City of Iqaluit, NU

Solid Waste Facility Operation & Maintenance Manual

May 18, 2005

05-4260-100

Submitted by

Dillon Consulting Limited

Revised by The City of Iqaluit

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1.0 INTRODUCTION

1.1_ PURPOSE

The purpose of this manual is to assist the City of Iqaluit personnel in the proper operation and maintenance of the City=s solid waste disposal facility located in West 40. The manual has been developed according to the requirements of the Nunavut Water Board, and is based on the *Guidelines for the Planning, Design, Operations, And Maintenance of Modified Solid Waste Sites, Municipal and Community Affairs, Northwest Territories (MACA), 1996.*

1.2 SITE SETTING

Iqaluit is a rapidly growing coastal community and is the Capital of Nunavut Territory. It is located at the south end of Baffin Island, on Frobisher Bay at 64E31' N latitude and 68E 31' N longitude. Access is provided by commercial aircraft year round, snowmobile trails from other Baffin Island communities in the winter, and sea-lift from the port of Montreal in the summer. Annual precipitation in the Iqaluit area is in the order of 255 cm of snowfall and 19.2 cm of rainfall. Average annual temperatures range from a low in January of approximately -29.7 ^{o}C to a high of approximately 11.4 ^{o}C in July.

Iqaluit has developed into the eastern Arctic=s largest community with a current population of approximately 5,500 to 6,000 people. The expanding population of Iqaluit has resulted in increased pressure on the arctic and coastal environment. In order to minimize the impact of the community on this environment, it is imperative that the solid wastes produced by the community are carefully managed.

A landfill facility was built in West 40 in 1995, and was intended as a temporary site until funding for a permanent solution could be allocated. Waste disposal techniques at that landfill include compaction and covering with granular fill.

The location of the solid waste disposal facility relative to the community is shown in **Figure 1.1.**

Figure 1-


DILLON CONSULTING
PROJECT
LANDFILL O&M MANUAL
TITLE
LANDFILL LOCATION
PROJECT NUMBER
02-9975
DATE
MAY 2002
FIGURE NUMBER
1-1
PLAN
SCALE: NTS
WEST 40 LANDFILL SITE

1

1.3 CONTACT LIST

The individuals responsible for the operation of the solid waste facility in Iqaluit are the following:

Title	**Phone Number**	**Name**
Landfill Site Operator	(867) 979-5640	Darcy Reist
Director of Public Works	(867) 975-8507	Mark Hall
Chief Administrative Officer (CAO)	(867) 979-5666	Ian Fremantle

2.0 BACKGROUND & DESIGN DATA

2.1 BACKGROUND STUDIES & REPORTS

Over the past several years, various studies have been conducted to address the long term solid waste management of the community, as the existing landfill at West 40 was intended to be a temporary site. Estimates indicated that the West 40 landfill would reach its design capacity in November 2001. As a result, there was an immediate need to select the long term solid waste management system and the locations for the components of this new system.

In October 1999, the City of Iqaluit, in conjunction with the Department of Community Government & Transportation (Now Community and Government Services, CGS), commissioned a Solid Waste Management Planning Study for Iqaluit. The study was completed by JL Richards & Associates and Golder Associates Limited in September 2000. Extensive community consultations were completed as part of the study to address residents= concerns. One recommendation from this study was to develop an incinerator and ash disposal facility to address the long term solid waste management of the community.

In October 2000, the City retained Dillon Consulting Limited (Dillon) to complete a Solid Waste Facility Site Selection in which several sites for an incinerator and ashfill were to be evaluated. Outlined in the report were a number of solid waste management (SWM) site options. These SWM site options were ranked by the SWM steering committee which was comprised of city council members and the public. The most highly recommended option was an incinerator facility located at the existing municipal garage site on Federal Road with an ashfill system at the current landfill site in West 40. Some of the reasons why the West 40 site achieved a higher ranking than other locations by the steering committee include:

- Capital cost is approximately $2 million lower than other site options as the existing access road to the landfill would not need major upgrading and the site has power and an operator building;
- The West 40 site is currently considered to be the greatest environmentally impacted site, therefore, the facility is not expected to further impact the site;
- The access road is fairly flat and is cleared and sanded regularly;
- Locating the facility at this impacted site also does not increase the number of environmentally impacted sites in Iqaluit;
- Using the existing landfill site for the ashfill also significantly reduces the cost of closing/capping dump sites.

The City needed to expand the existing West 40 landfill to meet current solid waste disposal requirements until a long term plan was put into place. In June 2001, Dillon was selected to design a landfill/ashfill facility. At that point, the City=s plan was to expand the existing West 40 landfill facility

to accept municipal waste until the new incinerator process was in place.

The landfill facility was to be expanded for continued use as an ash bury site. In 2001, an additional cell was constructed to the north of the active cell. The use of the newly constructed cell was not approved by the regulators, and to date is not used for the interment of waste. Open burning at the site was to be halted, and the City had initially selected the use of a waste incinerator to be part of the solid waste handling system. Concerns with long term costs, and the impact of the incinerator stack emissions were voiced by the community, and in 2002, the City changed the landfill operations to a standard sanitary landfill. The waste mass is segregated into the selected waste stream. Common waste is compacted and covered on a daily basis.

2.2 DESIGN DATA

2.2.1 Population Projections

A 20-year population projection for Iqaluit is required in order to estimate the demand that will be placed on the current facility and will provide an outlook of the City=s needs. Table 2-1 presents the census data for Iqaluit.

Table 2-1 Population Census Data

1996 Census	4,220
2001 Census	5,236
Yearly % Increase	4.41%

The population projection was determined using Nunavut Bureau of Statistics population projections. The latest Nunavut Bureau of Statistics population census data for year 2001 is 5,236. However, this figure does not include the population who own property in another province or who live here for short periods of time. Using population census data and population projections, Dillon used a base population of 6000 for year 2005. Using the population projections released by the Nunavut Bureau of Statistics, the resulting population for 2025 is 9,443. Table 2-2 presents a summary of population projections.

Table 2-2 - Population Projection Data

Year	2005	2010	2015	2020	2025[1]
Population	5,606	6,477	7,456	8,391	9,443

Notes:
1) Population Protection for 2025 was not included in the Nunavut Bureau of Statistics. 9,443 is projected based on a 2015 and 2020 population increase of 2.39%.

2.2.2 Waste Quantity

The average waste generation rate per capita was required in order to determine the size of the disposal facility and understand the operation of the facility.

An equation based on population was developed by the Department of Municipal and Community Affairs (MACA) of GNWT to estimate average waste quantities generated in northern communities. Dillon used this method to determine average waste quantities which would be produced in Iqaluit over the next 20 years based on the above mentioned population projection.

In the summer of 2000, the City completed a waste stream analysis at the existing landfill to determine the quantity and types of waste which is currently produced by the City. This waste analysis was used as a comparison to the MACA waste projection for the existing population.

Based on the MACA formula, the volume of waste used for the facility design are approximately 0.018 to 0.02 m^3/capita/day. These figures include residential, commercial, and industrial wastes. They also include recyclable materials such as plastics, paper, and metals.

The population projection and estimated volume of waste per year are presented in Table 2-3.

The un-compacted volume of waste estimated to accumulate over the next three years is approximately 121,000 m^3. The volume of un-compacted waste which is expected to accumulate from 2005 to 2025 is approximately 1.3 million m^3.

Table 2-3 Projected Population and Solid Waste Volumes

Year	Population	Annual Solid Waste Generation (cubic meters)	Cumulative Solid Waste Generation (cubic meters)
2005	5,606	40,924	40,924
2006	5,770	42,123	83,047
2007	5,939	43,358	126,405
2008	6,114	44,629	171,034
2009	6,293	45,937	216,971
2010	6,477	47,283	264,254
2011	6,662	48,633	312,887
2012	6,852	50,022	362,908
2013	7,048	51,450	414,358
2014	7,249	52,919	467,277
2015	7,456	54,429	521,706
2016	7,634	55,731	577,437
2017	7,817	57,063	634,501
2018	8,004	58,428	692,928
2019	8,195	59,825	752,753
2020	8,391	61,255	814,008
2021	8,592	62,720	876,728
2022	8,797	64,219	940,948
2023	9,008	65,755	1,006,702
2024	9,223	67,327	1,074,030
2025	9,443	68,937	1,142,966

Notes:

1. Waste volumes based on MACA equation.
2. Volume of un-compacted solid waste includes residential, commercial, industrial wastes, recyclables, large metals, etc.

