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Executive Summary

The Greater New Bedford Regional Refuse Management District is a rare example of regional cooperation providing a needed municipal service: solid waste disposal and a robust recycling program. Community leaders in two municipalities resolved complex regulatory and financial issues to make the Crapo Hill Landfill a reality in 1995. The District has always sought to implement innovative technical solutions and be in the forefront of pursuing developing technologies. The Landfill staff is cross-trained, rotating jobs daily to achieve maximum efficiency, and is actively engaged in the Landfill’s community. The District believes the Landfill should not be an aesthetic burden and that its neighbors have the right to quality living conditions. Ending every year with a positive balance, the Landfill’s operation offers very low disposal costs for member communities and favorable rates for commercial waste. The District has protected its future from encroachment by purchasing 430 acres of surrounding land. The Landfill is now in its 15th year of operation with a life span of at least 30 years, 50 percent more than originally expected. The remarkable success of the Landfill is due to excellent management, efficient use of space, and capturing landfill gases which generate 3.3 megawatts of electricity.

Section 1: Design & Construction

Site Preparation & Design

The Crapo Hill Landfill is owned and operated by the Greater New Bedford Regional Refuse Management District (the District). It is the result of more than twenty years of planning, design and collaboration between the City of New Bedford and the Town of Dartmouth. The District is a regional refuse disposal district formed in accordance with the General Laws of Massachusetts Chapter 40, Sections 44A-K, an Inter-municipal Agreement signed in 1979, and special legislation in 1980. The District is governed by three representatives from Dartmouth, appointed by the Select Board, and three representatives from New Bedford, appointed by the Mayor and confirmed by the City Council.

The District was formed with the purpose of constructing and operating the Crapo Hill Landfill as a foundation for a long-term solid waste management solution for the 130,000 residents and businesses of the member communities. The Landfill and the administrative offices are located in Dartmouth, Massachusetts. Access is provided via Samuel Barnet Boulevard, which passes through the New Bedford Business Park. The Landfill is permitted to accept 115,000 tons per year, and currently accepts about 385 tons per day.

The site was chosen after a comprehensive analysis of regional sites because of its favorable location away from municipal water supplies and advantageous geologic conditions, as the site is underlain by low permeability glacial till. In the early 1980s, an environmental impact review was performed in accordance with the Massachusetts Environmental Policy Act (MEPA). The analyses for that review included geologic and hydro-geologic evaluations, assessments of wetlands and wildlife at the site, and other potential project impacts. After a thorough public review process that engaged the member communities as well as neighboring communities, MEPA approved the project to proceed with detailed designs and permitting.
In 1983, the Dartmouth Board of Health assigned the property for use as a sanitary landfill. This action provided further local endorsement of the project and established parameters for the next phase of project development, including detailed engineering designs and permits from the Massachusetts Department of Environmental Protection (MassDEP). The MassDEP approved the landfill design in 1986, but the District did not proceed immediately with construction. The MassDEP subsequently made major changes to its solid waste regulations, and as a result, the technical design was revised and a new permit application was filed with the MassDEP in 1992. A final permit, allowing construction of the Landfill, was issued in January 1993.

The Landfill property is 152 acres in size and is located in the northeast corner of Dartmouth, adjacent to the Freetown and New Bedford town boundaries. Within one-half mile of the property are agricultural land uses, a dozen commercial and industrial establishments and approximately 70 residential homes. The agricultural uses include hay fields and active cranberry bogs. The residences in Dartmouth and Freetown are served by on-site private wells and septic systems, and the commercial and industrial businesses in the New Bedford Business Park have access to municipal water supply and sewer services.

**Site Soils & Geology.** There are two general soil types at the site, at different locations and depths below the ground surface. A dense layer of glacial till, referred to as basal till, is present on the surface of the bedrock underlying the site. In some areas this basal till rises to the surface. The basal till is glacial in origin; it is comprised of unstratified and unsorted pieces of rock and pre-existing soils scoured from the bedrock by the Pleistocene ice sheet that once covered all of New England, and deposited as the ice sheet advanced across the site. The basal till is a very densely packed mixture of varying amounts of gravel, cobbles and boulders. The presence of the basal till enhances the suitability of the site, since it effectively seals the surface of the bedrock. The material was initially evaluated for reuse in the liner system; however, the soil did not fully satisfy the MassDEP’s specifications for liner soils.

The basal till rises from the bedrock surface to within several feet of ground surface in the higher elevations of the site, expressed as drumlins at two or three areas within the property. In other areas, including the western-most portion of the site, there are varying thicknesses of recessional moraine and outwash soils which were deposited by melt water during the retreat of the ice sheet. These soils are comprised of permeable sands and gravels. Bedrock beneath the site is Granodiorite Milford-Dedham granite. It is characterized by its light gray to pinkish, medium to coarse grained granite and greenish gray to black, fine to medium grained schist. Although the bedrock is jointed and fractured to some extent, it has a limited water-bearing capacity. Groundwater flow occurs in the overburden soils and in the bedrock. Flow is in a southwesterly direction, away from residential areas and towards undeveloped land.

**Phase 1 Development.** In 1993, the Crapo Hill site was completely undeveloped and comprised mostly of woodland. Therefore, the initial phase of development had to include the construction of the supporting infrastructure, as well as the initial landfill disposal cells in the Phase 1 area. The District secured $11.4 million in municipal bonds to construct the maintenance building and scalehouse, the Phase 1 cells and to purchase equipment. Construction was completed in December 1994 and the Landfill opened January 2, 1995.
There were several important aspects to the development of Phase 1:

- **Site work: clearing and grading.** Approximately 50 acres of land had to be cleared for the site entrance and access road, the maintenance facility and scale, the Phase 1 landfill itself and a storm water control basin.
- **Site Access.** Although access to the Landfill was along an established road in the neighboring business park, the entrance road on site required crossing a wetland.
- **Replacement Wetland.** Construction of the site access road necessitated filling 4,600 square feet of wetland. In order to mitigate this impact retaining walls were constructed along the edges of the roadway with culverts to allow continued water flow in the wetlands. A replacement wetland area was constructed adjacent to the existing wetland to compensate for wetland area lost due to the roadway.
- **Scale, Scalehouse and Maintenance Facility.** Monitoring the incoming waste and tracking the tonnage accepted at the facility are critical to the operation of the Landfill. A 60-ton vehicle scale and appurtenant scalehouse with observation platform were installed. The Maintenance Facility is a 5,500 square foot metal building that houses both equipment and office space.
- **18.6 acre Composite Liner & Leachate Collection System.** Phase 1 was 18.6 acres in size and provided the first 7 years of disposal capacity. A composite liner meeting the requirements of Sub-title D and Massachusetts solid waste regulations was constructed. Leachate storage facilities included four underground tanks with a combined storage capacity of 60,000 gallons. A paved leachate load-out facility was constructed to allow the transfer of leachate from the tanks into trailers for off-site management.
- **Storm Water Management System.** A drainage swale was constructed around the entire perimeter of the Phase 1 landfill to convey run-off away from the Landfill and prevent run-on into the Landfill. In addition, a storm water retention basin (known as the Meadow Retention Area), with a storage capacity of 13 acre-feet, was constructed to manage run-off discharges from the Landfill and areas surrounding the Landfill.
- **Voluntary Gas Management System.** The District voluntarily installed an active landfill gas collection system, which initially became operational in early 2000. The system was comprised of 11 vertical extraction wells, 4 horizontal collectors, two blowers and an open flare. In 2000, the average landfill gas flow managed at the flare was approximately 600 scfm.

