needed.”

- pg. 1; WIHC&C. Ltd., 1996

The following chapter discusses how Peguis First Nation is developing strategies to manage community garbage.

4.1. LANDFILL SITE VISITS OBSERVATIONS

Ten site visits were made to the waste disposal grounds during a 1997 April to 1997 September timeframe and four during 1998 June to 1998 August. Using the Landfill Operations Checklist (previously shown in Figure 6) as an assessment tool, operational practices were observed and community waste handlers interviewed. The assessment showed that existing operational practices needed improvement.

Site visit observations at Peguis First Nation include:

- **Waste is delivered to the dump by either community residents or the local waste hauler. Limited roadside garbage hauling is available. Garbage is deposited indiscriminately by the deliverer when at the dump; no direction via attendant or signage is given.**
- **An attempt is made to compact and cover the waste. However, standard operating plans are non-existent.**
- **Water that accumulates in the landfill is not routinely removed.**
- **A fence does not enclose the site; there is no buffer zone.**
- **The site has no entrance signage. There are no postings anywhere within the site as to the name of the person responsible for landfill operations, hours of operation, waste restrictions, or telephone numbers of either the operator or community emergency response personnel.**

- No designated burn pit exists; random open burning occurs.
- There are no designated areas for the sorting, recovery, conditioning or storage of empty pesticide containers, bulk metal, used tires, used oil, household recyclables, or demolition waste.
- There are no verbal or written programs for detecting and preventing the disposal of hazardous, industrial or liquid wastes.
- There is no verbal or written standard operating plan for litter control.
- There is no verbal or written standard operating plan for pest control.
- There is no verbal or written standard operating plan for the management of landfill gas.
- There is no verbal or written standard operating plan for implementation of a remediation program if groundwater quality fails to meet performance standards, as designated by the community.
- There is no verbal or written standard operating emergency response plans covering such items as but not limited to fires, fugitive releases and medical needs.
- There are no verbal or written landfill decommissioning plans.
- Additional observations include: the site is not maintained in a clean and orderly fashion; the access road is not well-drained and properly surfaced to allow all-weather access; and uncontrolled scavenging is allowed.

The above observations as defined by the Landfill Operations Checklist, confirm **improper landfill operating practices at Peguis but practices of the above nature are not uncommon in older landfill sites.**

Manitoba's revised Waste Disposal Ground Regulation 150/91, proclaimed July 1991, required many Manitoba municipalities to improve waste disposal practices to achieve higher environmental standards (Ferguson, 1993). Specific concerns related to **groundwater contamination and a ban disallowing burning unless specified in the landfill operating permit.** Estimates in 1992 September show that there were 439 operating permits for waste disposal grounds in Manitoba. Estimates at that time, showed that for the existing sites to be in compliance with the new regulations, over 30% of the sites required some level of upgrading and up to 50% were potentially slated for closure over the next few years due to capacity limitations or the threat of groundwater contamination

(Ferguson, 1993). Figures for 1997 show that there are 314 active waste disposal grounds in Manitoba, 77 of which are Class 2. Ninety-six waste disposal grounds are slated for closure in the next five years (Ferguson, personal communication, 1998).

The provincial figures parallel a Federal Department of Indian Affairs and Northern Development late 1980's study – the most current National study available - which reported that of 600 First Nations communities surveyed, over 280 communities (47%) had inadequate landfill sites (House of Commons Standing Committee on Environment and Sustainable Development, 1995).

As such, landfill operations at Peguis were observed to be on par with other Manitoba Interlake Region Class 2 waste disposal grounds. Site visits were conducted, 1997 July, to four Class 2 landfill sites in the Rural Municipality of Gimili and Bifrost. The dumps were assessed using the Landfill Operations Checklist. The next photos show similarities in landfilling practices between Peguis and other rural Manitoba Class 2 garbage dumps. The first two photos are garbage dumps in Manitoba's Interlake Region. The following two frames are the dump at Peguis.

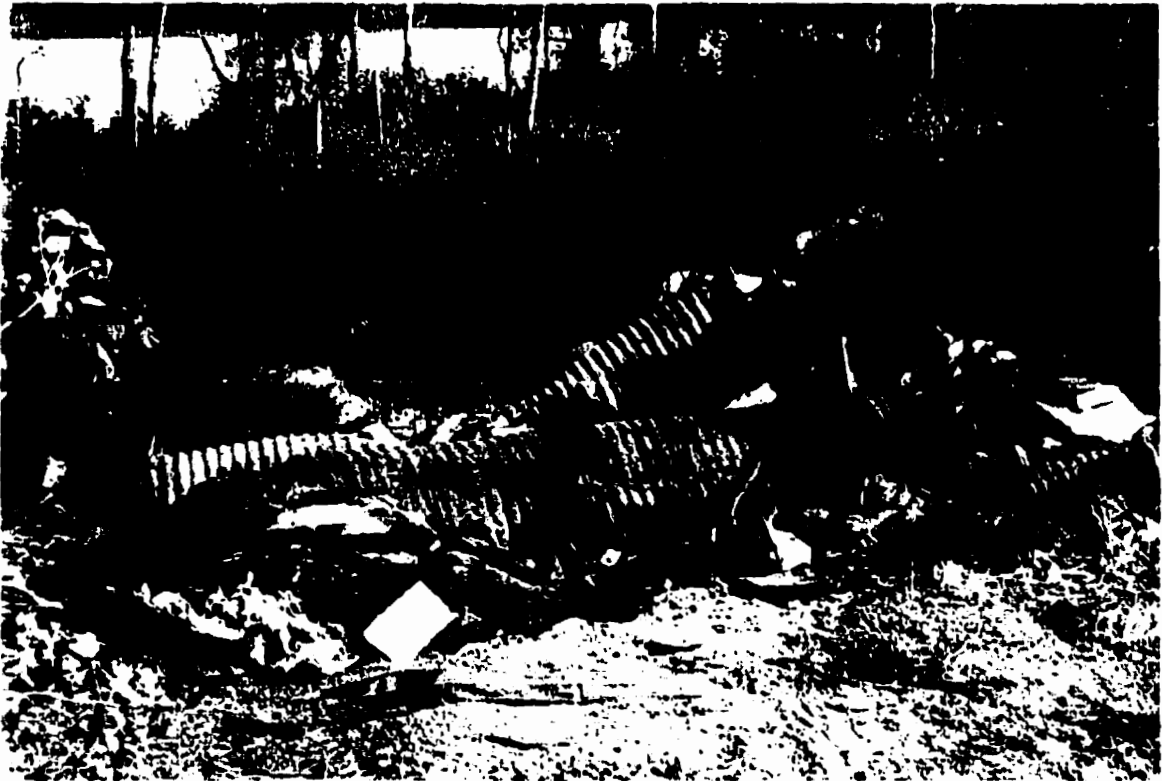


Photo-frame 3 and 4: Class 2 waste disposal grounds in Manitoba's Interlake Region





Photo-frame 5 and 6: Waste disposal grounds at Peguis First Nation



4.2 PROJECT CHALLENGES

Plan development met with two factors that needed addressment early in the project – i) cultural differences and ii) geographic distances.

4.2.1 CULTURAL DIFFERENCES

Many recognize that the culture of the North American Natives differs substantially from that of Western society (WCCCT&C, 1997). Variations in customs, beliefs, ideals and aspirations, as well as psychosocial differences, are well documented and generally accepted (WCCCT&C, 1997; Brant, 1990). Brant lists eight principles in his Native behavioral work: non-interference, non-competitiveness, emotional restraint, sharing, the Native concept of time, attitude toward gratitude and approval, Native protocol, and the principle of teaching (shaping versus modeling). In regard to community participation, three of Brant's "principles of behavior" directly affected the project and will be discussed here.