2.2.3 Landfill Requirements

Landfill Size

Based on the population growth rate shown in table 2-3, the volume of waste to be placed in the landfill over the 20 year life is estimated to be 1,143,000 m^3 of un-compacted waste.

To determine the design volume required for, the following assumptions were used:

- Waste with 3:1 slopes,
- Compaction ration of 4:1 using the sheeps foot compactor
- ratio of waste to soil cover of 1:6, and

The resulting volume of waste after compaction is approximately 286,000 m^3. The soil cover volume based on a 1:6 ratio is approximately 48,000 m^3. **The resulting landfill volume requirement is approximately 334,000 cubic metres**. Currently the City is using shredded waste as cover material. It is recommended that this practice continues. The use of shredded waste material for cover material reduces the total landfill volume over the 20 years to 286,000 m^3.

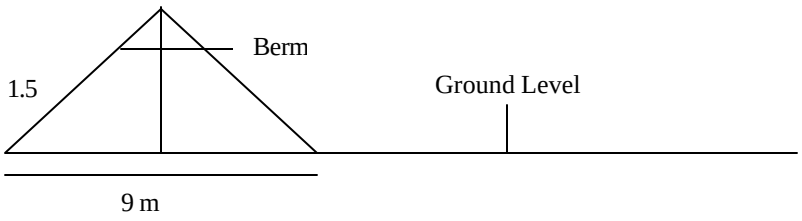
If it is assumed that the waste can be developed into a waste pile of 10 meters in elevation over existing grade, then the approximate foot print of the landfill will be 220 meters by 220 meters.

2.2.4 Waste Disposal

The landfill operation is the use of the area method. This method entails the placement of waste above grade with period cover material. The City of Iqaluit is using mulch as the landfill cover. The mulch is developed from construction waste, mattresses and tires. The mulch is produced using a Shred Max. The resultant mulch is a 25 mm to 300 mm material that compacts over the waste and prevents wind blown material.

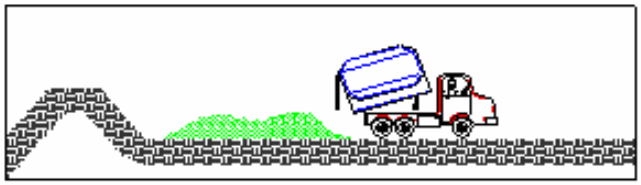
The landfill operation is as follows;

1. To begin a working face, build up a berm approximately 1.5 meters high using the cover material. The berm should be approximately 9 m wide at the base, in order to achieve a 3:1 gradient along the exterior slope.

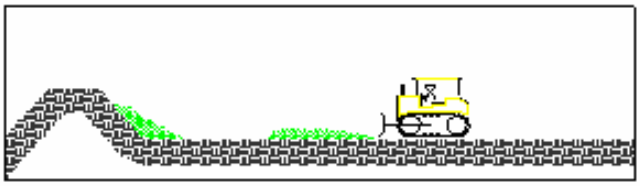


2. Dump waste near the berm.
3. Using the sheeps foot compactor drive over the waste 3-5 times. Always drive in an up and down direction to avoid toppling over. Using the sheeps foot compactor, push the garbage up the berm a little at a time to pack it. Only drive up and down the working face, not along the sides. Waste should be compacted approximately to 1/4 of its original volume.
4. Alternate between dumping and packing garbage until the packed garbage is approximately 1.5m high.
5. Cover the compacted waste with a minimum 150 mm of the cover material (mulch of wood, furniture, mattresses and plastic). Cover waste once per week during the summer months and once per month during the winter.
6. Repeat steps 2-5 until the site is full. Cover all waste with an additional 150mm of cover material. Grade the top to provide positive drainage off the waste mass using additional cover if necessary.
7. Build a new berm on top of the bottom row of cells. Again, build the berm 1.5 m high and 9 m wide at the base. Waste can be used to build up this berm in order to conserve cover material.
8. Repeat steps 2-7.
9. Once the landfill has reached maximum height, put a final 300 mm layer of cover over the entire area. Ensure that the final cover is packed and sloped evenly to allow water to easily run off.

The following figures show the landfill operation.



Step 2



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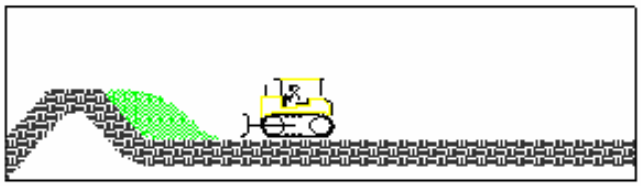

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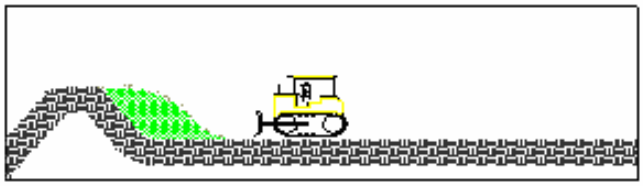

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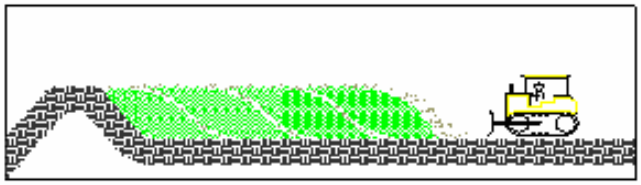
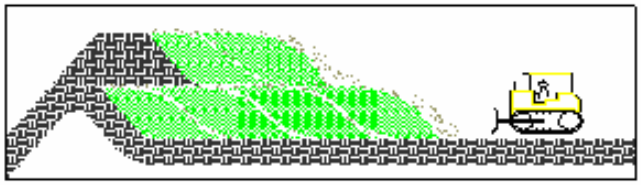


Step 6

Step7



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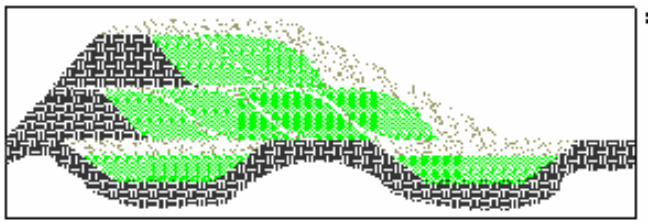

Step 9

Source: Kent, R., Marshall, P., and Hawke, L. 2003. *Guidelines for the Planning, Design, Operations and Maintenance of a Modified Solid Waste Sites in the Northwest Territories*. Department of Municipal and Community Affairs, Government of the Northwest Territories.

2.2.5 Runoff Management

The objective of the runoff plan is to control the discharge of water from the site to the receiving environment. The water leaving the site will be comprised of melt water from the spring freshet, runoff from precipitation, and leachate from the waste mass.

Water that comes in contact with the waste mass, will be collected within the waste cell. The water collected in the waste cell will be periodically pumped into a truck and disposed of at the sewage lagoon or sewage treatment plant.

Drainage improvements are required to expand the operation of the cell and to remove off site run off from entering the site. The drainage from part of the area of the "West 40" drains into the landfill site. This runoff enters into the new cell area, and then is directed through a series of ditches along the back (east side) of the operating cell. The water from the west 40 needs to be re-directed away from the land fill site. This will allow for the expansion of the operating cell to the east, and also remove much of the water issues that the City is currently experiencing at this site. There will be reduced leachate, and reduced ponding along the east side of the site.

The improved drainage works will include the development of a ditch running north from the land fill site along the access road. On site drainage improvements would include the relocation of the leachate control system to the east. This will open up an area of the landfill for operation, and provide better control of the leachate.

3.0 OPERATIONAL PROCEDURES

This section of the manual was developed to present operational procedures to operators of the landfill facility in Iqaluit. Each set of procedures is explained individually. The final section of the manual provides a summary of operational procedures broken down into daily, weekly, monthly and annual tasks.

The details of this Section are subject to modification to provide compliance with the Solid Waste By-Law 341 as amended.

3.1 HOURS OF OPERATION

Weekday Hours	**Weekend Hours**
Tuesday to Friday 8:00 am to 12:00 pm and 1:00 pm to 5:00 pm.	Saturday 8:00 am to 12:00 pm and 1:00 pm to 5:00 pm

The Landfill is closed on the following holidays:

- New Year's Day;
- Good Friday;
- Nunavut Day;
- Victoria Day;
- Canada Day;
- Civic Holiday (First Monday in August);
- Labour Day;
- Thanksgiving;
- Remembrance Day;
- Christmas Day; and
- Boxing Day.