**Phase 2 Development.** In 2000, the District laid out approximately 30 acres for Phase 2 of the Landfill and received a permit for the construction of the first two cells. These cells were built with a double-liner and leak detection system although the regulatory design standards in place at the time did not require this feature. The development of Phase 2 will be completed over a period of 17 to 20 years. Cells 1 and 2 were constructed in 2001, and Cells 3 and 4 were constructed in 2007. Each set of cells provides approximately 1 million cubic yards of landfill volume, enough for 5 to 7 years of landfill operations at about 400 tons per day.

Phase 2 development required additional wetlands replication due to the presence of a small isolated wetland area of 3,940 square feet, located adjacent to the Phase 1 cells and within the boundaries of Phase 2, Cell 1. Therefore, the District retained the services of an ecological consultant to explore alternatives for the relocation of the wetland to a more environmentally advantageous location on the property. Permit applications to reconstruct the wetland were submitted to the MassDEP and the U. S. Army Corp of Engineers.

The location chosen by the ecological consultant was in a wooded upland surrounded by forested wetlands. The new wetland area of 9,200 square feet was excavated to intersect the elevation of the groundwater table, and was shaped to resemble the original wetland with a deep seasonal pool, a shallow pool, and a vegetated shelf. Once excavation was finished, native organic soils were placed and wetland vegetation planted. The vegetation was selected to provide a suitable habitat for local wildlife. In addition to the plantings, hummocks, fallen trees, decaying logs and stones were placed to enhance the habitat. By creating the new wetland near an existing wetland, hydraulic and vegetative continuity could also be assured. **All of the construction was performed by District staff and equipment, and supervised by the ecological consultant.**
Construction of the new wetland was completed in 1998 and was closely monitored by the regulating agencies for a period of five years. Wetter than expected conditions affected some vegetation, but the replicated wetland contains several species found in vernal pools. Replacement vegetation has been carefully selected to match the conditions of the wetland with a good degree of success.

Other aspects in the development of Phase 2 included the following:

- **Leachate Pumping Facility.** In 2000, a duplex leachate pump station was constructed to allow the District to directly discharge leachate into the City of New Bedford’s municipal sewerage system. By doing this, the District could remove four existing underground leachate storage tanks.

- **Leachate Storage Facility.** Also in 2000, the District constructed a 100,000 gallon aboveground leachate storage tank. The tank, fabricated of glass-fused-to-steel panels, is used to store peak leachate flows and allow discharges to the municipal sewer during off-peak hours, if necessary. In the future, the tank may provide storage for a leachate recirculation system.

- **Double-Liner & Leachate Collection System.** All of Phase 2 will be furnished with a double-liner and leak detection system. The details of this system are described in Section 2.

- **Second Vehicle Scale.** An additional 60-ton scale was installed adjacent to the scalehouse to facilitate incoming and outgoing traffic and reduce the potential for truck queueing.

**On Site Environmental Protection**

Most of the landscape in southeastern New England was shaped and influenced by glacial activity during the retreat of the Pleistocene ice sheet approximately 15,000 years ago. The results include bedrock covered by broad expanses of overburden soils, a shallow groundwater table, and numerous small rivers and associated wetland systems. The 152-acre Crapo Hill Landfill property was suitable for a sanitary landfill because of its glacial till soils and its distance from active or potential water supplies. From the beginning, however, the District recognized that the property did have some challenging features for landfill development, as well as some interesting natural features that should be preserved. The property occupies highlands draining to three major regional wetlands, the Shingle Island Swamp to the west, the Acushnet Cedar Swamp to the south, and the Hobomock Swamp to the east. The drainage is overland flow, as there actually are no streams or waterways on the Landfill property. Forested wetlands are present on the southern portion and at the northwest corner of the property. These wetland areas do not possess some of the classical features of a wetland as they are infrequently wet. A more easily recognizable wetland feature is a shrub swamp along the southern boundary that provides high quality wildlife habitat. An embankment built along the southern boundary over one hundred years ago served to limit drainage off the property and contributed to the presence of on-site wetlands.

The Crapo Hill Landfill is built and operated to assure that these wetlands are undisturbed. Forested upland buffers are provided between the wetlands and the landfill operations. Storm water from the site is collected in a large infiltration basin situated in an area of relatively permeable glacial outwash soils. The basin is designed to retain the 100-year frequency storm event and to allow the collected runoff to infiltrate into the ground, instead of discharging to the wetlands. This assures that the hydraulics of the wetlands will remain undisturbed and the wetland areas will not be improperly inundated. Beneficial wildlife is encouraged by placement of bat and bird houses to encourage these species to nest, and by scheduling mowing of side slopes to avoid the nesting season of grassland birds.

**Long Term Planning**

Phase 2 landfill development includes four more cells that are well advanced on the drawing boards, with projected capacity to last an additional ten years at current rates of disposal. A Master Planning process is underway, which includes environmental studies to determine how best to utilize the balance of the available...
space. One goal of this planning effort is to fully utilize the site for waste management while continuing to provide the same level of environmental protection. Another goal is to lay the groundwork for future uses of the Crapo Hill Landfill once it closes. It could be the centerpiece of an extensive area for public recreation and open space that includes the agricultural uses, open fields, wetlands, and forested uplands, for the benefit of the wildlife and the people in the region.

Section 2: Environmental Controls

The Crapo Hill Landfill is governed by the Massachusetts Solid Waste Management Facility Regulations (310 CMR 19.000). These regulations, which have been in effect since 1991, require certain minimum standards for environmental protection and monitoring. It is the District’s philosophy not only to comply with the minimum standards, but in many cases try to set the standard for landfills in Massachusetts.