Non-interference

The principle of non interference is a often cited as a behavioral norm of North American Natives that promotes positive interpersonal relations by discouraging coercion of any kind, be it physical, verbal, or psychological (WCCCT&C, 1997; Brandt, 1990). The principle is thought to be one of the most widely accepted principles of behavior among Native people (WCCCT&C, 1997). A high degree of respect for every human being's interdependence leads the Native to view instructing, coercing, or attempting to **persuade another person as undesirable behavior. Accordingly, group goals are arrived at by consensus and achieved by reliance on voluntary cooperation (Brant, 1990). Brant contrasts a white society trait of "one-upmanship" to his principle of non-interference and states:**

"The white man who can out-advise another is 'one up' and the individual over whom he has exerted influence is expected to take it all with good grace. In Native society, by contrast, such an attempt to exert pressure by advising, instructing, coercing or persuading is always considered bad form or bad behavior. The advisor is perceived to be 'an interferer'. His attempt to show that he knows more about a particular subject than the advisee would be seen as an attempt to establish dominance, however trivial, and he would be fastidiously avoided in the future."

- Brandt (pg. 535, 1990)

The concept of non-interference became an important social principle in the project as pollution prevention initiatives involve behavioral change. Many Aboriginals believe that any change must be preceded by a "seed" from which action germinates (Todd MacFadden, personal communication, 1997). In facilitating the development of a pollution prevention initiative for Peguis First Nation, a fine line had to be drawn. The non-interference principle had to be respected but at the same time, new behavioral community practices were being championed.

Native concept of time

The Native person, historically, lived in close harmony with nature and as such has an intuitive, personal and flexible concept of time (WCCCT&C, 1997; Brant, 1990). Brant continues:

"It may have had its origin in an age when the activities of Native people were regulated by the seasons - by the sun, the migratory patterns of birds and animals, and a changing food supply. The absence of electricity and any other form of energy meant that the Native people developed the concept of 'doing things when the time is right' - that is, when the whole array of environmental factors converge to ensure success."

- Brant (pg. 536, 1990)

Although Brandt (1990) speculates that the concept seems less a principle for living with nature and more of a manifestation of the need for harmonious interpersonal relationships, the Native concept of time remains today. The concept existence played a large role in the project necessitating flexibility in meeting times and project deadlines. A meeting started with the time was right. Brant (1990) sums with:

"For example, Tom, Dick and Harry may not make it to an 8 PM meeting because they have other responsibilities; they are unable to leave because the time is 'not right'. If they have a particular interest in the matter under discussion, the meeting will not be started until they arrive or until some message is received that they are not coming. To start without them might offend these esteemed and influential members of the community, quite aside from the fact that the other members of the community may not be aware of the importance of their input into the discussion.Given the universality of the concept of time in Native society, Native people never seem to be inconvenienced or annoyed if social functions and other meetings start hours after the scheduled time."

- Brant (pg. 536, 1990)

The Native concept of time affected the project in that project timelines were initially drafted, but discarded altogether as the project proceeded. Infrastructure necessities for Peguis First Nation and acts of nature such as the 1997 Spring flood continuously re-prioritized the project. At the time of the project report writing, the commissioning of a new landfill is still in a conceptual phase.

Native Attitude toward Gratitude and Approval

Brant (1990) argues that gratitude or approval among Native people is often not shown, verbalized or openly accepted. He further states that:

"teachers are often puzzled by the failure of the 'normal' reward system to motivate students".

- Brant (pg. 537, 1990)

Student participation contributed greatly to the community education component of the project. Contrary to Brandt's principle, most students accepted praise graciously. Section 4.3. discusses work with the students.

4.2.2 GEOGRAPHIC DISTANCE

Peguis First Nation is located 170 kilometers north of Winnipeg. As an employment commitment prevented any lengthy stays at Peguis, all visitations for consultative work were done through day-trips. Day-trips were conducted on an as-needed basis. The lack of a continuous community presence assisted in defining the Masters candidate's facilitating and capacity-building role in program development, but overall, geographic distance impacted upon the project in two aspects: i) project sustainability and ii) project supervision.

4.2.2.1 PROJECT SUSTAINABILITY

The project identified a pollution prevention opportunity in community waste management. Facilitation and consultative services for program development were provided, but concerns were raised about project sustainability post completion of the initial academic work. Walpole Island in the *Waste Manual for First Nations (1996)* concurs in the caution:

"Don't start things that can't be continued. You may feel that the First Nations should be collecting recyclables, or that there should be regular collection (and careful disposal) of hazardous household wastes. You are probably right. But it is vital that such collection systems are regular and dependable. You may be the person needed to get things going, but who

is going to do it six months later? If individuals, families or offices cannot be sure that such materials will be collected regularly, they will quickly stop separating them from the rest of their wastes. Worse still, an initiative that is not sustained may make it difficult for someone else to put in an effective system later on (Oh, yes, we tried that a few years ago, but it didn't work)."

- WIHCC Ltd. (pg. 8, 1996)

To support project sustainability, a grant submission for a part-time community waste coordinator was made to the Sustainable Development Innovations Fund. The grant application was unsuccessful.

The theory behind establishing a part-time waste coordinator was that responsibility for the community waste management program would be assigned to one person; ideally a community resident trained as a waste management coordinator. Peguis would then have a community resident on-site, actively involved and knowledgeable in community waste management issues. It was intended that the coordinator position help to ensure project sustainability post completion of project development. Once trained, it was proposed that the coordinator's position be incorporated into the community's existing operating budget. Peguis had several persons that were interested in the position.

4.2.2.2 PROJECT SUPERVISION

Project supervision was the second challenge. To obtain greater community presence, foster community involvement and promote community ownership, students from the Peguis Summer Employment Program were hired into the project. The working arrangement met with varying degrees of success and is discussed in following section.

4.3 POLLUTION PREVENTION INITIATIVE DEVELOPMENT

The literature search identified several pollution prevention models. Two models were selected: the 1994 Canadian Standards Association (CSA) *Guideline for Pollution Prevention* and the Pollution Prevention model used at the 1995 National Tribal Pollution Prevention Conference, sponsored by the Montana Pollution Prevention Program (MPPP). The CSA standard was chosen for its benchmark reference ability; the latter for its association with Native Americans. The models were merged to develop a pollution prevention model applicable to the needs of Peguis.

4.3.1 POLLUTION PREVENTION MODEL FRAMEWORK

Six steps (MPPP, 1995) are involved in establishing long-term pollution prevention activities. With an element of continuous improvement, the pollution prevention concept is dynamic. Once stated objectives are achieved, new objectives are set. As such, the steps are arranged in circular fashion as shown in Figure 7.