3.2 SITE SECURITY

The landfill is surrounded by a chain link fence and has controlled access through one gate at the landfill entrance. The hazardous waste area has a separate access gate. The gates are locked when the landfill is closed. The hazardous waste area gate will be locked at all times when a worker is not present in the hazardous waste area.

Public sorting of waste or scavenging is not permitted within the disposal area of the landfill.

However salvageable wastes which have been separated by the landfill operator are placed by the gate and may be reused by the community.

3.3 SITE PERSONNEL

The City=s Department of Public Works is responsible for the overall operation of the landfill facility. The daily operation and maintenance of the landfill is the responsibility of:

- Site Owner – City of Iqaluit;
- Landfill Foreman
- Landfill Equipment Operator
- Landfill Office Assistant.

A general outline of the minimum duties and responsibilities of each position follows.

3.3.1 Site Owner

The Site Owner, City of Iqaluit, is responsible for the operation of the facility. The Owner oversees and coordinates day-to-day operations at the site.

Reporting Relationships:
Supervises - Site Operator

Maintains Liaison with:
- Clients (Private Sector & Government Departments)
- Suppliers
- Contractors
- Nunavut Water Board and other regulatory agencies

Duties and Responsibilities:
The Site Owner shall:

1. Perform operations at the facility in accordance with the Landfill Operations & Maintenance Manual (latest approved version), applicable Engineering Drawings, the Operating Permit issued by the Nunavut Water Board;

2. Ensure that only acceptable wastes, as indicated on the approved list for disposal, are permitted at the site in consultation with regulatory agencies;

3. Prepare facility operating budgets and undertake staffing selections;

4. Communicate as required with regulatory agencies, including the forwarding of monitoring results;

5. Deal directly with the public, responding to disposal requests;

6. Coordinate site visits;

7. Maintain the environmental monitoring/sampling program;

8. Ensure that site staff receives required training;

9. Ensure that the site is maintained and operated in a clean and safe manner at all times, including regular collection of litter and complies with *Nunavut Safety Act and Regulations*; and

10. Coordinate the preparation of landfill areas for operation, and identifying the requirement for the establishment of surface water control measures.

11. Provide a safe work environment for landfill employees and ensure employees are familiar with the **City of Iqaluit Occupation Health and Safety Program and Nunavut Safety Act and Regulations .**

3.3.2 Site Operator

Under the direction of the Site Owner, the Site Operator is responsible for general site operation and maintenance requirements at the facility.

Reporting Relationships:

∃ Supervises - Full-Time and Part-Time Assistants

∃ The Site Operator reports directly to the Site Owner.

Duties and Responsibilities:

The Site Operator shall:

1. Perform operations at the facility in accordance with the Landfill Operations & Maintenance Manual (latest approved version), applicable Engineering Drawings, and the Operating Permit issued by the Nunavut Water Board;

2. In consultation with the Site Owner, ensure that only acceptable wastes, as indicated on the approved list for disposal, are permitted at the site;

3. Prepare regularly scheduled reports (daily, weekly, monthly, annually) on progress and planning at the site;

4. Provide overall direction for daily site activities;

5. Conduct work in accordance with the **City of Iqaluit Occupation Health and Safety Program** and Nunavut Safety Act and Regulations;

6. Be responsible for the operations and maintenance of the site machinery;

7. Make recommendations to the Site Owner for major and minor repair work required for site equipment as well as replacement of same;

8. Ensure that the site is maintained and operated in a clean and safe manner at all times, including regular collection of litter;

9. Ensure that solid waste is compacted and covered in accordance with the Landfill Operations & Maintenance Manual;

10. Coordinate snow removal and general maintenance for the access roads within the site and other areas as necessary;

11. Operate and maintain the surface water control structures and other site infrastructure;

12. Undertake site security checks, reporting any noted issues to the Site Owner;

13. Inspect the site access road on a regular basis to recover any accumulation of garbage or other debris;

14. Recommend to the Site Owner the need for bird control and odour control;

15. In consultation with the Site Owner, maintain the completed portions of the landfill;

16. Arrange for removal of Freon from refrigerators (and similar equipment) in accordance with applicable ozone depleting substance regulations;

17. Ensure that adequate signage and traffic control devices are in place in coordination with the Site Owner;

18. Perform all duties related to the identification and recording of incoming vehicles, and inspection of incoming waste;

19. Answer incoming telephone calls and requests for information, directing such requests as required; and

20. Perform such other related duties as may be assigned from time to time by the Site Owner.

3.3.3 Site Assistants

The Site Assistants are responsible for tasks assigned to them by the Site Operator. These positions would typically address both ongoing and periodic general site operation and maintenance requirements.

Reporting Relationships:

The Site Assistants report directly to the Site Operator.

Duties and Responsibilities:

The Site Assistants shall:

1. Perform duties as assigned by the Site Operator;

2. Conduct work in accordance with the **City of Iqaluit Occupation Health and Safety Program** and Nunavut Safety Act and Regulations.

3.4 PERSONNEL TRAINING

Every landfill employee will be trained to perform his or her job in a safe and environmentally responsible manner, in accordance with applicable regulations. Employees will be kept current with changes in regulations and technology through ongoing training courses in such areas as regulations and the technical aspects of landfill operation. Specific training topics may include hazardous waste, surface water control, spill prevention, special wastes control, first aid and safety.

Given the nature of activities at the site, the Site Owner and Site Operator will serve as the facility=s health and safety representative, and health and safety issues will be discussed as part of regular site meetings. All personnel should be familiar and abide by the **City of Iqaluit Occupation Health and Safety Program and Nunavut Safety Act and Regulations.**

Continued on-the-job training will be provided for all employees. The training will emphasize the safe and environmentally sound operation of the landfill. **A review of this Operations and Maintenance Manual will be a prerequisite for any employee before being declared eligible for work at the Landfill.** All employees will be given safety training covering all equipment and systems, with which they will be expected to operate on a daily basis. The dangers associated with the use of protective equipment, and the handling and precautions associated with special wastes, will also be included in the safety training.

A training program for more specific tasks, such as those of mobile equipment operators, will be documented with written records of meetings and types of instruction. This instruction will include identification of special wastes and unacceptable wastes; emergency procedures in case of fire, spill or injury; confined space entry; respirator use and fit testing; and other issues that will periodically arise. As required, individuals must be trained in Confined Space Entry, Transportation of Dangerous Goods (TDG) and/or Hazardous Waste Management, WHMIS, and practice proper safety procedures in accordance with applicable legislation and the requirements of the Nunavut Workers Compensation Board. Documentation will also be kept on file at the Site Owner=s office and reviewed annually for any necessary updates.

A general outline of some of the training that employees will require is found in Table 3-1. It is not intended to be comprehensive or to limit additional staff training, should legislation change, or limit the employer's or employee's right to require additional training.

TABLE 3-1
STAFF TRAINING REQUIREMENTS

Program	Position		
	Site Owner	**Site Operator**	**Site Assistant(s)**
WHMIS	T	T	T
Emergency First Aid	T	T	T
Confined Space Entry		as required	
General Safety Training	T	T	T
Environmental Protection Training[1]	T	T	T
Transportation of Dangerous Goods (TDG) and/or Hazardous Waste Management	T	T	

Note: 1. Demonstrated through familiarity with environmental protection provisions within the Operations Manual.

3.5 EQUIPMENT LIST

The waste collection equipment consists of:

Table 3-2 Collection Equipment List

List of Collection Equipment
1989 Ford 24 yd^3 rear packer
2003 Sterling Rear Packer

The equipment which is provided on-site at the waste facility consists of:

Table 3-3 Landfill Equipment List

List of Landfill Equipment
Cat 814 wheeled dozer
Cat 816F Land Compactor
Cat 928G Loader
Ford F350 With tidy tank fro refueling
ShredMax 120 H.P. Shredder

The City has access to heavy equipment as required through the Public Works department or rental from local contractors.

3.6 WASTE RECEIVING, PLACEMENT, COMPACTING & COVERING

The landfill facility is organized into three separate disposal areas in which certain wastes are to be disposed in each area. The following is a summary of the three areas of the landfill, the types of wastes to be disposed, waste receiving controls, and cover operations. Figure 2-1 presented the location of the three areas.