Groundwater Protection

The Crapo Hill Landfill is located in southeastern Massachusetts where the natural groundwater table is generally shallow, often seasonally within 5 to 10 feet beneath the ground surface. Since groundwater is extensively used for drinking purposes in the region, the protection of groundwater is a paramount concern. This Landfill is the only one in the state that is completely lined with a modern composite liner to segregate the waste from the groundwater.

The first liner system employed at this Landfill was a composite (Subtitle D) liner system constructed for the 18.6 acre Phase 1 area. This liner included a layer of compacted clayey soil and a 60-mil thick high-density polyethylene geomembrane, overlain with a leachate collection and drainage layer. Although not required by regulation at the time, the first two cells of the Phase 2 landfill, designed and permitted in 2000, featured a double-liner using two geomembranes with a leak detection zone in between. This double-liner system was ahead of its time. Subsequent regulatory changes now require a double composite liner with two layers of a soil/geomembrane sandwiched around the leak detection zone. The newest Cells are built with this double composite liner.

The quantity of leachate collected in the secondary leachate collection system is monitored and reported to MassDEP. All leachate is drained by gravity to a central pump station that discharges the leachate to the New Bedford city sewerage system. In 2009, the District managed approximately 2,450,000 gallons of leachate.

Landfill Gas Management

The Crapo Hill Landfill is located within approximately 800 feet of the closest residential neighbor. Therefore, the control of odors, gas emissions and subsurface gas migration is critical. Waste produced by the local fishing industry contributes its own unique problems to the issue of odor control. The Landfill operates in accordance with an Odor Control Plan that was developed voluntarily and in cooperation with MassDEP and the Landfill neighbors. The intent of the Plan is to assure that any odor condition is promptly brought to the attention of the District’s operators, the source is rapidly identified, and the condition is remediated as soon as possible.
Odors and gas emissions are managed by implementing specific operational strategies on a regular basis and by using engineered systems. The staff takes a pro-active approach on a daily basis to address the potential for these problems before they arise. Crapo Hill was one of the first landfills in Massachusetts to demonstrate the effectiveness of an alternative daily cover called “Posi-Shell®”, developed and supplied by Landfill Services Corp. Posi-Shell® is applied as a slurry to the active face and hardens to a shell-like cover. The slurry is comprised of shredded recycled plastic and paper fibers in a cement-like mixture and is effective at preventing odors and controlling windblown dust. It also deters gulls and other vectors.

Crapo Hill utilizes engineered solutions as well to control odor. Various masking agents can be disbursed where needed using an Air-One power atomizer mounted on a trailer and transported around the site. A leaf compost filter on the vent pipe from the leachate pump station wet well serves to control potential odors from this location.

In 2000, the District voluntarily installed an active landfill gas extraction system consisting of lateral and vertical landfill gas extraction wells, header pipes connecting the wells, and a flare to combust the landfill gas, in order to prevent odor conditions and to provide a means for productive use of the landfill gas in the future. Two vacuum blowers were installed to pull the landfill gas to an open flare capable of combusting 2,000 scfm of landfill gas.

After the initial system was installed the landfill gas collection system was subsequently expanded aggressively in anticipation of the development of an electric generating facility. The gas extraction system is currently comprised of 41 vertical gas extraction wells and over 20 interconnected horizontal collections wells, installed at approximately every thirty feet of landfill elevation. District personnel maintain operational control over the active gas extraction system.

By 2002 sufficient gas was being collected and destroyed to make use of this resource feasible. The District put out a Request for Proposals for Beneficial Use of the landfill gas it was collecting. Five proposals were received and reviewed for uses that included electric energy generation, waste heat use for growing vegetables, and transporting the gas by pipeline to an industrial user in the New Bedford Business Park. After a thorough review, the proposal from Commonwealth New Bedford Energy LLC (CNBE) to build an on-site electric generating power plant was selected. CNBE subsequently developed and constructed a 3.3 megawatt electric generating facility, and commenced operation in October 2005. The District sells the landfill gas to CNBE and both CNBE and the District share the economic benefits of the environmental attributes of destroying the landfill gas and the renewable energy credits associated with the production of electricity from a renewable fuel.

**Leachate Management**

Leachate is an ongoing by-product of any landfill operation and its proper management is a basic tenet of environmental protection. The District is fortunate to have access to the municipal sewer system and modern wastewater treatment plant of the City of New Bedford.

When the Landfill was first in opened, all leachate produced was conveyed to four underground storage tanks with a combined capacity of 60,000 gallons and removed by pumper truck. In the late 1990s, the City of New Bedford completed a new wastewater treatment facility and the District received approval to pump leachate directly to the municipal sewer system. The leachate management system provides great flexibility, with on-site storage capacity and the potential for storing leachate for beneficial use.
Two essential components of the system include a duplex, alternating pump system and wet-well; and a 100,000 gallon aboveground leachate storage tank. The pumps are the submersible-type, each having a 15 horsepower motor, and the capability for pumping 180 gallons per minute. The tank is steel with a fused glass surface finish, which resists the corrosive character of the leachate.

The combined pump and storage tank system enables the District to schedule discharges of leachate to the sewer during off-peak periods and to store peak leachate flows. Also, the system has been designed for a connection to a future leachate recirculation system. A 75 kilowatt stand-by generator allows the system to continue operating during power outages and other emergency situations.

**Storm Water Management**

Storm water run-off at the Crapo Hill Landfill facility is handled in one of two ways, depending on where the run-off originates. Contact run-off (run-off from active landfill areas where waste is exposed or provided with daily cover) is kept on the landfill and is directed to the leachate collection system. Non-contact run-off (run-off from inactive areas and non-landfill areas) is managed as conventional storm water drainage.

*Contact Run-off Management.* The District employs a variety of measures to segregate and collect contact run-off. The landfill area in the vicinity of the active face is graded and sloped to prevent contact run-off from flowing off the landfill into the perimeter run-off management system. Flow diversion berms and swales are employed to prevent contact run-off from flowing off the landfill and to prevent non-contact run-off from entering the active landfill area. These controls are implemented as a regular part of daily landfill operations.

*Non-Contact Run-off Management.* Non-contact run-off is managed using conventional storm water management methods. Non-contact run-off from landfill areas with intermediate or final cover systems is managed by on-slope flow diversions and lined channels that discharge to a swale at the toe of the Landfill. This run-off is then conveyed through a series of swales and culverts to the storm water retention basin, which has a capacity of 17 acre-feet. The system is designed to handle a 100 year storm.