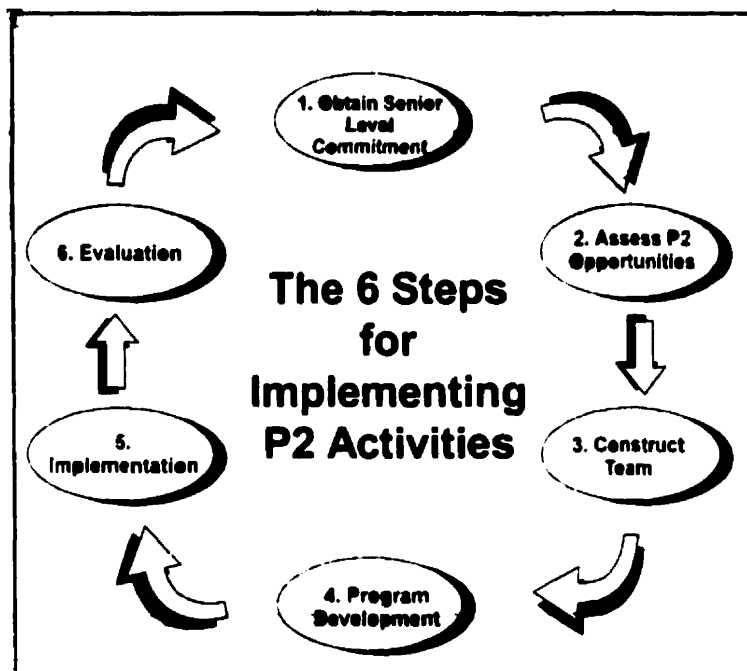


Figure 7: The 6 Steps for Implementing P2 Activities
Source: pg. 3; MPPP, 1995

The six pollution prevention framework steps are discussed in detail:

Step 1. Obtain Senior-Level Commitment

Community leaders provide the goals, conceptual base and support needed to initiate a pollution prevention activity, incorporate it into an existing operational program and to sustain it (MPPP, 1995). To secure senior-level support and to further define the project, brainstorming sessions with the Peguis Environment Committee, INAC and the NRI Masters candidate took place 1997 January – 1997 February. The sessions identified a community concern about a potential threat to both human health and the

environment emanating from the community garbage dump. The concern provided an opportunity for the development of a pollution prevention initiative.

Band Council representatives attended all meetings. A formal presentation to Band Council on the development of the pollution prevention initiative was conducted in 1997 May.

Step 2. Assess P2 Opportunities

An initial assessment of Peguis' solid waste management practices began by examining the landfill operating practices associated with the municipal solid waste stream. Site visits were conducted, operational practices were observed against the Landfill Operations Checklist (previously shown in Figure 6) and community waste handlers interviewed. Interviews were through informal discussions; no set questions were used. The assessment, as discussed in Section 4.1, found that community waste management practices needed improvement.

Concerned with potential threat to both human health and the environment, Peguis First Nation issued a Band Council Resolution, dated 1997 February 25, recommending closure of the existing community waste disposal grounds.

Step 3. Construct a Pollution Prevention Team

Community commitment to a pollution prevention initiative is best overseen by a community based Pollution Prevention Team. Team purpose is twofold. Firstly, a team should be established to identify pollution prevention opportunities (CSA, 1994). Secondly, by establishing a team, responsibility for the development of the pollution prevention program is assigned (CSA, 1994). The main objectives of the pollution prevention team are to identify, evaluate, and prioritize pollution prevention opportunities within the overall community mandate as well as rallying support for the opportunities (CSA, 1994).

As proper waste disposal practices impacts upon the entire community, it was necessary for the team to have cross-sectional community representation. As such, the existing Peguis Environment Committee served as the basis for the Pollution Prevention Team.

The committee is composed of representatives from Health Administration, Community Health, Maintenance and Band Council. To ensure the team has the required influence to obtain information and make necessary organizational changes, Band Council representation was seen as critical. The NRI student and the INAC representative provided support roles to the committee.

The Team's first meeting discussed team objectives. The main objectives initially offered were to: i) develop an environmental policy incorporating the pollution prevention commitment to community waste management practices; ii) construct pollution prevention guidelines specific to the community's waste management needs; and iii) identify, evaluate and prioritize pollution prevention activities within the overall framework of the environmental policy.

Environmental Policy

Program development started with the Peguis Environment Committee drafting general principle statements for a Peguis First Nation Environmental Policy. The mandate of the policy was to promote community-wide, solid waste best-management practices and to incorporate a commitment to pollution prevention. The policy was also intended to establish an overall sense of direction and suggest the parameters that the community should action in respect to environmental issues (MPPP, 1995; CSA, 1994). CSA (1994) states that:

"Environmental policies establish an overall sense of direction and set the parameters for action of the organization. The policies define the boundaries of what an organization will attempt to do, what it will not do, the kinds of actions by its people that are acceptable, and those that are not."

- pg. 9; CSA, 1994

Environmental policies by convention are generally written documents that serve as a commitment from senior level authority (MPPP, 1995; CSA, 1994). Several principle statements, the root of the environmental policy, were drafted but await adoption. Draft principle statements for Peguis' Environmental Policy are found in Appendix B. The draft documentation awaits formal presentation to Chief and Council. The documentation, once formally accepted, serves as a statement of support by Chief and Council and secures written senior-level commitment.

Step 4. Program Development

Project scope was the development of a pollution prevention initiative for promoting community-wide, solid waste best-management practices. Since the most consistent constraint to adopting new practices is education and training, it was necessary to ensure that the components be addressed (CSA, 1994). P2 program development focused heavily on community education and training.

Landfill Staff Training Course

Peguis issued a Band Council Resolution, dated 1997 February 25 recommending i) closure of the community waste disposal grounds and ii) the commissioning of a new landfill facility. To ensure provisions were made for an adequately trained landfill operations staff, training opportunities for landfill operators were secured through courses offered by the Solid Waste Association of North America (SWANA). SWANA is a non-profit, education organization serving the individuals and communities responsible for the management and operation of municipal solid waste management systems. Additional information on SWANA can be accessed via the SAWNA home page at <http://www.swana.org>. Four Peguis residents attended the landfill staff training course in 1997 Spring. The two-day course was a practical landfill operator's training course specifically targeted to small Canadian prairie landfills.

Peguis Summer Employment Program

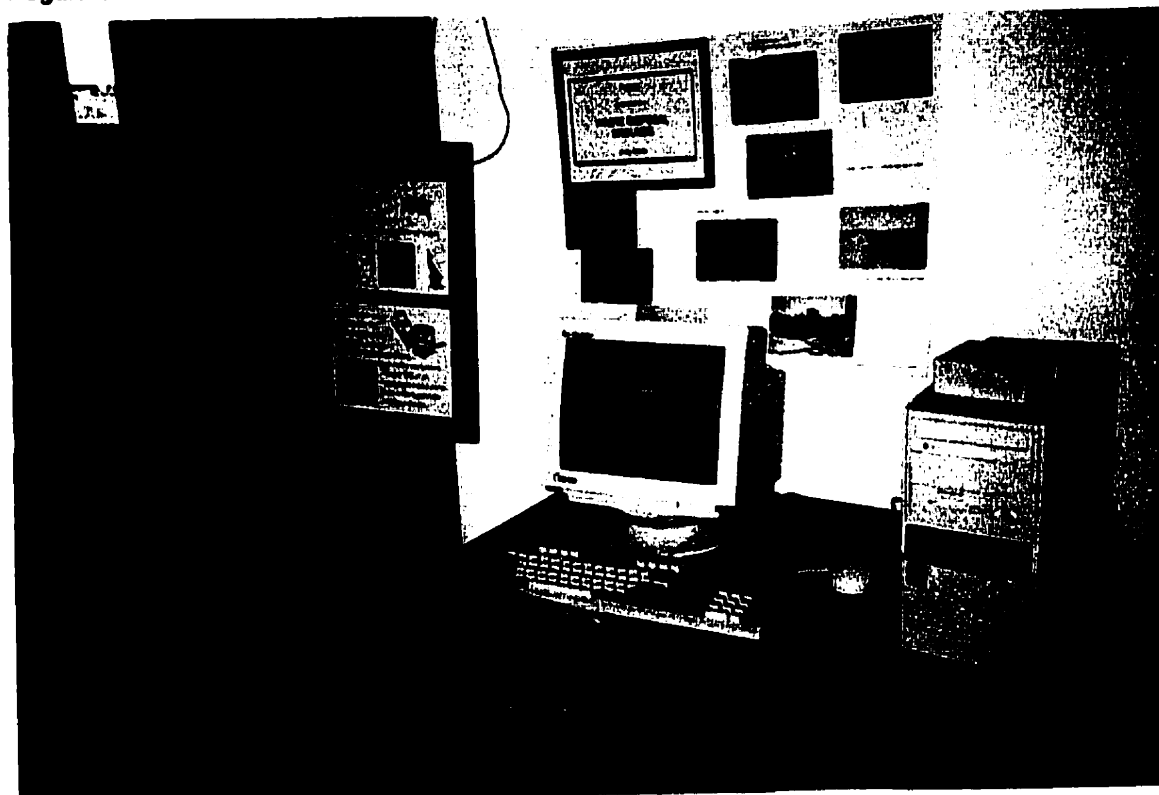
Community involvement at project onset fosters greater project interest, participation and ownership. The Peguis Summer Employment Program was accessed during July and August 1997. Figure 8 shows a copy of one of the successful application form. Peguis Central School, shown in Photo-frame 7 and 8, provided in-kind office space, computers and administrative support services.