3.6.1 Types of Waste

There are certain wastes which are not accepted at the Iqaluit landfill. The checking of waste entering the facility is crucial to the safe and correct operation of the landfill. The site operator should carry out random checks of the waste entering the facility. The following sections describe the wastes which are and are not accepted.

3.6.1.1 Accepted Waste

Any waste disposal option has limitations with respect to the waste streams which may be handled in an environmentally safe manner. Limits must be placed on the types of waste accepted at a disposal site in order to protect the environment, the employees, the users and neighbours, as well as the equipment from damage, while simultaneously providing adequate levels of service.

The Site Owner shall allow only those materials to be deposited at the Iqaluit Landfill for which the facility has been designed and which have, with the exception of unique circumstances reviewed in consultation with regulatory agencies.

Acceptable wastes for disposal are listed below:

1. Plastic, metal, and paper wastes; packaging; cardboard; newsprint; food; rubber; leather; glass; wood; from residential, commercial or industrial premises.

2. Animal and vegetable (organic) waste material.

3. Sweepings, clothing and textiles, consumer electronics, and discarded household utensils.

4. Furniture and major appliances.

5. Non-salvageable metals.

6. Tires.

7. Construction & Demolition wastes (provided the waste is not a hazardous or banned material).

8. The following hazardous wastes in reasonable volumes (less than 5 Litres in one load):

   Commercial/Industrial Hazardous Waste Streams:
   - Antifreeze
   - Batteries (lead-acid vehicle batteries)
   - Solvents (varsol, turpentine, P-50 oil, waste aviation gas)
   - Waste Paint (oil-based paint from building construction, automotive paint)
   - Oil filters (fuel filters and oil filters and fuel line filters from heating systems)
   - Waste oil & fuel
   - Automotive fluids (brake fluid, transmission fluid)

   Household Hazardous Waste Streams such as:
   - Cleaning Products (oven cleaners, drain cleaners, bleach, spot remover)
   - Paints and Solvents (oil-based paints, thinners, paint stripper)
   - Automotive Products (antifreeze, motor oil car batteries, brake fluid, transmission fluid)
   - Pesticides and herbicides
   - Small propane tanks & cylinders (Barbeque tanks)
   - Miscellaneous Hazardous Materials (household batteries, photographic chemicals, pharmaceuticals, aerosol sprays)

9. Biomedical wastes/ash that have been incinerated, and cooled prior to disposal.

The following materials may be received at the site, although none of the items listed are considered suitable for routine disposal. As a result, the Site Owner will specify in each case an appropriate disposal method and location. The Site Owner reserves the right to limit the amount of these materials received at any one time or to define the material as non acceptable waste and to specify management requirements.

- Contaminated soils meeting the acceptance requirements of Department of Environment (DOE). Analytical test results for all candidate materials will be evaluated by the City of Iqaluit and DOE. No material will be accepted for disposal until this evaluation has been completed. Subsequent management requirements for accepted soils will be defined on a case by case basis in consultation with DOE.

- Asbestos waste from within Iqaluit, provided that it is packaged and handled in accordance with the "Environmental Guidelines for Waste Asbestos" (pursuant to the DOE Guidelines) and site-specific protocols.

- Waste building lumber less than four metres in length and other construction material in reasonable quantities. Salvageable construction and demolition materials will be diverted to the site=s dedicated storage area.

- Non-hazardous incinerator ash, fly ash and wood ash, when properly quenched and cooled.

- Electrical transformer casings on the condition that all oils have been removed consistent with applicable regulations, and that the units have been rendered free of potentially hazardous materials.

- Carcasses of animals weighing less than 25 kg.

- All wastes not specifically fitting into the above categories and not specified as unacceptable will be referred to the Site Owner and for recommendations as to acceptability and appropriate disposal methods.

3.6.1.2 Non-accepted Waste

Wastes which present a danger at the Landfill Site, require special disposal techniques, or may interfere with the level of service to the public, are not acceptable for disposal. In some cases, wastes which are acceptable in small quantities may not be acceptable in large quantities from a single generator because they may cause the level of service to other users to deteriorate and cause handling problems at the site and increased environmental liability. To some extent, the acceptability of large quantity wastes must be at the Site Owner=s discretion, depending on the ability to accommodate disposal without deterioration in the level of service. In cases where unacceptable wastes are identified, site staff will attempt to identify allowable management alternatives to material haulers.

All wastes which pose potential safety or environmental problems cannot be listed in their entirety. The Site Owner and site personnel in general must be wary of accepting wastes which could cause future operational problems and must watch for the inclusion of unacceptable wastes in regular loads of refuse.

A list of materials which MAY NOT be accepted for placement in the landfill is as follows:

- Explosives or highly combustible materials of any nature.

- Large volumes of waste oil & fuel (more than 5 Litres per load).

- Gas cylinders, unless the valve has been removed and the cylinder properly drained by a

professional trained in handling gas cylinders.

- Radioactive materials.
- Mercury.
- Drums with unidentified contents.
- Carcasses of animals weighing more than 25 kg.
- Large volumes of fuel tank sludges from tank farms.
- Septic tank waste and sewage treatment plant sludges, unless a facility is specifically designed for their disposal or they have been pre-treated.
- Large quantities of fish processing wastes.
- Hot ashes.
- Pieces of concrete or asphalt which are larger than one metre by one metre.
- Any liquids, or liquid waste, of a quantity greater than five Litres in any one load.
- Dangerous goods as defined by the Transportation of Dangerous Goods Act.
- Biomedical wastes that are not incinerated or autoclaved prior to disposal.
- Waste pharmaceuticals.
- PCB=s or PCB contaminated materials.
- Any other materials not listed as acceptable or conditionally acceptable with the approval of the Site Owner.

3.6.2 Waste Receiving

3.6.2.1 Reception Procedures

The landfill facility is organized into four separate disposal areas in which certain wastes are to be disposed in each area. The four areas include:

- Fill refuse disposal area,
- Bulky wood waste disposal area (for subsequent removal to the shredder),
- Bulky metals waste disposal area, and
- Hazardous waste storage area.

Upon arrival at the landfill waste hauling vehicles will form an orderly line. The following information will be collected and recorded:

- date
- vehicle type
- mailing address
- time waste disposal
- driver name & company
- type of waste
- estimated volume of waste

Waste haulers will then be directed to the appropriate disposal area.

3.6.2.2 Waste Inspection

The checking of waste entering the facility is crucial to the safe and correct operation of the landfill. The site operator should carry out random checks of the waste entering the facility and random waste inspection in the disposal area. The following methods are employed to minimize the quantity of unacceptable waste which is disposed at the site and to direct the waste hauler to the correct disposal area:

- Site operators will be watchful for unacceptable or potentially hazardous wastes during unloading;

- Site operators shall receive training to assist in recognizing unusual, un-acceptable, and hazardous wastes;

- When personnel encounters suspect waste in the disposal area, landfilling shall cease until the material is segregated and appropriate action is taken;

- The Site Operator will inform the hauler that a random check is to be performed. If the hauler refuses, the vehicle will not be permitted entry to the site, and will be selected for a check on its next visit. The Site Operator will record as much information as possible about haulers who refuse a random check;

- The selected hauler will be directed to an area near the active landfill area that is separate

from all other incoming waste. Prior to dumping, the driver of the inspected vehicle will confirm the absence of unacceptable materials. An inspector (the Site Operator or a delegate) will examine the load for hazardous or unacceptable wastes. Completion and results of the inspections shall also be noted in the daily checklist.

3.6.2.3 Handling Unacceptable Waste

Unacceptable wastes may be classified as non-hazardous, potentially hazardous or unacceptable, and, depending on the time of discovery, may or may not be associated with a known hauler. DOE will be notified of all attempted deliveries of unacceptable waste. Once a waste is suspected to be hazardous or unacceptable, the onus is on the hauler to demonstrate otherwise, or remove the waste, at their expense. Repeat deliverers of unacceptable or hazardous wastes may be banned from the site at the discretion of and for a period determined by the Site Owner.

3.6.3 Refuse Disposal Area

The municipal refuse disposal area is the largest area at the landfill. Residential, restaurant, institution, store and construction wastes are placed here. The site is surrounded by drainage ditches which transport runoff off-site. This area is also surrounded by berms and fencing to minimize windblown debris. The active disposal area (area where waste is dumped daily) compacted and covered daily. The following sections describe the operation of the municipal refuse disposal area of the landfill.