**Waste Control & Inspection**

The Crapo Hill Landfill implements a comprehensive waste control and inspection program to monitor for the inappropriate disposal of recyclables and to prevent accepting other wastes prohibited from disposal. The program includes:

- Waste inspection to assess conformance with state prohibitions against disposing certain wastes
- Hazardous waste exclusion policy and waste inspection
- Identification of asbestos containing materials
- Review and analysis of special wastes

Certain waste is prohibited from landfill disposal in Massachusetts under what is known as the “Waste Bans”. These wastes banned from landfill disposal include:

- Lead Batteries
- Leaves
- Whole Tires
- White Goods
- Other Yard Waste
- Aluminum Containers
- Metal or Glass Containers
- Wood
In addition, the state prohibits disposal of hazardous waste, liquid waste, sludges, asbestos containing materials and infectious waste. Certain sludges and asbestos containing materials may be managed as special waste, subject to approval from MassDEP.

The Crapo Hill Landfill operates in compliance with a Waste Ban Compliance Plan approved by the MassDEP. This Plan includes the provision for periodic comprehensive waste load inspections and an ongoing waste monitoring program to identify waste loads with unacceptable and/or recyclable material.

The Landfill’s waste control and inspection program begins with the Delivery Procedures Manual signed by all facility users. The users certify that their waste is free of known hazardous waste, liquid waste, infectious or hospital waste, tires and any regulated “special” waste.

Once a vehicle containing waste arrives at the facility the scalehouse attendant determines the source of the waste and identifies the waste hauler. The attendant can question the hauler and request that the load be uncovered for viewing from a platform. Each vehicle passing over the scale is scanned by a radiation detector to screen for radioactive material.

Each month, six random waste loads are subject to comprehensive viewing and inspection of waste near the active face. This level of inspection includes dumping and spreading of the load so its contents can be viewed and characterized. Typically, the waste is spread with a compactor and tracked to open bags in the load. Upon completion of each random inspection, a log is prepared with the name of the waste hauler, the source of the waste, the general nature of the waste, and any waste prohibited from disposal. If a vehicle fails the comprehensive inspection, a letter is sent to the hauler providing the results of the inspection.

The equipment operators are trained to perform the ongoing waste monitoring program by recognizing unacceptable waste as they spread and compact all incoming loads. The operators are familiar with tell-tale signs that may indicate the presence of unacceptable waste, including asbestos containing material. Special wastes, which require specific handling and are regulated by the MassDEP, are subject to a higher level of scrutiny and review. Based on the nature of the special waste and its source, chemical identification tests are performed and reviewed by the District’s consultant prior to delivery and disposal.

The District is a strong supporter of the recycling programs that have been developed in the member communities. Both New Bedford and Dartmouth provide weekly curbside collection of household recyclables, which curtails the quantity of recyclable material entering the Landfill. The District conducts two collection days each year for household hazardous products and paint, and two collection days for tires and batteries, and mails an annual flier to all residents in Dartmouth and New Bedford, providing information on collection of hazardous waste.

Environmental Monitoring

A comprehensive network of groundwater, surface water, landfill gas and leachate sampling points is used to monitor the impacts of the Landfill. The environmental monitoring program, first implemented during the exploratory site investigation stage prior to opening in 1995, includes a regular schedule of sampling and analysis.
Groundwater. The District monitors groundwater quality four times per year at ten monitoring wells at five locations. Each location includes a shallow and a deep well couplet to monitor water quality in the upper overburden and at depth within the aquifer. Each well is equipped with a dedicated sample collection tube and foot-valve to eliminate cross-contamination between wells and to ease the sample collection process. Groundwater elevations are recorded quarterly at an additional four monitoring wells. This data is used to establish regional groundwater elevations and to guide the design for the future landfill cells. In addition, two deep bedrock wells are located on the Landfill property, and overburden monitoring wells are located on other adjacent property of the District as well. A large number of the Landfill’s residential neighbors rely on private wells for their water supply. The groundwater monitoring program provides assurances the local aquifer remains clean and potable. The District has also provided periodic water quality testing on samples drawn from neighbor’s wells. All results to date have shown normal background levels of groundwater constituents.

Surface Water. Surface water quality is monitored quarterly at two locations within the on-site wetlands. In addition, outfalls are sampled under the federal NPDES program where surface water may flow off the property, including the shrub swamp near the facility entrance and the storm water management basin adjacent to the Landfill. For groundwater and surface water monitoring, six parameters are measured in the field, including temperature, pH, dissolved oxygen, specific conductance, turbidity, and oxidation-reduction potential. Laboratory analyses are performed for a suite of inorganic indicator parameters, twelve metals, and volatile organic compounds. Results are compared to drinking water standards.

Leachate. Leachate samples are collected from the wet-well of the pump station on a bi-weekly basis. Testing parameters include organic strength, solids, and metals. Other parameters, such as volatile and semi-volatile organic compounds, pesticides, PCBs, oil and grease, and chemical oxygen demand are tested at varying schedules. The pH of the leachate is monitored continuously at the wet-well.

Landfill Gas. The District monitors for the presence of landfill gas in the soil above the groundwater table, along the perimeter of the landfill, at ten locations. Each monitoring probe spans the unsaturated zone.

Section 3: Regulatory Compliance

Community Role

The Greater New Bedford Regional Refuse Management District is a public agency, formed by the municipalities of Dartmouth and New Bedford. The District was organized with the specific purpose of providing long-term management of solid waste from the member communities. The District constructed, owns and operates the Crapo Hill Landfill. It receives solid waste from curbside collections in Dartmouth and New Bedford, commercial waste from local haulers, and some municipal waste from surrounding communities.

The District considers it of primary importance to be a good neighbor and to perform all its waste management functions in a manner that is compatible with the environment. The District’s Operations Director makes an effort to personally meet with any Landfill neighbor with a question, a comment, or a complaint. The Landfill staff is ready to help identify and alleviate anything perceived as an impact by the neighbors.
Environmental Compliance

The Crapo Hill Landfill operates in compliance with local, state and federal regulations. No violation notices or notices of non-compliance have been received in the last 10 years. When a situation develops that requires attention, such as the occasional odor complaint, it is handled swiftly by District staff. The following is a partial list of the permits under which the facility operates. Unless otherwise specified, permits are issued by the MassDEP under the Solid Waste Management Facility regulations:

- **Site Assignment from the Town of Dartmouth Board of Health** authorizing the siting of a sanitary landfill on the Crapo Hill site.
- **Solid Waste Facility Permit** authorizing 69.8 acres of sanitary landfill on the Crapo Hill site.
- **Interim Environmental Monitoring Plan** describing the groundwater, surface water, and soil gas monitoring plan for the facility.
- **Industrial Discharge Permit #S044** issued by the City of New Bedford, Department of Public Infrastructure. It allows the leachate to be discharged to the New Bedford sewer system for treatment at the publicly owned treatment works.
- **Approvals for Landfill Gas Collection System** authorizing installation of gas wells and interconnecting and conveyance piping.
- **Approvals for Final Cover** authorizing installation of final cover over approximately 20 acres of the Landfill.
- **Comprehensive Plan Approval** issued for the open landfill gas flare.
- **Comprehensive Plan Approval**, issued to CommonWealth New Bedford Energy LLC under Air Pollution Control regulations at 310 CMR 7.00 for five landfill gas fueled engines to generate electricity.
- **Authorizations to Operate a Landfill** including separate permits for Phase 1, Phase 2 Cells 1 and 2, and Phase 2 Cells 3 and 4.