In total, eight students worked on various aspects of the project over the summer months. The author tutored all students in various aspects of solid waste management and supplied resource material to supplement teachings.



Photo-frame 7 and 8:

Peguis Central School which housed the students from the Summer Employment Program.



PEGUIS SUMMER EMPLOYMENT PROGRAM

Organization: Jane Maslowski – Pollution Prevention Strategy .
Natural Resources Institute, University of Manitoba .
(name)
MH008 – Environmental Protection .
Health Sciences Centre .
820 Sherbrook Street .
Winnipeg, MB R3A 1R9 .
(address)

Job Title: Recycling Education Developer (2 positions) .

Length of Employment: 8 weeks .

Duties & Responsibilities:

- Prepare draft communication material to inform community on new waste diversion strategy
- Develop and implement 'exhibitor booth' to promote recycling awareness

Eligibility Criteria:

- Resident of Peguis First Nation
- **Illustration knowledge preferred**
- Interest in environmental issues
- Basic computer skills
- Ability to work independently
- Good interpersonal and communication skills

Figure 8: Peguis Summer Employment Application Form

Material from the Montana Pollution Prevention Program's *Pollution Prevention and Cultural Preservation in Native American Communities – An Educational Tool Kit for Tribal Colleges*, provided a foundation for the community education program. The Instructor's Manual opens with the quotation:

"We are responsible for the condition of the Earth. We are the ones who are responsible and we can change that. If we wake up, it is possible to change the energy. It is possible to change everything"
- Hunbatz Men, Mayan (pg. 1; MPPP, 1996)

During the July - August time period, on-site consultative services averaged one to two days a week at Peguis. Additional support was via fax and telephone. The lack of continuous on-site student supervision, introduced in Section 4.2.2.2, was a concern for both the Summer Employment Coordinator and the Masters candidate who assumed the role of Project Manager. As such, one student selected because of her interest and overall knowledge in environmental matters, was assigned supervisory duties. The student took full project ownership and did a wonderful job in the six weeks that she worked on the project. Overall, the students assisted project development in three ways.

Firstly, students assisted by developing promotional material for a community awareness campaign informing residents of anticipated changes in garbage handling at the proposed new landfill site. The opening of a new landfill site as opposed to the old garbage dump was an opportunity to initiate a new community mindset on garbage handling. **Figure 9 shows an example of promotional material.**

The overall theme of the awareness campaign, as seen in Figure 10, stressed the difference between a dump and a landfill. The student's work served as a basis for community displays promoting proper waste handling and informing Peguis residents that the existing garbage dump was going to be closed and a new one opening up. Displays focused heavily on the use of posters as seen in Photo-frame 9.



That the Peguis
Band wants to
construct a new
"sanitary landfill" in
the near future !!!
To find out more
info, talk to
Melissa, Tammy or
Jane

Figure 9: Promotional material: Introducing the new landfill

WHAT IS A DUMP?

- Usually a simple hole or trench where garbage is dumped or burnt. It is not well organized or properly managed
- Generally not planned in a way that considers the environment or the health of community residents
- No mechanisms for monitoring what is dumped
- Usually just abandoned when full. Often future use of this land becomes unusable or expensive to make it usable

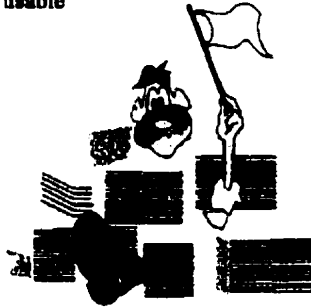


Figure 10: Promotional material: Dump vs. Landfill

WHAT IS A LANDFILL?

- Licensed by the government
- Operates under certain rules to keep it as safe and healthful as possible
- Carefully monitored to screen out materials that could create health or environmental hazards
- Constructed in layers: they are filled with trash, compacted by heavy machinery, and covered with soil daily
- Usually seeded or sodded over after it is full



Secondly, the students compiled a Recycling Survey under the direction of the Peguis Environment Committee. The survey's intent was to get a sense of community interest in recycling. The students conducted the survey by interviewing community residents from a defined list of questions. The survey was distributed at the Health Fair held during Peguis Treaty Days (Figure 11 shows an example of promotional material) and at two of the four Peguis Mall displays. From the survey, the Peguis Environment Committee recommended recycling considerations be incorporated into the new landfill site. A copy of the survey is found in Appendix C.

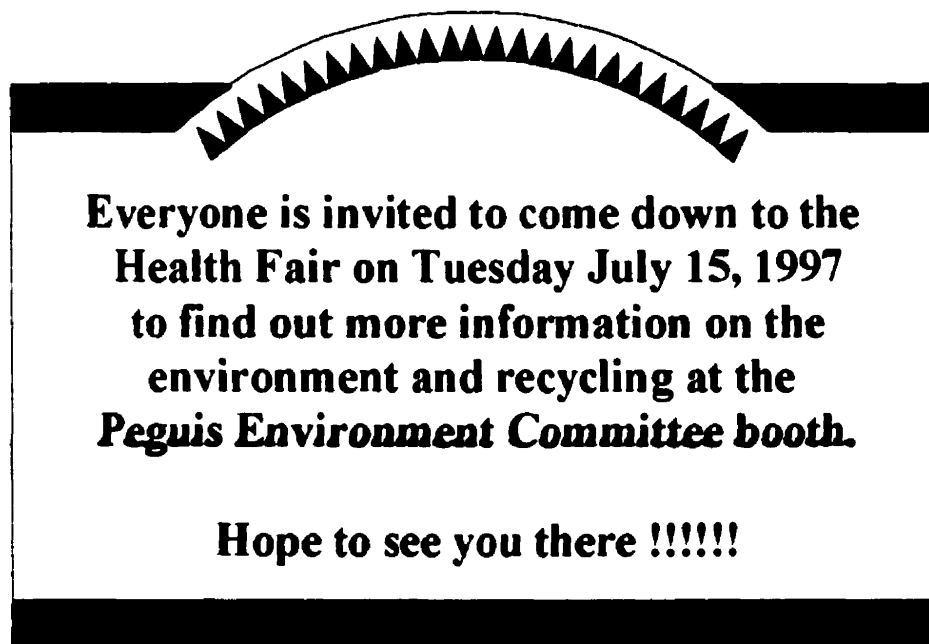


Figure 11: Promotional material: Recycling Information Booth at Treaty Days.



Photo-frame 9: Compiling posters for the Community Awareness Campaign

Thirdly, the students acted as ambassadors for the new landfill site. Central to the Peguis community is the Peguis Mall (previously shown in Photo-frame 2). The Mall houses the Band Office, Health Unit, Band Constable Office, Royal Bank, a restaurant, a foodmart and several small businesses. The Mall serves as a town hall and meeting place. The students organized four mall displays during the six weeks. Although all

displays centered on waste management, each display had a slightly different focus to capture several aspects of the many waste streams generated by Peguis.