3.6.3.1 Waste Placement

The Site Operator should maintain a defined active tipping face using portable signs and portable barricades. The waste haulers should be directed to the active tipping face. The active disposal area size should be minimized to reduce exposure of the waste to water, wind, odour, and birds.

Where feasible, construction and demolition wastes which may be reused (such as lumber) should be segregated for reuse by the public. Scavenging of this waste will be supervised by the site operator in designated areas.

3.6.3.3 Compaction & Cover Operations

The active waste area is compacted regularly to maximize density (thereby minimizing the disposal area), minimize cover requirements, and reduce bird attraction and odour.

The compacted waste area is then covered with soil to minimize the problems of odour, birds, and flies. Soil cover also ensures rapid surface drainage from the finished surface, thereby reducing infiltration and subsequent leachate production. As well, the weekly cover serves as a break between cells in the event of accidental fire.

The following is a summary of waste compaction & covering procedures at the refuse disposal area of the Iqaluit landfill facility.

A minimum of once a day, a compaction and cover cycle for the waste is to be conducted at the landfill. Using the sheeps foot compactor drive over the waste 3-5 times after each layer has been placed. Always drive in an up and down direction to avoid toppling over. Using the sheeps foot compactor or a bulldozer push the garbage up the berm a little at a time and compact the waste. Only drive up and down the working face, not along the sides. Waste should be compacted to approximately to 1/4 of its original volume. Alternate between dumping and packing garbage until the packed garbage is approximately 1.5m high.

Cover the compacted waste with a minimum 150 mm of the cover material (mulch of wood, furniture, mattresses and plastic). Cover waste once per week during the summer months and once per month during the winter. Each layer of solid waste and cover material will be sloped towards the collection ditches to allow drainage. A compaction and covering cycle is to be completed in the fall to prepare for the onset of winter.

3.6.4 Bulky Waste Area

Large items such as automobiles, snowmobiles, old furnaces, appliances, holding tanks, and tires are placed in the bulky waste disposal area. Runoff from this area is directed into the main collection ditch through a drainage swale.

To ensure effective operation of the bulky waste disposal area:

- Place bulky wastes in an organized manner, starting from the back of the site and working towards the front;
- Stack and collapse bulky wastes whenever possible to conserve space;
- Ensure that wastes are stacked in such a way that it is safe to walk through the site;
- Hazardous materials associated with bulky waste such as fuel or ozone depleting substances must be removed by the waste generator prior to disposing the material at the landfill;

- These wastes do not need to be covered however fill material may be required to advance the driving surface.

3.6.5 Hazardous Waste Area

Hazardous waste materials which are household in origin or are disposed by the City of Iqaluit are to be treated or stored in the hazardous waste disposal area. Hazardous wastes from commercial/industrial sectors will not be accepted at the landfill. In accordance with the Nunavut Waste Guidelines all hazardous waste generated by commercial and industrial activities are to be demobilized south by the waste generator.

The hazardous waste storage area has 5 sea lift containers for storage of wastes. This area is surrounded by fence and has a separate gated entrance from the main road.

Due to the danger of handling hazardous wastes, the handling, packaging, storage, treatment of the wastes should only be completed by personnel trained in Transportation of Dangerous Goods (TDG) and/or Hazardous Waste Management and WHMIS.

3.6.5.1 Hazardous Waste Definition

Hazardous wastes as those wastes which, due to their nature and quantity, are potentially hazardous to human health and/or the environment and which require special handling and disposal techniques to eliminate the hazard. A hazardous waste includes products, substances or organisms which, by their nature, satisfy the requirements of being a dangerous good as defined in the Federal Transportation of Dangerous Goods Act. The Transportation of Dangerous Goods Act recognizes nine classes of dangerous goods which are considered hazardous.

Those products, substances, or organisms that would be considered hazardous generally include the following Classes of waste as defined in the Transportation of Dangerous Goods Act.

- Class 1 - Explosives
- Class 2 - Compressed gases
- Class 3 - Flammable and combustible liquids
- Class 4 - Flammable solids
- Class 5 - Oxidizing substances
- Class 6 - Poisonous, toxic and infectious substances
- Class 7 - Nuclear substances
- Class 8 - Corrosives
- Class 9 - Miscellaneous products, substances or organisms that may pose a risk to life, health, property or the environment

Typical household hazardous waste which can be expected to be stored at the landfill includes:

- Cleaning Products (oven cleaners, drain cleaners, bleach, spot remover)
- Paints and Solvents (oil-based paints, thinners, paint stripper)
- Automotive Products (antifreeze, motor oil car batteries, brake fluid, transmission fluid)
- Pesticides and herbicides
- Small propane tanks & cylinders (Barbeque tanks)
- Miscellaneous Hazardous Materials (household batteries, photographic chemicals, pharmaceuticals, aerosol sprays)

3.6.5.2 Hazardous Waste Collection

A household hazardous waste collection program will consist of 4 days of house hold hazardous waste acceptance once per year. The citizens will bring their household hazardous wastes to designated areas for collection and preparation for disposal. After each collection event the wastes will be recycled for future reuse, neutralized on site, or stored at the hazardous waste collection area at the landfill.

Household hazardous wastes dropped off by individuals at the landfill will also be placed in the hazardous waste area.

Any known hazardous wastes spotted in the general refuse area of the landfill will be relocated to the hazardous waste area by trained personnel.

3.6.5.3 Hazardous Waste Storage

The accumulated household hazardous wastes shall be placed in the on-site storage containers by trained personnel. Once the wastes have accumulated a significant volume, they will be prepared and shipped to a southern disposal facility.

The hazardous waste collection and storage depot will have to be registered, licensed, and approved by the Department of Environment, Environmental Protection Service.

The site operator should be trained in WHMIS (Workplace Hazardous Material Information Sheet) and Transportation of Dangerous Goods (TDG) and/or Hazardous Waste Management. The current Material Safety Data Sheets (MSDS) must be kept on site for all products stored at the site. Supplier or workplace labels must be placed on all containers which hold a hazardous waste.

Factors to be considered when storing hazardous waste include compatibility, segregation, ventilation, climate/environment, handling, security, labeling, record keeping, and emergency response. The following summarizes some of the factors to be considered when dealing with hazardous wastes.

Compatibility

The compatibility between different types of hazardous wastes stored in the same storage container must be considered before storage. The compatibility of wastes with materials and equipment which is stored nearby is also very important, particularly when dealing with flammable wastes. The compatibility of wastes with their storage containers must also be considered. The site operator should review the WHMIS for this information.

Segregation

The final destination of hazardous wastes should be considered before storage. If future recovery may be possible, storage of the material should allow for such recovery.

Ventilation

Hazardous wastes may present a serious health hazard in storage and should therefore be well ventilated. Volatile materials in particular should be considered. Since sealift containers do not accommodate proper ventilation, the site operator must ventilate the storage container before entering.

Ventilation should consist of opening the access doors one hour prior to entering. An observer should be present upon entering to ensure that the operator is not overcome by fumes. The observer must have access to communication in the event of an emergency.

Climate/Environment

Contact between hazardous wastes and rainwater and soil must be prevented, and wastes should not be exposed to direct sunlight. For outside storage of hazardous wastes, containers should be covered by a tarpaulin and placed on an impermeable base. This should also facilitate and reduce the cost of clean-up for any spills or leaks. The containment area should be curbed and diked to collect spills, leaks and precipitation.

Handling

Handling of hazardous wastes should be in accordance with WHMIS guidelines. The site operator should obtain WHMIS information for materials accepted at the site. The Transportation of Dangerous Goods Regulations must be followed when transporting the wastes off site.

Security

Security precautions should be taken to avoid theft, accidental discharge, and any possible harm to the public. The gate to the hazardous waste storage area should be locked at all times except when the operator is working in the hazardous waste area. Sealift containers must be closed and locked when access is not required.

Record Keeping

A record of the types and quantities of hazardous wastes must be maintained in a log book to ensure safe storage. Containers must be properly labeled during the entire time in storage. If this is not carefully completed then there could be problems identifying the waste when it is time to ship it south for disposal.

Record keeping should also include ongoing quantity totals and dates received. Since relatively small quantities of materials are expected to be delivered to the site, individual lists for each material will be worthwhile.