Facility Inspections

The Crapo Hill Landfill is inspected six times a year pursuant to the Massachusetts solid waste regulations that state: “The facility shall be inspected by a registered Massachusetts professional engineer, or other qualified professional approved by the Department, experienced in solid waste management, and retained by the owner/operator, on a frequency approved by the Department in the Operation and Maintenance Plan.” (310 CMR 19.130(35)(a)). The District uses the engineering firm Brown and Caldwell. The standard bi-monthly inspection requires review and comment on 35 areas of landfill operations, including operator supervision; waste materials and disposal restrictions; equipment and shelter; staffing and staff facilities, health and safety; signage; cover, drainage and erosion; vectors; litter; access and security; and leachate management. In addition to these bi-monthly third party inspections, representatives from the MassDEP stage unannounced inspections periodically. Representatives of local agencies, such as the Dartmouth Conservation Commission, the Dartmouth Board of Health, and the New Bedford Wastewater Division also inspect the facility periodically. **The District staff is pro-active in alerting any of these agencies to situations that may arise within their respective areas of jurisdiction.** Specialty inspections also take place when called for, such as storm water inspections under the federal NPDES program.

“Regarding environmental compliance, there has been no higher level of enforcement actions taken at this Facility since it began operation in 1995 and it is in compliance at this time.”

-David Ellis, Chief Solid Waste Management Section, MassDEP
Section 4: Planning, Operations & Financial Management

Operations

The Crapo Hill Landfill operates six days per week. The hours on Monday through Friday are 7:30 a.m. to 3:30 p.m. On Saturday, the Landfill is open from 8:00 a.m. to 11:00 a.m.

**Personnel & Staff.** The District employs a staff of fifteen full-time employees, nine at the Landfill and six in recycling and administration. The Landfill staff is comprised of the Director of Operations/Chief Procurement Officer, the foreman, the master mechanic, two equipment operators, one scalehouse attendant, and three utility technicians. Day laborers are hired when needed. All of the staff is cross-trained to operate equipment, run the scalehouse and perform vehicle maintenance and repairs. Rotating jobs on a daily basis promotes teamwork, builds skills and creates a positive work environment. The Landfill crew frequently carries out major construction projects such as laying landfill gas pipe or building an infiltration basin. The District has significantly reduced its construction costs by this method compared to putting the projects out to bid.

Most of the Landfill staff has attended the Manager of Landfill Operations course and all staff members took the Landfill Operations course prepared by the Solid Waste Association of North America (SWANA). The District further supports its employees by paying the costs of seminars and technical sessions, and providing fifty percent tuition reimbursement for relevant courses. The major training programs are:

- Manager of Landfill Operations – SWANA
- Landfill Technical Associate – SWANA
- Hazardous Waste Operations and Emergency Response Training – 40 hour (with annual refreshers)
- Confined Space Entry
- Asbestos Awareness
- Radiation Meter and Monitor Training
- Oxygen-Fuel Safety Training
- Emergency CPR

The administrative staff consists of the Executive Director, Executive Secretary, Accountant, Office Clerk and two full-time Recycling Coordinators. The District places heavy emphasis on recycling as much tonnage as possible from the residential and commercial waste streams. Together Dartmouth and New Bedford have about 130,000 residents who receive an annual recycling flier listing all the programs provided by the District. In order to reduce the toxicity of the waste stream, the District holds two household hazardous waste collections per year that are free to residents, and two tire and battery collection days for a small fee.
**Waste Placement Operations.** Waste placement is the backbone of the operation at Crapo Hill. Given the scarcity of landfill capacity, volume reduction and optimized waste compaction are paramount. All compaction equipment is maintained in accordance with a strict program to maximize equipment life.

Each year the District commissions a topographic survey of the Landfill to determine surface elevations, assess compliance with the state’s landfill slope requirements, and to calculate in-place waste density. In 2008, the District achieved an in-place waste density of 0.86 tons per cubic yard (1,670 pounds per cubic yard). In 2009, the District achieved a somewhat lower in-place waste density of 0.73 tons per cubic yard (1,463 pounds per cubic yard) due to moving disposal operations into a new cell for much of the year. The industry standard is 0.60 tons per cubic yard (1,200 pounds per cubic yard). **We attribute this success to the dedication of the equipment operators, the proper maintenance of the equipment, the use of an innovative alternative daily cover, and the accelerated process of biodegradation due to recovery of the landfill gas.** The District landfills between 95,000 and 100,000 tons per year of municipal solid waste. The Landfill does not accept construction and demolition debris.

**Budgets and Finance**

Annually, the District Committee prepares and adopts an operations budget. The FY 2009 operating budget was $4.8 million. The budget covers the expected categories of salaries and wages, benefits, utilities and supplies, buildings and site maintenance, equipment expenses, debt service payments, and major equipment. The budget also includes regular Deposits to Reserves: (a) the Closure and Post-Closure Funds required by the MassDEP, (b) an Equipment Reserve Fund to replace aging equipment, (c) an Environmental Contingency Fund for any environmental issues, and (d) a Phase 2 Construction Fund for construction of the next pair of landfill cells in approximately five years.

There are five sources of income: (1) tipping fees paid by contracted waste haulers, (2) tipping fees for a variety of special wastes managed at Crapo Hill Landfill, (3) sale of landfill gas and carbon credits, (4) interest earned on investments, and (5) annual assessments paid by the member communities. A summary of the District’s operation costs and Deposits to Reserves for the last four years is shown in the table to the right.

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Operations Costs</th>
<th>Deposits to Reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>$3.20 million</td>
<td>$ 958,000</td>
</tr>
<tr>
<td>2008</td>
<td>$3.22 million</td>
<td>$1,190,000</td>
</tr>
<tr>
<td>2007</td>
<td>$3.55 million</td>
<td>$ 696,000</td>
</tr>
<tr>
<td>2006</td>
<td>$3.57 million</td>
<td>$1,050,000</td>
</tr>
</tbody>
</table>

**The District has ended with a favorable balance every year since it opened in 1995.** During the first five years of its existence, the District returned more than $600,000 to the member communities, either as a direct cash payment or as credit against the next year’s assessment, thereby repaying them for their original investment. Since then, the annual assessments have been steadily lowered from the original $2.2 million to less than half of that figure. Beginning with FY 2007, the total assessment for the two communities has been level funded at $835,000.