For example, Photo-frame 10 shows the medical waste display. The intent of the display was to inform community residents on the origin of medical waste and subsequent disposal path. The Health Unit generates needles and soiled bandages as part of the daily healthcare facility function. The medical waste is segregated from the general waste stream and transported seven kilometers off-reserve to Percy E. Moore Hospital in Hogdson, Manitoba where incineration occurs in accordance to the 1992 *CCME Guidelines for Biomedical Waste Management*.

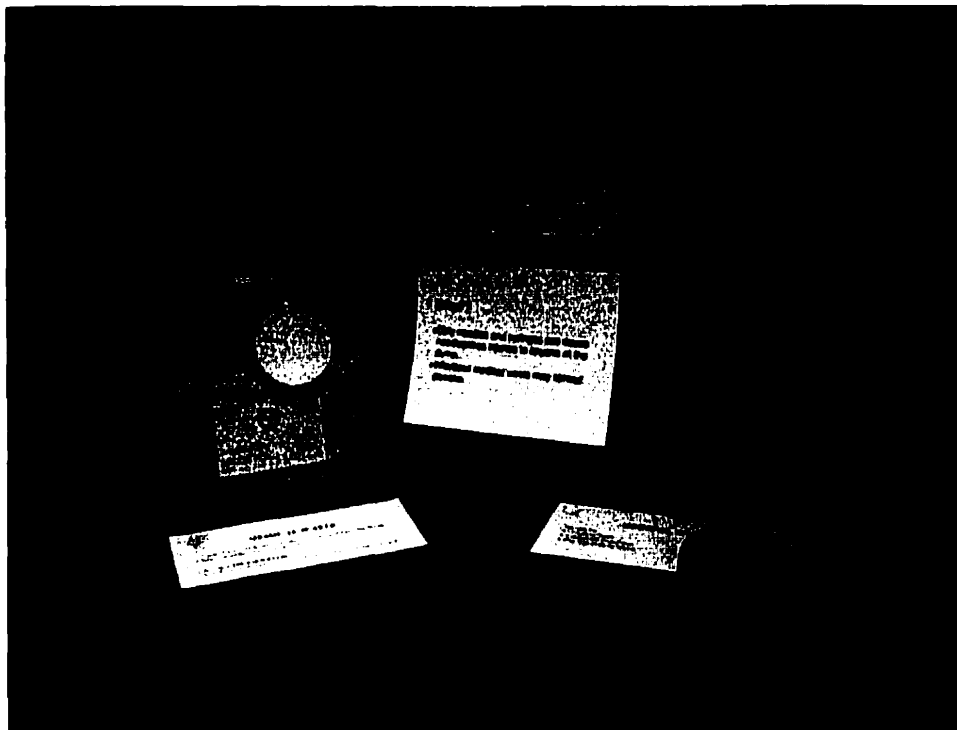


Photo-frame 10: Information Booth - Medical Waste

A second display focused on household hazardous waste. The display highlighted common household hazardous waste such as solvent-based paints and used oil. Handouts supplemented the display material.

A third display focussed on what a new landfill site would look like. The display showed a schematic diagram of a generic, licensed landfill site and a generic site plan from a Class 2 waste disposal grounds. Pictures of components of a best-management-practices landfill site - examples include: fences, gates, shelterbelts and signage - were displayed and referred to by the students in discussions with community residents. Examples of pictures are shown in Photo-frames 11 and 12.



Photo-frame 11: Information Booth – Appropriate signage in a landfill site.
Source: Class 2 landfill site – RM of Thompson



Photo-frame 12: Information Booth – Appropriate storage of pesticide containers
Source: Class 2 landfill site – RM of Thompson

A fourth display targeted community recycling complete with physical examples of recyclables, reasons to recycle, and products made from recyclable materials. Two short videos, both on recycling, were routinely played throughout the display.

In addition to the Mall displays, a recycling information booth was set up during Peguis Treaty Days - an annual two-day festival for community residents. Photo-frame 13 shows Tammy Gleish at the recycling information booth.

Routinely changing the Mall display provided continual interest for Peguis residents. Using material developed by community students and incorporating educational material from the Montana Pollution Prevention Program's *Pollution Prevention and Cultural Preservation in Native American Communities* provided an Aboriginal focus to the displays. The Pollution Prevention Wheel previously discussed in Section 2.3.2 and shown in Figure 4 serves as an example.



Photo-frame 13: Recycling information booth at Treaty Days

Peguis First School

Two formal presentations on the pollution prevention initiative were given to school officials 1997 October. The first to members of the Peguis School Board; the second to the members of the administrative staff, teaching staff and curriculum development staff. The purpose was to invite community school involvement into the project. Walpole Island Heritage Centre's *Waste Management Manual for First Nations* (1996) puts an onus on the children to restore old ways:

"In the past, our people lived in harmony with the Earth and used as much of her gifts as possible, leaving very little waste. This is what was taught - take care of the land, water, air and animals for future generations. Careless dumping or burning of garbage, especially with the amounts we make today, goes against those teachings. Here we focus on the children who will inherit our Earth, and who can ensure that, in the future as in the past, we respect its gifts and its needs."

- pg. 4; WIHC&C Ltd., 1996

The request for assistance from the community school was timely. A new elementary school, named Peguis First School, opened in 1998 January. With the new school came new rules.

Access to the Manitoba Product Stewardship Corporation's Student Action for Recycling (STAR) Program provided for the establishment of a recycling program within the school. The STAR Program is designed to assist Manitoba schools in developing effective recycling programs. The program provides a \$500/year honorarium to any school that is interested in establishing an in-school recycling program. Program requirements state that all recycled materials collected in the program be school generated and that the school complete an annual questionnaire. Ms. Cindy Spence, Peguis First School Principle, directs the program. Ms. Spence and Peguis First School students are shown in Photo-frame 14.



Photo-frame 14: Ms. Cindy Spence and students, Peguis First School

Environmental awareness packages for the school resource centre were sourced and are listed in Figure 12. As an abundance of environmental information was found to be available from a variety of sources, the information listed in Figure 12 was recommended for content and price consideration. Several packages were obtained.

School enrollment to the Society, Environment & Energy Development Studies (SEEDS) Foundation was facilitated. Because children are the key to many desirable changes, schools are constantly asked to add items to the curriculum, or to find other ways to get the message across (WIHC&C. Ltd., 1996). The SEEDS program provides additional implementation resources by providing over 200 action ideas that can be integrated within the total school curriculum.

Step 5 Implementation and Step 6 Evaluation

Program implementation requires continuous interaction and cooperation among those affected and those with decision-making capabilities while the progress of the pilot process can be evaluated by examining quantitative changes (CSA, 1994). Full scale implementation of a pollution prevention initiative for community-wide environmentally sustainable solid waste management was not within the defined scope of the project, as the second and third project objectives, as identified in Section 1.4, was to develop and assess the P2 initiative development process. The following Chapter concludes with project summary, conclusions and recommendations.

LIST OF EDUCATIONAL RESOURCES

➤ **The KEY Foundation – Knowledge for the Environment for Youth (KEY)**

Teaching packages, targeted to grades K – 12, include but are not limited to: ozone, recycling, petrochemicals, and agricultural pesticides. Material is obtained by downloading off Internet or written request. There is no charge for the teaching material, but postage and handling charges are required.