As a minimum record keeping should include the following:

- type of waste received
- quantity received
- dates received
- name of person/company who disposed the waste if available
- method of storage/disposal
- on-going total quantity for each type of waste

Emergency Response Plan

An emergency response plan should be developed in case of a significant spill, fire, or other emergency. The depot should also be equipped with an emergency spill kit and fire suppression equipment.

3.7 NUISANCE CONTROL

3.7.1 Litter Control

Litter can be a significant problem at municipal solid waste disposal sites. Litter control is best accomplished by a combination of proper disposal operations, litter retaining fences, and a litter picking program. A clean, litter-free appearance should be maintained at the site at all times, not only for public relations, but also for efficient operation of the landfill. Poor litter control attracts unwanted scavengers and contributes to surface drainage problems by blocking ditches and culverts.

In summary, litter control measures include:

- Covering of wastes in the active disposal area;
- Litter collection fencing is located around the perimeter of the site to catch blowing litter;
- A litter collection directed by the Site Operator;
- Litter on fencing, on site roadways, in ditches and adjacent properties is monitored and collected on a minimum weekly basis.

3.7.2 Odour Control

Odours will be controlled at the facility by implementation of the following daily measures:

- Regular soil cover shall be applied at the active disposal area;
- Routine site inspections to identify and eliminate localized surface water ponding and/or surface water drainage problems.

3.7.3 Bird Control

Solid waste disposal facilities attract birds due to the availability of food. This landfill facility is within the airport buffer zone and therefore bird control is very important. Control measures to minimize the presence of birds shall include:

- Collecting litter daily;
- If this does not seem to minimize the amount of birds in the area then a noise device such as propane cannons and electronic screechers may be required to discourage

birds from the site.

3.7.4 Indiscriminate Dumping

Waste will be disposed at designated areas at the facility (i.e., bulky waste, hazardous waste areas or disposal area) only. When indiscriminately dumped materials are discovered, they will be immediately relocated to the appropriate designated area.

3.8 SAFETY CONSIDERATIONS

Due to the nature of the facility, safety precautions should be taken by those personnel involved in the operation and maintenance of the landfill. All personnel should be familiar and abide by the **City of Iqaluit Occupation Health and Safety Program** which contains information such as training requirements, personal protective equipment requirements, WHMIS & Transportation of Dangerous Goods, Chemical Storage & Fire Protection, and First Aid. All personnel should be familiar and abide by the **Nunavut Safety Act and Regulations**.

Some of the safety precautions which landfill personnel should follow include:

- Water and puncture proof gloves, coveralls, and safety boots are to be worn at all times,
- Eye Protection and hard hats are recommended;
- Work clothes should not be worn home;
- Hands are to be washed frequently, as a minimum after work and before eating;
- An appropriate fire extinguisher and a No. 1 First Aid Kit should be available at the site operators buildings;
- Personnel should receive appropriate vaccinations and ensure they are kept up to date;
- Proper lifting techniques should be exercised, lift with your legs and not your back;
- **Only personnel trained to handle hazardous materials should do so.**

Management is responsible to maintain an effective health and safety program, and provide the equipment, materials and training necessary to promote safe work practices and environments.

Supervisors are responsible to ensure that workers are supplied with the proper equipment and materials to conduct work safely, and to ensure that workers are trained in and follow established safe work procedures.

It is the duty of every worker to assume responsibility for their own safety by complying with legislative, company and industrial standards as well as the prompt reporting of all unsafe acts or conditions to supervisors to ensure immediate action and resolution.

3.9 RUNOFF MONITORING PROCEDURES

The deep collection ditch located at the south east end of the landfill will be used for both surface water and leachate water collection and sampling. This ditch has a control valve which can be closed to prevent water from leaving the site and which shall remain closed except in exceptional circumstances. All leachate collected in this ditch shall be collected periodically, as required, and dumped in the sewage lagoon.

4.0 MAINTENANCE PROCEDURES

Proper maintenance of a landfill is crucial to ensuring the efficient operation of all the components. Items which require maintenance procedures include:

- Site Equipment;
- Site Infrastructure;
- Site Services.

4.1 SITE EQUIPMENT

The solid waste equipment which requires regular maintenance includes, but is not limited to, the on-site storage containers, heavy equipment, waste collection vehicles, and residential waste containers.

Storage Containers/Sea Lift Containers

The storage containers should be inspected regularly by the operator to observe signs of deterioration, leakage, or spills. Storage containers must be organized and all wastes must be properly labelled. The log book should be kept on site and shall be up to date. Any problems should be immediately reported to the Public Works Foreman.

On-site Heavy Equipment

Regular vehicle maintenance is to be performed on all on-site equipment. This should include but is not limited to regular:

- oil changes
- fluid changes
- checking of tire pressure

- greasing
- brake pad replacement
- cleaning
- periodic maintenance requirements as set out by the equipment manufacturer.

Collection Vehicles

Garbage collection is conducted from Monday to Friday. Residential collection is provided twice per week utilizing a 20 yd^3 packer truck with a 3 person crew. The crew collects approximately 2 truck loads per day, 5 days per week. Commercial and institutional collection is provided by a separate 2 person crew with a 24 yd^3 packer truck. The crew collects approximately 2 truck loads per day, 5 days per week.

The waste collection vehicles should be maintained in good operating condition to ensure the collection service is not interrupted for extended periods. Other maintenance considerations include the following:

- The collection vehicles should be equipped with a shovel to clean up accidental spills during collection;
- The collection vehicles should be cleaned periodically.

Residential Waste Storage Containers

As the first step in the waste collection process, residential and commercial waste storage containers should be adequately maintained. The following points should be considered:

- Garbage containers should be covered to prevent wind blown debris from littering the community and to prevent animals from getting into the garbage;
- Bulky wastes should not be left in residential areas for long periods due to aesthetic and safety concerns.

4.2 SITE INFRASTRUCTURE

The landfill facility infrastructure which requires regular maintenance includes, but is not limited to, the building, access roads, ditching, fencing, beams, and signs.

Building

The landfill operator building should be inspected regularly by the operator to observe signs of building deterioration or problems with services such as heating, lighting, lavatory, phone, etc. Any problems should be immediately reported to the Public Works Foreman.

Access Roads

Basic road maintenance is to be conducted on the gravel access and site roads as follows:

- As required, the roads are to be graded to smooth and reshape the surface;
- Pot holes can be filled with stockpiled materials;
- A good granular base is to be maintained on the roads;
- Wastes fallen from collection vehicles should be removed from roads daily;
- As necessary during the winter, snow is to removed to ensure unrestricted access to the site for the garbage collection vehicles.

A spring clean-up is to be conducted after the snow has melted to collect waste that has accumulated around the City over the winter. A spring clean-up of the landfill site and roads should also be conducted.

Drainage Ditches

Culverts have been installed at road crossings and a main culvert with a control valve is located at the southeast berm to control drainage from the site. Water that comes in contact with the waste mass, is collected within the waste cell. The following weekly maintenance should be conducted on the culverts and ditching to ensure the site drains as intended and to prevent unwanted pooling of water:

- Culverts are to be inspected to ensure they have not become blocked;
- Obstructions are to be removed to ensure drainage is unrestricted;
- Ditching is to be inspected to assess the need for cleaning or litter pick-up.

Fencing

A 1.8 m high fence is in place around the perimeter of the landfill. The fence serves the dual purpose of restricting public access to the site and reducing the migration of windblown debris out of the landfill area. On a weekly basis, the following maintenance procedures should be carried out on the fence:

- Wind blown material should be removed from the fence to reduce lateral loading and to improve the aesthetics of the site.

On a monthly basis, the following maintenance procedures should be carried out on the fence:

- The fence should be examined for holes in the mesh,
- The fence posts should be inspected for frost heave.

Perimeter Berms

The perimeter berms of the landfill should be inspected regularly during summer months to ensure there is no erosion and to remove any waste which may have accumulated along the berms. Any problems should be immediately reported to the Public Works Foreman.

Sign Maintenance

A sign shall be posted at the entrance to the site to identify the different disposal areas at the facility and to outline permissible dumping practices for each. The separate disposal areas are to be identified with their own signs. A warning sign indicating the potential hazards associated with the site is also to be located at the entrance.

On a monthly basis, check to insure the signs are present, have not become obstructed and are readable.

Signs and barricades within and adjacent to the site should be inspected regularly for damage and wear and to ensure they have not become obstructed. Any problems should be immediately reported to the Public Works Foreman.