**Future Planning**

The original plans and designs for the Crapo Hill Landfill anticipated a twenty-year lifespan for a 69.8 acre landfill situated on a 152 acre parcel. **The District Committee intends to construct the entire landfill as originally conceived, but the lifespan has been extended out well beyond twenty years.** At least ten additional years are possible. The present estimate is that Phase 1 and Phase 2 will be filled no sooner than 2026 if current fill rates of approximately 100,000 tons per year are maintained. These two phases will occupy 49 acres, leaving approximately 20 acres to be designed and constructed in Phase 3. The District is always open to new technologies that might increase the longevity of the Landfill, such as leachate re-circulation, mechanically stabilized earth berms, or waste processing prior to disposal.
Section 5: Utilization of Equipment, Systems & Technologies

Equipment

The Crapo Hill Landfill employs many different types of equipment to address the daily needs of the facility. All of the equipment is owned by the District and is maintained by the District’s staff. A list of the equipment is tabulated below:

<table>
<thead>
<tr>
<th>Waste Compaction/Site Construction</th>
<th>Waste/Materials Processing</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rex 370A Trashmaster Compactor</td>
<td>Olathe Tub Grinder</td>
<td>Genie S-65 Lift Truck with Boom</td>
</tr>
<tr>
<td>Caterpillar 826 Compactor</td>
<td>Read Screen-All CV90-D</td>
<td>Yale Forklift</td>
</tr>
<tr>
<td>Caterpillar 315C Excavator</td>
<td>Scalper</td>
<td>Ford F-350 Dump Truck</td>
</tr>
<tr>
<td>Caterpillar D8N Dozer</td>
<td>Two 30 cubic yard containers</td>
<td>Two Ford Pickup Trucks</td>
</tr>
<tr>
<td>Komatsu D65PX Dozer</td>
<td></td>
<td>Henderson Sander (Roadway Sanding)</td>
</tr>
<tr>
<td>Caterpillar 966F Series II Front-end Loader</td>
<td>PSA 2000 Applicator</td>
<td>New Holland 9390 Tractor (Mower)</td>
</tr>
<tr>
<td>Caterpillar 966G Series II Front-end Loader</td>
<td>PSA 2000 Applicator</td>
<td>John Deere Mower</td>
</tr>
<tr>
<td>Volvo BM A25C Articulated Dump Truck</td>
<td>PSA 2000 Applicator</td>
<td>Side-arm Mower</td>
</tr>
<tr>
<td>Volvo BM A25D Articulated Dump Truck</td>
<td>PSA 2000 Applicator</td>
<td>Two John Deere 1445 Gator 4WD All-Terrain Vehicles</td>
</tr>
<tr>
<td>Caterpillar 426B Backhoe</td>
<td></td>
<td>Kubota RTU1100 4WD All-Terrain Vehicle</td>
</tr>
<tr>
<td>Takeuchi Excavator</td>
<td></td>
<td>Portable LeRoi Air Compressor</td>
</tr>
<tr>
<td>Elgin Pelican Street Sweeper</td>
<td></td>
<td>Air-One Atomizer</td>
</tr>
<tr>
<td>International 4000 gallon Water Truck</td>
<td></td>
<td>Two Jerome Hydrogen-sulfide Analyzers</td>
</tr>
<tr>
<td>Mack Yard Tractor</td>
<td></td>
<td>GEM 2000 Landfill Gas Meter</td>
</tr>
<tr>
<td>HDPE Pipe Butt Fusion Welding Machine</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Systems and Technologies

Crapo Hill Landfill uses several new equipment technologies as a part of its routine landfill operations:

Alternative Daily Cover. In an effort to preserve landfill capacity and reduce reliance on natural soils, the District has explored the use of a variety of alternative daily cover (ADC) materials. In 1995, the District took the lead in Massachusetts by starting a demonstration project with a product named “Posi-Shell®” manufactured by Landfill Services, Inc. of Appalachin, New York. Posi-Shell® is a mixture of recycled materials including plastic and cellulose fibers and a mineral binder, usually cement kiln dust. When mixed with water, these materials form a slurry that is sprayed onto the Landfill surface, hardening in less than an hour to a shell-like cover on the waste. Posi-Shell® provides all the functions of conventional daily cover: control of odors, fire, vectors, wind-blown litter, and scavenging birds. In addition, Posi-Shell® has proven effective at erosion control when applied to soil surfaces and soil stockpiles, and is used for dust control. Due to the compounds in the Posi-Shell, the Landfill staff has found it useful in mitigating odors as well.

An area 2,000 to 3,000 square feet in size can be covered with Posi-Shell® in less than one hour, thereby minimizing the amount of time needed to place daily cover at the end of the day. In the period of a year, the District estimates that it saves approximately 12,000 cubic yards of landfill capacity that can be used for an
additional 8,400 tons of waste. Therefore, the net benefit can be increased revenue as well as extending the life of the Landfill. The District also utilizes other types of alternative daily cover available within the local waste management market: automobile-shredder residue, fines from construction/demolition waste processing, and petroleum-contaminated soil that meets the MassDEP Policy COMM-97-001 for lightly contaminated soil.

Pease/Peckham Riser Conduit for Gas and Leachate Management. When Landfill operations moved into new Cells in late 2009 and early 2010, District staff implemented a new technique to provide access to the leachate trunk line for cleanout, gas control and drainage purposes. The Pease/Peckham riser conduit is a build-as-you-fill structure named for the two team members who developed it. The riser conduit is a steel cylinder, ten feet long and four feet in diameter, that is positioned on a pad of crushed stone directly above a leachate collection trunk line. An eight-inch diameter perforated pipe is connected to the leachate trunk line, run vertically upward, and the cylinder is filled with crushed stone drainage media. The cylinder is painted to aid in gull control and acts as a “slip form” for the drainage media and is raised as the solid waste fills up around it, thereby leaving a vertical stone/waste interface. Gas emissions are controlled by a gasketed cover that has adapters for passive destruction or active extraction. The riser conduit will allow greater control of leachate by providing a corridor to drain leachate from the upper levels of the Landfill, thus minimizing perched leachate tables, and at the same time improving movement of landfill gas.

Active Gas Flare. The initial active gas extraction system and open flare manufactured by Organics, Ltd of Great Britain was installed and commenced operation in 2000. It is capable of combusting 2,000 scfm of landfill gas. This manufacturer has environmental control gas flares operating in many locations in Europe, Asia, and other parts of the world, but Crapo Hill Landfill represented their first installation in the United States.