KEY Foundation

50 Belmont Crescent
Box 155 Midhurst, ON L0L 1X0

Tel: (705) 722-6711

Fax: (705) 722-4803

Web: <http://www.key.ca>

➤ **MPPP - Pollution Prevention and Cultural Preservation in Native American Communities**

An eight (8) lesson educational package complete with teaching and student manuals, overheads, worksheets and tests. Lessons include: pollution prevention, solid waste management, air/water/pesticide pollution, and energy conservation. Cost is \$50 US plus taxes, postage and handling.

Todd McFayden

Montana Pollution Prevention Program (MPPP)

Montana State University Extension Service

Bozeman, MT 59717

Tel: (406) 994-3451

➤ **Resource Council Manitoba – Environmental Speakers Bureau**

Resource Council Manitoba in conjunction with Manitoba Product Stewardship operates an Environmental Speakers Bureau. Upon request, volunteer presenters visit elementary school classrooms with posters, diagrams, photographs, and samples of recycled and recyclable materials. The service is free.

Tel: (204) 925-3777

➤ **SEEDS Foundation – Society, Environment & Energy Development Studies**

The SEEDS Foundation offers two-hundred (200) Environmental Action Ideas to schoolchildren encompassing grades K-12. The program provides examples of how environmental themes could be incorporated within the school curriculum. For example: art/poetry reflecting a sustainable Earth; projects for 'greening the schoolyard'; and waste reduction challenges. A school joins the SEEDS Foundation program at a cost of \$48/year. The students receive nominal incentive awards (e.g. decals, trophies) for participating.

SEEDS Foundation – Society, Environment & Energy Development Studies Foundation

Suite 202 – 25 St. Michael Street

St. Albert, AB T8N 1C7

Tel: (403) 458-2411

➤ **A&WMA – Air & Waste Management Association**

Educational packages, targeted at grades K-12, focus on air quality, pollution prevention and solid waste. The packages are project-focussed and cost \$50 US plus taxes, postage and handling.

Web: <http://www.awma>

➤ **British Columbia – Pollution Prevention Division**

The BC government developed a 3 part Eco-Education Program in 1993; material is free upon request.

Mr. Dean Sekyer

Pollution Prevention and Pesticide Management Branch, EP Division

777 Broughton Street

Victoria, BC V8V 1X5

Tel: (604) 953-3867

Fax: (604) 356-9836

Figure 12: Listing of School Environmental Awareness Programs

CHAPTER V - SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF PROJECT FINDINGS

Peguis First Nation concerned with a potential threat emanating from operating practices at the community garbage dump to both human health and the environment, issued a Band Council Resolution, dated 1997 February 25, recommending i) closure of the existing garbage dump and ii) the commissioning of a new landfill facility.

The recommendation provided an opportunity for a pollution prevention initiative, specifically targeted at a public education program focussing on community-wide, solid waste best-management practices. Peguis, in regards to garbage handling, was in transition – the existing community garbage dump was slated for closure and a new landfill site was to be opened. It is anticipated stringent landfill operating practices will be adopted at the new site. In preparation for the new community landfill, a strategy to build community awareness for adopting sustainable waste management practices was needed. Developing the community education program within a step-wise pollution prevention model – obtain senior level commitment, assess pollution prevention opportunities, construct community team, develop program, implement and evaluate – serves as a potential basis for a Environmental Management Framework for Peguis First Nation.

The project commenced with an assessment of landfill operational practices at the existing community waste disposal grounds. The assessment provided an overall sense of community garbage handling practices. Disposal grounds site visits were conducted, landfill operational practices observed against the Landfill Operations Checklist and community waste handlers interviewed. The assessment found that landfill operational practices needed improvements.

Following the assessment, a pollution prevention model targeted at increasing community awareness about sustainable waste management practices was developed. The step-wise pollution prevention application focussed heavily on community education.

Several gains were made through the public education program:

- Four community residents attended a landfill operators course conducted through the Solid Waste Association for North America (SWANA).
- Eight students through the Peguis Summer Employment Program were educated in various aspects of sustainable waste management practices and public education processes.
- A Recycling Survey helped to identify community interest level in establishing a community-wide recycling program. Appendix C shows a copy of the survey.
- Draft principle statements that could serve as the basis of an Environmental Policy for Peguis were compiled. Appendix B shows a copy of the draft principles.
- A recycling program for Peguis First School was established through the Manitoba Product Stewardship Corporation's Student Action for Recycling (STAR) Program. The STAR Program is designed to assist Manitoba schools in developing effective recycling programs.
- School enrollment to the Society, Environment & Energy Development Studies (SEEDS) Foundation was facilitated.
- Available environmental awareness packages, such as the Air and Waste Management Association's educational packages, were reviewed, sourced *and obtained for the community schools.*

As of 1999 December, waste disposal continues at the old landfill site. Original timelines for the decommissioning of the old and commissioning of the new were re-prioritized. The 1997 flood impacted Peguis First Nation requiring a need for emergency preparedness activities and several community improvement projects already underway, required additional human and financial resources. As such, the commissioning of the new landfill is currently under community discussion.

5.2 CONCLUSIONS

The primary purpose of the study was to facilitate capacity-building at Peguis First Nation during the transition of the closure of the existing garbage dump and the opening of a new landfill facility and its anticipated stringent operating practices. Project conclusions to the specific objectives follow:

- 1. To determine the state of solid waste management practices at Peguis First Nation waste disposal grounds;*

Observations of current daily landfill operating practices at Peguis, as defined by the Landfill Operations Checklist (Figure 6) and discussed in Section 4.1, confirm improper landfill operating practices. Summarized observations include:

- Waste is delivered to the dump by either community residents or the local waste hauler. Limited roadside garbage hauling is available. Garbage is deposited indiscriminately by the deliverer when at the dump; no direction via attendant or signage is given.
- An attempt is made to compact and cover the waste. However, standard operating plans are non-existent.
- Water that accumulates in the landfill is not routinely removed.
- **A fence does not enclose the site; there is no buffer zone.**
- **The site has no entrance signage. There are no postings anywhere within the site as to the name of the person responsible for landfill operations, hours of operation, waste restrictions, or telephone numbers of either the operator or community emergency response personnel.**
- No designated burn pit exists; random open burning occurs.
- **There are no verbal or written programs for detecting and preventing the disposal of hazardous, industrial or liquid wastes.**
- **There are no designated areas for the sorting, recovery, conditioning or storage of empty pesticide containers, bulk metal, used tires, used oil, household recyclables, or demolition waste.**
- There is no verbal or written standard operating plan for litter control.

- There is no verbal or written standard operating plan for pest control.
- There is no verbal or written standard operating plan for the management of landfill gas.
- There is no verbal or written standard operating plan for implementation of a remediation program if groundwater quality fails to meet performance standards, as designated by the community.
- There is no verbal or written standard operating emergency response plan covering such items as but not limited to fires, fugitive releases and medical needs.
- There are no verbal or written landfill decommissioning plans.
- Additional observations include: the site is not maintained in a clean and orderly fashion; the access road is not well-drained and properly surfaced to allow all-weather access; and uncontrolled scavenging is allowed.

The observations support the Band Council 1997 February recommendation for landfill closure. Daily operational landfill activities currently continue at the existing site. Community discussions on establishing a new landfill facility are being undertaken.

2. *To develop, in preparation for Peguis' new landfill facility, a pollution prevention initiative for community-wide, solid waste best-management practices which reflect the traditional knowledge and values of Peguis First Nation; and*
3. *To assess the applicability of the pollution prevention initiative amongst community residents and draw conclusions;*

Peguis First Nation supports environmental protection. Steps are being made to integrate sustainable environmental practices into community operations. Actions however, are slow as mechanisms for integration are immature and need to be developed.

- The community education program was greeted favorably, as was the idea of adopting community-wide, solid waste best-management practices. However, no single community resident or community group is responsible or accountable to the initiative. A community waste coordinator would provide project direction, structure and sustainability.