4.3 SITE SERVICES

Power and telephone services are to be inspected regularly to ensure poles or lines are not damaged.

Site lighting is to be inspected monthly and broken lights are to be replaced immediately.

Any problems with site services should be immediately reported to the Public Works Foreman.

5.0 SITE RECORDS

Records should be kept to assist in planning for yearly operations and future expansion. The information should be reviewed yearly to evaluate the effectiveness of the operation and to forecast future operational requirements. The records should be kept in the Landfill Site office and maintained by the Landfill Operator. The records should be summarized and presented to the Public Works department. As a minimum, the following information should be recorded:

1. **Incoming Material Quantities** - It is recommended that all materials entering the Landfill be recorded for general type and approximate quantity of waste. This information can be used for determining waste compaction values, soil to waste ratios, trends in waste generation, and general quantification of the waste stream. This information is to be summarized in the monthly waste reports.

2. **Correspondence** - A filing system shall be maintained to keep any correspondence associated with site operation, as well as any written complaints (i.e., noise, litter, odour) which may be received, this information is to be summarized in an annual report.

3. **Financial** - Complete records of budget forecasts and actual expenditures must be maintained for the operation. This information is to be summarized in an annual report, as well as forecasts for the upcoming year.

4. **Site Operations Log** - A daily log describing location of landfilling, quantity of waste placed, and cover requirements, shall be maintained. The log shall also include items such as road work, ditching work, any unusual operation events (i.e., arrival of unacceptable wastes). The site log will consist of the daily and weekly checklists (see **Appendix A**). Other operations forms, including weather logs, waste inspection forms, complaint forms, can also be incorporated into the site log. It is recommended that the log itself take the form of a binder, allowing for the easy addition of documentation. The landfilling log will be held and maintained by the Site Operator. The following should be recorded for the disposal areas:

   Refuse

   - Number of loads per day and approximate volume of waste per load.
   - Dates of compaction and cover.
   - Weekly record of the area filled with waste in order to track the progress of the landfill cell.

   Bulky Wastes

- Itemized list of the site contents,
- Number of trips to the site and the dates,

Hazardous Wastes

- Maintain an up to date list of the contents in each sea lift container and storage area,
- Maintain a list of waste disposed daily including:
  - type of waste disposed;
  - date;
  - by whom;
  - quantity;
  - type of container;
  - area it is to be stored or disposal method used.

5. **Weather** - Records relating to temperature, wind conditions and precipitation shall be recorded daily using a standardized form (see **Appendix A**).

6. **Disposal Area Development** - A weekly log of the location of the active landfill area should be maintained.

7. **Surface Water Monitoring** - A database of all surface water monitoring results shall be maintained at the site office and with the Director of Public Works. This information is to be included to the annual report to the Water Board.

8. **Sediment Control** - Documentation shall be maintained of surface water control measures, including ditch construction, dam/trap installation, and operation of the ditching control valve.

9. **Bird Control** - If control measures are undertaken, all activities are to be recorded on the daily and weekly checklists.

10. **Reports** - As directed by the Site Owner, written facility reports shall be prepared by the Site Operator. The following reports shall be prepared:

- Daily Logs;
- Weekly Activity Reports;
- Monthly Summary Reports;
- Annual Report.

6.0 OPERATIONS AND MAINTENANCE SUMMARY SCHEDULE

This section offers a summary of the requirements on a daily, weekly, monthly, semi-annual, and annual basis for the landfill. It is intended for use as a quick reference only and does not encompass any detailed information. Supporting sections of the Manual should be referred to for further details.

Daily O&M Summary

- Collect waste from the City and transport to the landfill;
- Ensure all wastes are disposed of and stay in designated areas;
- Log the quantity and types of waste entering the facility;
- Divert recyclable/salvageable wastes away from disposal area when possible;
- Conduct random checks of the waste entering the facility;
- Clean up any spills immediately;
- Pick up any wastes which have been dumped along the access roads or in improper areas;
- Move household hazardous wastes to the hazardous waste area, log wastes, and properly store wastes;
- Clear snow from roads and disposal areas as required;
- Lock both gates at end of day;
- Ensure the hazardous waste area gate is locked at all times when unattended;
- Ensure positive drainage from the active landfill area;
- Complete daily log summarizing landfill operational activities and waste volumes.

Weekly O&M Summary

- Pick up windblown materials which have migrated along fencing, on site roads and access road, past the boundaries of the landfill, etc;
- Inspect the site ditching, culverts, and control valve assessing need for clean-up or clearing;
- Inspect the mobile equipment, assessing the need for maintenance. Check tracks/tires for debris;
- Inspect the waste storage containers for signs of deterioration, leakage, or waste spills;
- Complete a weekly activity summary report including:
    - volume and types of wastes;
    - area developed;
    - days of cover;
    - site maintenance and litter control;
    - problems encountered;
    - weather;
    - other pertinent info.

Monthly O&M Summary

- Compact waste material of the active area and cover with soil;
- Grade and maintain access roads;
- Conduct monthly surface water runoff monitoring from June to October;
- Maintain a copy of the results of runoff analysis for inclusion in the monthly summary report;
- Inspect the berms for excess erosion during summer months;
- Inspect the fencing for holes and frost heave;
- Inspect the sediment control structures to ensure they are in tact;
- Take inventory of the supplies within the first aid kits and other safety equipment, replenishing as necessary;
- Take inventory of supplies including stockpiled soil, replenish as necessary;
- Check for litter around building, roads, and ditching;
- Inspect site lighting and replace broken lights;
- Check to ensure signs have not been obstructed;
- Conduct required maintenance on on-site heavy equipment and waste collection vehicles;
- Compile the weekly reports into a monthly summary report and submit to the Director of Public Works. Monthly Reports should summarize the weekly report information and any of the O&M activities completed during the month.

Semi-annual

- Review emergency procedures twice per year,
- Inspect site building for problems.

Annually

- Qualified persons shall inspect the site building and storage containers,
- Review O & M records to assist in planning for the upcoming year,
- Review employee training records to ensure all courses are up to date,
- Ensure employee vaccinations are current,
- Order safety equipment,
- Conduct a landfill audit to ensure that all operational & maintenance procedures are being conducted in accordance with the plan,
- Maintain equipment,
- Inspect site services,
- Complete an annual facility operational report which is submitted to the Nunavut Water Board.

7.0 EMERGENCY RESPONSE

Emergency procedures must be available in the site building at all times. The procedures should be reviewed a minimum of twice per year by landfill operators and the director of public works to ensure employees are familiar with procedures and to make the required changes.

Due to the nature of the facility, uncontrolled fires and spills of unknown materials should be treated with extreme caution. City personnel responsible for solid waste facilities should be trained in:

- Workplace Hazardous Materials Information System (WHMIS),
- Transportation of Dangerous Goods (TDG) and/or Hazardous Waste Management,
- Emergency Response First Aid, and

- City of Iqaluit Occupation Health and Safety Program.

7.1 EMERGENCY CONTACTS

FIRE DEPARTMENT	**979-4422**
RCMP	**979-1111**
AMBULANCE	**979-4422**
CITY DISPATCH	**979-5650**
Director of Public Works	975-8509
SAO	979-5666
24 hour Spill Line	867-920-8130

7.2 FIRE

A contingency plan should be developed by the City Fire Department for responding to a fire at the solid waste disposal site. Special precautions should be implemented as burning refuse can produce poisonous vapours.

If fire is small, it may be fought with an extinguisher **AFTER** notifying fire department, or as an immediate action if the fire may be extinguished safety and with certainty.

Surface Fire

If a surface fire spreads out of control, the following procedures should be conducted:

- Evacuate area around landfill immediately,
- Keep all personnel up-wind of site,
- Notify the City Fire Department at 979-4422,
- Notify the Public Works Foreman.

Subsurface Fire

Subsurface fires should be assessed for danger and may be treated as an emergency. If a subsurface fire is suspected the **following procedures should be conducted:**

- Evacuate area around landfill immediately,
- Notify the City Fire Department at 979-4422,
- Notify the Public Works Foreman,
- Trained personnel should investigate the extent of the fire by excavation,
- Remedial action may involve excavating the burning materials and extinguish on the surface or may require isolation of the burning area with cut-off ditches and flooding the area with water.