The Organics, Ltd flare was shipped in a one-piece unit that consisted of a steel frame containing all the components mounted in operating position, including all piping, condensate knock-out tank, two blowers, flame arrestors, meters and valves, pre-wired control panel, and stack with burner thirty feet high. The burner and the upper portion of the stack were shipped lashed to the steel frame and hinged to the lower portion of the stack, so that it only had to be raised into position and secured prior to use. The structural frame is galvanized steel and the piping, stack, blower housings, and other components are stainless steel. The flare utilizes landfill gas as pilot gas, so no auxiliary fuel is required. The flare operated continuously from 2000 through October 2005. Since the commencement of operation of the electric generating facility, the flare operates as a backup to combust any excess landfill gas.

Gas Extraction and Collection System Operation and Components. The District retains operational control of the landfill gas extraction and collection system, and cooperates with CommonWealth New Bedford Energy, the developer and owner of the landfill gas power generating plant, in delivering high quality gas to the generating facility. District staff operates the piping system and fabricates most of the components of the system. Using their own butt-fusion pipe welding machine, District staff assembles all the header piping, the horizontal collector pipe, and the vertical well-strings themselves. They install the well heads, make the connections to the vacuum system, and balance the well-field. They have designed and installed an innovative gas condensate discharge sump that takes advantage of the difference in elevation on the Landfill’s side slope to overcome the vacuum head in the gas piping system.

Bulk Waste Processing. Using their own tub grinder, District staff grinds clean wood such as trees and branches, used pallets, and select construction debris, and then uses the wood grindings for road treatment, landscaping, slope stabilization, and mulch. The District accumulates rock and concrete rubble and periodically brings in a portable rock crushing machine to reduce the rubble for use at the facility.
**Leaf and Yard Waste Composting.** The District accepts leaves and yard waste from its member communities and composts this material on site. Finished compost is used to manufacture organic vegetative support soil for capping projects and for landscaping the site. When the quantity is sufficient, finished compost is also made available to residents of the member communities.

**Maintenance**

The Crapo Hill staff is trained to perform routine and preventive maintenance on all of the facility’s equipment, and a full-time master mechanic is on the staff. Detailed maintenance and inspection logs are completed for inspection and repair work. All maintenance and repair activities are recorded in a master maintenance record. Maintenance is performed according to manufacturer’s recommendations; the Caterpillar Scheduled Oil Sampling Program is employed as an early detection program. A Detect and Correct Program is implemented to ensure the timely completion of repairs on minor problems before a major equipment failure may occur. Training, service and record-keeping are carried out in accordance with the manufacturer’s recommended procedures. The program addresses engines, hydraulics, power trains and many other aspects of equipment systems, including theory of operation, diagnosis and repair.

All on-site maintenance is performed in the 5,500 square-foot maintenance garage, located adjacent to the scalehouse. The garage is completely enclosed and insulated, allowing maintenance to be performed in a climate-controlled environment. A 1,600 square foot portion of the garage floor is lined with 3/4-inch thick diamond-plate steel, specifically designed to accommodate track-mounted equipment. In addition, the garage is equipped for oil dispensing and recovery, refrigerant recovery and recycling, and welding. An inventory of parts is kept for general maintenance and repair work in a locked holding cage in a corner of the garage. Sanitary facilities, an employee break room, and an office for the Director of Operations and his Foreman are provided in the garage. The garage is heated by burning waste oil generated by the vehicle maintenance program.

The District maintains sufficient numbers of equipment to provide their own backup systems. For instance, one compactor generally works the active face, but the District owns two, so that one may undergo maintenance or repair while the other is working on the Landfill. Similarly, the District owns two front loaders, three bulldozers, two heavy duty end-dumps, two excavators, and multiples of a number of smaller pieces of equipment. If necessary, additional equipment is available on short notice from local rental companies or local earthwork contractors.

**Section 6: Public Acceptance, Appearance and Aesthetics**

**Facility Appearance & Aesthetics**

The District Committee and staff place a high value on the appearance and aesthetic appeal of the Crapo Hill Landfill. The facility is located adjacent to the New Bedford Business Park and to residential areas in both Dartmouth and Freetown. The District believes its neighbors have the right to quality, rural living conditions. The presence of a landfill should not be an aesthetic burden.

The Landfill staff spends many hours each year landscaping the area. Dozens of trees, bushes and ornamental plants are purchased annually and are planted at the facility and in buffer zone areas surrounding the site. The District maintains a small nursery near the scalehouse where trees and shrubs are raised for transplanting. Overstocks and discards from area nurseries, home center stores and department stores are often recycled by incorporating them into the landscaping, and employees bring surplus plants from their homes for replanting on site. Vegetation is
selected for its fragrant qualities, windbreak or visual barrier qualities, and hardiness. Many visitors remark on the appearance of the site, saying they have never seen a landfill that looks more like a park.

The land clearing needed for Phase 2 construction removed a patch of forest and resulted in increased visibility from neighboring homes to the southwest, across some cranberry bogs also owned and managed by the District. To address this situation, the Landfill staff constructed a large vegetated berm to act as a visual barrier at the edge of the Landfill property, thereby blocking the view of the Landfill. This berm also serves to attenuate sound and blocks landfill odors from drifting towards residences.

The District attempts to maintain a green surface on the Landfill itself by placing loam and seeding outward-facing slopes as soon as possible after disposal operations are completed. The development sequence for the Landfill includes the construction of temporary barrier-berms along the perimeter of the active area. The barrier-berms restrict the visibility of the active face and attenuate sound and drifting litter as well.

Community Education & Service

Recycling & Community Education. The community leaders in Dartmouth and New Bedford who led the effort to create the District and build the Crapo Hill Landfill recognized that recycling was a vital part of a successful solid waste program. The District Committee directed staff to work with the member communities in developing their recycling programs, marketing the recyclables, and assisting in every way possible to educate the residents to Reduce, Re-use and Recycle. The District’s actions include:

- An annual flier that is mailed to every residential address in New Bedford and Dartmouth, listing when the special collections for household hazardous waste, tires and batteries will be held, and what can be recycled at the curb or at the drop-off center. The annual flier in New Bedford provides information in English, Spanish and Portuguese, including numbers to call where a native speaker can answer questions.
- A municipal flier for Dartmouth (“Make Recycling Part of Your Life”) and New Bedford (“Recycle More! New Bedford”) that lists all of the recycling programs in that community. An example flyer is provided as an attachment.
- Data collection of all recycled tonnage delivered to market, and preparation of reports to the Mass-DEP.
- Assistance with grant applications for various types of recycling equipment, technical support and recycling incentive cash payments.
- Workshops in schools and at businesses promoting waste reduction, reuse and recycling.
- In-school environmental programs involving staff or the University of Massachusetts - Dartmouth college students; and promoting increased recycling with cash awards to school winners.
- Cable TV programs and public service announcements about recycling.
- Tours of the Landfill and gas-to-energy plant for school groups and other interested groups.
- “Ramp up Recycling”, a program targeting businesses in New Bedford that need to increase recycling.