- The process framework for the pollution prevention model, as designed, was too heavily structured and document-needy. Process modifications will allow for flexibility and greater user applicability.
- An environmental policy mission statement (Appendix B) was drafted to reflect community commitment. The document is currently under review of Chief and Council. Senior level commitment is crucial to project development as senior level commitment provides both human and financial resources to the project.
- The community has a responsibility to implement environmentally appropriate solid waste management practices for its own sustainability and social well-being. Pursuing environmental stewardship and associated responsibilities strengthens Peguis as a leader in Manitoba First Nations.

5.3 RECOMMENDATIONS

Objective 4 stated:

4. *To provide recommendations to Peguis First Nation.*

Out of the above conclusions, recommendations follow as:

1. Ensure that community mechanisms, under the direction of Chief and Council, are in place to integrate sustainable environmental practices into community operations. **The step-wise application of the pollution prevention model, specific to waste management but transferable to many processes, could provide the basis for a future Environmental Management Framework (EMF). Harmonizing an EMF with Peguis' existing management operations sets the framework for a cost-effective systematic approach to integrating environmental considerations into overall decision making. Proper documentation ensures value for money spent in environmental programs. Adoption of the pollution prevention model is recommended.**
2. Facilitate First Nation policy development that reflects Native traditional knowledge and values. **The step-wise application of the pollution prevention model required written documentation in a highly structured and time-consuming format. Modification of the step-wise application will ensure that the needs of both the**

pollution prevention process and end-user are met. Modifying the pollution prevention initiative to fit the needs of First Nations will also ensure First Nation participation while fostering community self-reliance. Modification of the pollution prevention model through a Manitoba based First Nation focus group, steered by Peguis First Nation, is recommended.

3. Strengthen the Manitoba First Nations communication network. Several Manitoba First Nations are in various stages of integrating sustainable environmental practices into community operations. Sharing the information learned through the project development process should be encouraged. I recommend developing a series of radio commercials developed in the local language that promote sustainable environmental practices and that the community schools produce a video promoting the 5Rs of waste management (Reduce, Reuse, Recycle, Recover and Rethink).
4. Establish an active community recycling program. I recommend that Peguis First Nation participate in the Manitoba Product Stewardship Corporation Municipal Recycling Program. I also recommend that Peguis First School continue to participate in both the Manitoba Product Stewardship Corporation's STAR (Student Action for Recycling) Program and the Society, Environment & Energy Development Studies (SEEDS) Program. Program expansion to Peguis Central School should be encouraged. Fifteen First Nation schools are enrolled in the Manitoba Product Stewardship Program as of 1998 December (Bereza, personal communication, 1998).
5. Identify a champion for the waste management program internal to the community. Community champions provide project direction and support. I recommend that Peguis First Nation support and assign responsibility to a Band staff member for coordinating a community waste management program. A community waste coordinator provides community education and oversees the community recycling program. Initial start-up costs may be accessed through grant funding; salary could be build into existing operating costs.

6. Establish a community program for the collection and recovery of used oil, used oil filters and used oil containers. Recovering and recycling used oil reduces the threat of toxic leachate. Program participation is through the Manitoba Association for Resource Recovery Corporation (MARCC). MARCC operates a used oil recovery program targeted at diverting improperly discarded used oil, oil containers and used oil filters from the landfill.
7. Establish a community program for the collection of pesticide containers. Removing pesticide containers reduces the risk of toxic leachate. The Association for a Clean Rural Environment (ACRE) operates a pesticide container management program targeted at diverting metal and plastic pesticide containers from landfill. Reimbursements are given for both plastic and metal containers.
8. Establish a community program for the collection of old tires. Segregating tires reduces the threat of fire. A by-product of burning tires is dioxin, a potentially carcinogenic agent. Through the Manitoba Tire Stewardship Board, dealers pay for materials that can be reused, recycled or recovered.
9. Integrate, where feasible, best-management practices into current operating procedures at the community dump. Incorporating best-management practices: i) reduces the risk of insult to human health and the environment and ii) provides opportunities for revenue generation. Suggestions for improvements to current operations are found in Appendix D but examples include:
 - Daily cover and compacting reduces the potential for disease carrying organisms, odor, litter, leachate generation and scavengers. Daily cover also acts as a firebreak.
 - Separating construction/demolition material allows material re-use. Rubble often supplements the base of a landfill's access road.
 - Segregating durable goods and scrap metal provide potential revenue as scrap metal dealers pay for materials that can be reused, recycled or recovered.

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APPENDIX

A

**Excerpts from Regulations
associated with
Landfill Operations Best Management Practices**

ALBERTA CODE OF PRACTICE FOR LANDFILLS

Section 7: OPERATING REQUIREMENTS

7 (2) The person responsible shall develop, maintain and implement an operations plan that ensures landfill operations are consistent with the landfill design and includes as a minimum:

- (a) operational procedures such as waste control, soil cover operations, surface water management and nuisance controls;
- (b) waste acceptance procedures and policies;
- (c) an emergency response program, covering fires, releases and medical concerns; for Class II landfills, a remediation program to be implemented if groundwater quality fails to meet performance standards; and
- (d) a plan for the management of gas, which may include detection, interception, venting or recovery.

7 (3) The operations plan for a Class II landfill shall include a program for detecting and preventing the disposal of hazardous wastes at the landfill.

7 (6) Where a landfill accepts any of the following wastes, the person responsible shall provide specific areas for the sorting, recovery, conditioning or storage of these wastes:

- (a) empty pesticide containers;
- (b) petroleum hydrocarbon contaminated soils;
- (c) automobile hulks;
- (d) scrap metal;
- (e) sump waste from vehicle wash bays;
- (f) used tires; and
- (g) sorted household wastes.

7 (8) The person responsible for a Class II landfill shall cover waste with 15 centimeters of soil or an alternative cover material approved by the Director to control litter, prevent spread of fires, minimize propagation of disease vectors, reduce odors, and minimize infiltration of moisture. Wastes shall be covered within:

- (a) 15 days from the last cover operation at landfills that receive between 1000 and 3000 tonnes of waste per year or serve a population between 1000 and 3000.
- (b) 7 days from the last landfill cover operation a landfill that receive between 3000 and 5000 tonnes of waste per year or serve a population between 3000 and 5000.

7 (9) If soil is used to meet the requirements of section 7 (8), the person responsible is not required to apply the required soil cover during the period between November 15 and April 15 if the necessary soil cover material cannot reasonably be obtained.

7 (12) The person responsible shall remove water that accumulates in a landfill trench to avoid contact with the waste.

7 (13) The person responsible shall treat any leachate or contaminated surface or groundwater prior to discharging it to the surrounding environment to meet the least stringent of the following parameters: surface water background quality;

- (a) the latest addition of Alberta Ambient Surface Water Quality Interim Guidelines, published by Alberta Environmental Protection; or
- (b) the latest edition of Canadian Water Quality Guidelines, published by the Canadian Council of Resource and Environment Ministers.

7 (14) The person responsible shall post signs at the landfill entrance providing the following information:

- (a) the name of the person responsible;
- (b) the landfill class;
- (c) any waste restrictions; and
- (d) telephone numbers for:
 - (i) the person responsible;
 - (ii) the local fire department;
 - (iii) Alberta Environmental Protection, Pollution Emergency Response Team;
 - and
 - (iv) the local police department.

7 (15) The person responsible shall use artificial or natural barriers to control public access to the landfill and prevent unauthorized vehicular traffic and illegal dumping of wastes.

7 (17) The person responsible shall establish and maintain litter controls to minimize the escape of waste from the landfill and shall retrieve waste that is washed or blown onto adjacent properties or accumulates on the landfill site.