7.3 SPILLS

Spills of unknown substances at the landfill should be treated with extreme caution. Spilled materials should only be handled by properly trained and equipped personnel. The following actions should be undertaken by personnel in the event of a hazardous materials spill at the landfill:

- **Be alert and consider your personal safety first;**
- **Assess the hazard to persons in the vicinity of the spill and where possible take action to control danger to human life. If possible, identify the material or products spilled;**
- **If the spill creates a fire, explosion or other hazard to human life, remove all potential ignition sources, if possible evacuate the area and contact the RCMP 979-1111, and the Fire Department, 979-4422;**
- **If safe and practical, try to take appropriate action to stop the release material;**
- **Contact the Public Works Foreman and report the spill;**
- **Mark the spill scene to warn public and prevent access.**

Once contacted the Public Works Foreman shall:

- Proceed to the spill location;
- Make necessary arrangements for first aid and removal of injured personnel;
- Take necessary action, where possible, to secure the site to protect human safety;
- If not already done so and if it is safe to do so, take the appropriate action to stop the flow or release of material. If at all possible take the necessary action to contain or prevent the spread of spilled material;
- Contact the 24-hour spill line at (867) 920-8130;
- Contact the City CAO, 979-5666;
- Contact the Fire Department if required, 979-4422.

Throughout the spill response, personnel should place their personal safety as the highest priority.

7.4 ACCIDENTAL INJURY

In the event that a serious accident occurs on the landfill site, the operator should report it to the city dispatch **979-4422 or 979-5650** who will decide the appropriate response.

8.0 REFERENCES AND RELATED STUDIES

Dillon Consulting Limited, 2001, *Municipality of Iqaluit, Landfill Facility Expansion Preliminary Design Report.*

Dillon Consulting Limited, 2000, *Fort Simpson, NT, Solid Waste Facility Operation and Maintenance Manual*.

Golder Associates and JL Richards Associates, 2000, *Solid Waste Management Planning Study Municipality of Iqaluit.*

Dillon Consulting Limited, 1999, *Baker Lake, NT Sewage & Solid Waste Disposal, Operation and Maintenance Manual*.

Kent, R., Marshall, P., & Hawke, L., 2003, *Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories*. Produced for MACA.

UMA Engineering Ltd, 1994,*Town of Iqaluit Landfill Operation and Maintenance Manual for Site 3 in West 40.*

Nunavut Bureau of Statistics, 2000, *Nunavut: Community Population Projections 2000-2020.*

Heinke, G.W. and Wong, J., 1990, *Guidelines for the Planning, Design, Operation and Maintenance of Solid Waste Modified Landfill Sites in the Northwest Territories, Volume I - Planning and Design, Volume II - Operation and Maintenance* Produced for MACA.

NWT Public Works and Highways, 1987, *Specifications for Operations and Maintenance Manuals.*

APPENDIX A
Sample Forms

THE CITY OF IQALUIT
WEST 40 LANDFILL CELL #1

FACILITY DAILY OPERATIONS CHECKLIST
***to be completed daily* with Daily Weather Log**

Date:

(A) Morning (Beginning of Working Day) Completed by:

Item	Acceptable Condition? (Y/N)	Comments/Action
1. Dozer		
2. Hazardous Waste Area		
3. Site Entrance		
4. Site Roads		
5. Building		
6. Active Disposal Area		
7. Ditching & Control Valve		

Other Issues/General Comments:

(B) Afternoon (End of Working Day) Completed by:

Item	Information
1. Active Area Location	
2. Total Landfilled Volume	
3. Major Haulers (names)	
4. Number of Private Loads	
5. Number of Commercial Loads	
6. Hazarous Waste Volume and Type	
7. Total Diverted Volume (i.e. recyclables, salvageable metals, tires, processable C/D)	
8. Litter Pick-up	
9. Snow Clearing	
10. Gates Locked	
11. Waste Burn	
12. Spill Clean-up	

Other Issues/General Comments:

THE CITY OF IQALUIT
WEST 40 LANDFILL CELL #1
DAILY WEATHER LOG

Log Completed on: _____ _____ _____ Time: _____
Day Month Year

Log Completed by: _____

Weather Record for: _____

Temperature: High _____C Low _____C

Wind Velocity: _____km/h

Precipitation Accumulation	Cloud Cover
☐ Rain mm	☐ Sunny
☐ Freezing Rain mm	☐ Partly Sunny
☐ Snow mm	☐ Partly Cloudy
☐ Other units	☐ Cloudy

Action Required Due to Weather Conditions	Personnel Required	Comments
☐ Snow Removal		
☐ Road Sanding/Salting		
☐ Dust Control		
☐ Litter Control		
☐ Slope Stabilization		
☐ Ditching		
☐ Equipment Servicing Description		
☐ Other (Specify)		

THE CITY OF IQALUIT
WEST 40 LANDFILL

DAMAGE WAIVER

In requesting assistance from the City of Iqaluit in aiding a disabled or immobilized vehicle or trailer at the Landfill Facility, I HEREBY WAIVE all claims against the City and its staff for damage or loss caused by the disablement or immobilization, or attempted or actual release from same.

PLEASE PRINT:

Vehicle Type: _____

Vehicle License Plate: _____

Nature of Difficulty: _____

OWNER/OPERATOR:

Signature: _____

Date: _____

Print Name: _____

THE CITY OF IQALUIT
WEST 40 LANDFILL CELL #1

Complaint Response Form

Complainant: _____ **Date Received:** _____

Repeat Complainant* (Y/N): _____

Address: _____ **Time Received:** _____

_____ Received By: _____

Phone No.: _____

Date of Complaint: _____

Time of Complaint and Noted Weather Conditions: _____

_____

Delivery of Complaint: ☐ **Phone Call** ☐ **Letter** ☐ **Personal Visit**

Nature of Complaint: _____

_____

_____

_____

Suggested Response: _____

_____

_____

_____

Actions Taken: _____

_____

_____

_____

Complaint Received By (Sign & Date): _____

Written Acknowledgement By (Sign & Date):

*: i.e., has this individual previously lodged a complaint regarding operations at the facility?

THE CITY OF IQALUIT
WEST 40 LANDFILL CELL #1
FACILITY WEEKLY OPERATIONS CHECKLIST
to be completed with reference to the Daily Facility Checklists

Checklist for Week Ending: Completed by:

Date Completed:

Item	Actions Taken, Days Completed, Condition	Comments/Action
1. Dozer & Equipment Inspection/Maintenance		
2. Litter Control		
3. Bird Control		
4. Snow Removal		
5. Site Entrance		
6. Site Roads Maintenance		
7. Building		
8. Waste Burning		
9. Sediment Control Measures		
10. Surface Water Ditches & Control Valve		
11. Fire Safety Equipment		
12. Health and Safety Procedures		
13. Waste Placement (Location)		
14. Waste Compaction		
15. Soil Cover		
16. Surface Water Monitoring		
17. Weekly Landfilled Volume		
18. Weekly Diverted Tonnage		
19. Unacceptable Loads		
20. Personnel		
21. Complaints		
22. Hazardous Waste Area Inspection		
23. Berm Inspection		
24. Fence Inspection		
25.		
26.		
27.		
28.		
29.		

Other Issues/General Comments:

THE CITY OF IQALUIT
WEST 40 LANDFILL CELL #1

WASTE INSPECTION/ATTEMPTED DELIVERY
OF UNACCEPTABLE WASTE FORM (1)

PART A - INSPECTION

Date/Time of Delivery: _____

Date/Time of Inspection: _____

Hauling Firm/Vehicle Owner: _____

Driver's Name: _____

Contact Phone Number: _____

Vehicle License Plate: _____

Size of Load (i.e. tonnes, cubic metres): _____

Source of Waste (as stated by Driver): _____

Type of Waste (as stated by Driver): _____

Inspection Location: _____

Inspection Observations: _____

Suspected Unacceptable Wastes? (Yes/No; if Yes, complete Part B)

PART B - SUSPECTED UNACCEPTABLE WASTE

Suspected Type of Unacceptable
Waste: (as stated by Inspector): _____

Action Taken: _____

Comments: _____

Inspector	Driver
Signature: _____	Signature: _____
Date: _____	Date: _____

Inspector: Write "refused" in space for driver's signature if driver refuses to sign form.

Notes:
(1) Random inspections of incoming loads are to be conducted on a minimum monthly basis. Site personnel, however, are to be observant for unacceptable wastes at all times.