Source: pg. 10; Alberta Code of Practice for Landfills, 1996

SCHEDULE C
WASTE DISPOSAL GROUND OPERATIONAL REQUIREMENTS

CLASS 2

1. All solid waste must be deposited in an active area within the waste disposal ground.
2. All solid waste must be compacted and covered with a layer of earth compacted to a thickness of at least 15 centimeters once each month, or at such other intervals required by an environment officer.
3. Within 12 months of the termination of use of an active area in excess of 0.5 hectares, or upon closure of the waste disposal ground, a final cover of earth compacted to a thickness of at least 0.5 metres must be applied to the surface of the active area and the area graded to minimize the ponding of water on the surface.
4. An active area must be enclosed with a fence at least 1.8 metres in height, constructed in such a manner as to contain the solid waste within the active area.
5. In the event of closure of the waste disposal ground, re-vegetation of the site must be undertaken within one year of the closure.
6. Where the municipality has not provided a metallic waste compound, bulky metallic waste must be deposited above grade in a part of the waste disposal ground other than the active area.
7. Liquid wastes and liquid industrial wastes shall not be deposited in a Class 2 waste disposal ground.

Source: pg. 9: Manitoba Regulation 150/91

APPENDIX

B

Draft *Principle Statements*
for
Peguis Environmental Policy

DRAFT

- *Commitment to sustainable solid waste management within the community.*

January 1998

ENVIRONMENTAL POLICY

PRINCIPLES STATEMENTS

for

Peguis First Nation

Peguis First Nation commits to sustainable solid waste management practices within the community with the following goals:

- To maintain a clean and safe waste disposal grounds.
- To develop pollution prevention strategies applicable to solid waste management.
- To integrate the **5Rs** of waste management into community activities.
- *Reduce, Reuse, Recycle, Recover & Rethink*
- To **increase environmental awareness through community education.**

APPENDIX

C

Community Recycling Survey



PEGUIS ENVIRONMENT COMMITTEE



Recycling Survey

In the near future, the Peguis Band is planning to construct a new sanitary landfill that means that the old garbage dump will be closed. This proposed new landfill site would ensure a clean and safe environment for a healthy community. Your participation in planning this landfill site is appreciated.

Community Attitude/Awareness on Recycling:

1. Do you know what recycling is? Yes ___ No ___
2. Do you know why we should recycle? Yes ___ No ___
3. Do you know that some materials (i.e. plastics, metals, and glass) take longer to decompose than others? Yes ___ No ___
4. Is there a difference between a "garbage dump" and a "sanitary landfill"? Yes ___ No ___
5. Would you be willing to recycle or to participate in a recycling program? Yes ___ No ___
6. If you answered yes to the previous question, would you prefer (check one)
 weekly curbside recycling with your garbage pick-up _____
 or
 centralized recycling bins located at the landfill site _____
7. Would you participate in a recycling program with a centralized depot (i.e. an employee at the depot would sort the recyclable materials, you wouldn't have to do it)? Yes ___ No ___
8. Do you think that a recycling program would benefit the Peguis community? Yes ___
 No ___

Purchasing Practices of Community Residents:

1. On a weekly basis, for you or your family, how many:
 - (i) cans of softdrinks are purchased (check one)
 1-5 ___ 6-10 ___ 11-15 ___ 16-20 ___ 20+ ___
 - (ii) plastic bottles of softdrinks are purchased (check one)
 1-5 ___ 6-10 ___ 11-15 ___ 16-20 ___ 20+ ___
 - (iii) glass bottle or jar items are purchased (i.e. spaghetti sauce, pickles), (check one)
 1-2 ___ 3-4 ___ 5-6 ___ 7-8 ___ 9+ ___
 - (iv) tin can items do you purchase (i.e. canned fruit/vegetables, tuna/salmon), (check one)
 1-3 ___ 4-6 ___ 7-10 ___ 11-14 ___ 15+ ___
 - (v) newspapers do you purchase or receive (i.e. Free Press, Spectator), (check one)
 1-2 ___ 2-4 ___ 5-7 ___ 8-10 ___ 11+ ___
2. If you have a vehicle or vehicles, how many litres of used oil are produced each month?
 1-5 ___ 6-10 ___ 11-15 ___ 16-20 ___ 20+ ___
3. What percentage of all of the food you or your family purchases, comes from outside of Peguis? (i.e. Fisher Branch, Arborg, Winnipeg) _____

Waste Management Practices of Community Industry:

1. How do you currently dispose of the packaging materials from all of the items that you or your family purchases? _____

2. Do you currently re-use any of these packaging materials? If so, for what? _____

3. Would you be willing to promote recycling through a small sponsorship? Yes _____ No _____

APPENDIX

D

Suggested Considerations

for

Best-Management Landfill Operational Practices

Related to Peguis' EXISTING community site

Suggestions for:

Incorporating Best-Management Practices into the EXISTING Peguis Landfill

A. Develop a site plan and garbage disposal strategy for existing site

Issues:

- Waste is delivered to the dump by either community residents or the local waste hauler. Limited roadside garbage hauling is available. Garbage is deposited indiscriminately by the deliverer when at the dump; no direction via attendant or signage is given.
- No designated burn pit exists; random open burning occurs.
- There are no designated areas for the sorting, recovery, conditioning or storage of empty pesticide containers, bulk metal, used tires, used oil, household recyclables, or demolition waste.
- The site has no entrance signage. There are no postings anywhere within the site as to the name of the person responsible for landfill operations, hours of operation, waste restrictions, or telephone numbers of either the operator or community emergency response personnel.

Possible Solutions:

- **Centrally house a community-wide recycling program at the dump.**
- **Develop a site plan for systematic garbage disposal within the site. The site plan should incorporate segregated areas for recycling household materials, tires, pesticide containers, used oil, bulk metals and demolition materials as well as a burn area.**
- **Promote the plan through a community education program (e.g.: a display in the Peguis Mall, advertising on the community radio station, an article in the community newspaper).**
- **Use appropriate signage to direct users when at the site.**

B. Develop standard operating practices for the existing site

Issues:

- **An attempt is made to compact and cover the waste. However, standard operating plans are non-existent.**
- Water that accumulates in the landfill is not routinely removed.
- The site is not maintained in a clean and orderly fashion.
- The access road is not well-drained and properly surfaced to allow all-weather access.
- There is no verbal or written standard operating plan for litter control.
- There is no verbal or written standard operating plan for pest control.
- There is no verbal or written standard operating plan for the management of landfill gas.
- There is no verbal or written standard operating plan for implementation of a remediation program if groundwater quality fails to meet performance standards, as designated by the community.
- There is no verbal or written standard operating emergency response plan covering such items as but not limited to fires, fugitive releases and medical needs.
- There are no verbal or written landfill decommissioning plans.

Possible Solutions:

- **Develop standard operating plans for the existing community dump. Procedures for a litter control program, pest control program, gas management, groundwater management, emergency response and landfill decommissioning as well as for daily operations should be in written form. Include a task list for the following:**
 - **compacting and covering the waste taking into consideration the availability of cover material and equipment, as well as financial and human resources;**
 - **removing standing water regularly;**
 - **conducting a regular litter control program;**
 - **conducting a regular pest control program;**
 - **maintaining the site in a clean and orderly fashion; and**
 - **maintaining the access road to allow all-weather access.**
- **Assign a landfill waste operator the responsibility and accountability for the tasks.**

C. Develop a community hazardous waste program

Issues:

- There are no verbal or written programs for detecting and preventing the disposal of hazardous, industrial or liquid wastes.

Possible Solution:

- **Develop a community hazardous waste program to divert hazardous materials from the landfill. Include hazardous wastes generated from households, commercial businesses and agricultural processes.**