In 1991, prior to opening the Crapo Hill Landfill, the District worked with Public Works Departments in New Bedford and Dartmouth to launch one of the first curbside recycling programs in Massachusetts. At that time, recyclables were separated curbside for placement into separate compartments of the recycling truck: two colors of glass, metal cans, plastics #1 and #2, and newspaper. Over time, additional types of paper were added to the program. Finally, Dartmouth and New Bedford took the step of collecting recyclables in a dual stream: residents put all types of papers in one blue bin and commingled containers in a separate blue bin or barrel to be picked up by the recycling crew using specially designed, dual-compartment packers. To manage all recycling programs, the District hired a Recycling Coordinator full time in 1998. That staff has now expanded to two full-time employees plus a part-time helper to deliver blue bins.
**Being a Good Neighbor**

**Neighborhood Well Tests.** In March 1999, a group of residents expressed concerns about groundwater quality. Although none of the residents had conducted tests to indicate a problem existed, and the Landfill groundwater monitoring program had not identified any groundwater impacts, the District invited residents and a local environmental advocacy group to talk about the issue. Initial discussions with the group began with an explanation of the protective environmental systems in use at the Landfill and a description of the comprehensive environmental monitoring program. A summary of the geologic and hydrogeologic conditions of the area followed to provide perspective on the depths to groundwater and its flow direction.

When the concerns of the residents were not fully satisfied, the District decided to take additional steps and funded a neighborhood well testing program in cooperation with the Boards of Health of Dartmouth and Freetown. All of the close neighbors were invited to participate, and ten neighbors accepted the offer to have their well water tested for a variety of chemical constituents and landfill contamination indicator parameters. All results were negative, which further reduced neighborhood concerns. Since that time, some residents have periodically requested their wells to be re-sampled and tested, and the District has always done so.

**Control of Gulls.** Crapo Hill is located within seven miles of the New Bedford Harbor, and near the westerly boundary of New Bedford, a city with long history in the fishing industry. In addition, the Landfill receives waste from the fishing industry, which attracts gulls. As a result, scavenging birds can become a problem and gull control at the Landfill can be a big job. The District employs a variety of measures to control gulls. The primary methods are non-lethal, and include automatic and remotely detonated propane cannons, a broadcast of gull distress signals and/or predator calls, use of scare balloons and “spider” streamers attached to fence posts, minimizing the size of the active face, and regular movement of heavy equipment during working hours. After hours, the Posi-Shell cover serves as a barrier. No single method is effective for very long, as gulls become conditioned to almost any deterrent. Therefore, a revolving program of gull deterrent devices has been implemented at the Landfill.

In response to concerns expressed by neighbors in the adjacent New Bedford Business Park, the District met with representatives of the businesses and the Greater New Bedford Industrial Foundation to discuss the effects of gulls at their facilities. The District provided the businesses with information on how building construction and renovation may deter gulls. At one existing structure, the District installed a gull deterrent comprised of a centrally mounted pole with flexible wiring running out from the pole to other poles mounted on the roof. The wire was connected in a fish net pattern a few inches above the surface of the roof. This method has had a good deal of success in preventing gulls from landing and roosting on the roof.

**Serving Our Neighbors.** The Landfill staff provides a diversity of services to nearby neighborhoods. For example, the staff will plow snow from driveways of elderly neighbors. The staff also uses the sander to spread sand on roads in the adjoining New Bedford Business Park when surfaces become slippery or icy. Roadways near the Landfill are checked regularly for litter even though most of what is found did not come from the Landfill. A neighboring dog training club uses the fields of the former horse farm as a training and testing site. The District also provides space near the fields for a local beekeeper to place several hives on a permanent basis. The bees strengthen the local bee population and help in crop pollination. One of the fields is regularly mowed as an emergency Med-Evac site for the Dartmouth Fire and Rescue Department. Lastly, the staff is ready to respond in a positive, friendly way to individual problems. Neighbors have the phone numbers of the District office, the guard service and the home and cell phone numbers of the Landfill Manager.

**Land Preservation Program.** It is a policy of the District to purchase land bordering the Landfill when funds are available and property is for sale. This policy ensures a sizable buffer zone between the Landfill and developed land, and preserves the rural character of the area. In the process, valuable woodlands, wetlands, working cranberry farms, hay fields and open areas are protected.
Over the course of the last fifteen years, the District has acquired fourteen parcels of land totaling 430 acres. The first purchase included a horse farm and pastures. The District relocated its administrative offices to the former residence on this property, and uses the barns for storage of equipment and hay. The hay is produced on 15 acres of former pasture area. Hay bales are used as erosion control barriers at the Landfill or sold to local farmers for feed. There are two cranberry farms totaling more than 40 acres, with the bogs leased to local growers for cranberry production. The forested parcels are managed by a state-approved forester. None of these properties is planned for future landfill development. Finally, the District also owns abutting property in the New Bedford Business Park. These parcels may be suitable in the future for recycling activities or a project using the waste heat from the electric plant.

Section 7: Innovation and Creativity

Facility Innovation

The Greater New Bedford Regional Refuse Management District, as the developer and operator of a new municipal landfill, is a rarity in Massachusetts as well as nation-wide. Most municipalities do not decide to build and operate their own landfill. All municipalities have to decide how to handle their solid waste and recycling programs, but landfills are usually operated by counties or by private industry. The spark that brought a City and a Town together for the benefit of their residents and taxpayers is remarkable. From 1979 when the Inter-municipal Agreement was signed to the day the packers rolled in the gate of the Crapo Hill Landfill in January 1995, many community leaders spent thousands of hours working through the legal, regulatory and financial issues that had to be resolved. The vision and perseverance of these municipal officials has paid off. The Landfill space at Crapo Hill will last at least 50% longer than originally planned (30 years instead of 20 years) because of careful site management and increased recycling. The annual cost to the communities has dropped steadily from $2.2 million in 1995 to a level amount of $835,000 since 2006. In effect, the communities pay about $20 per ton for their trash disposal, a very low number for New England and the northeast. The revenue base has been expanded to include commercial waste, handling of lightly contaminated soils, sale of methane gas and energy credits, and even the sale of cranberries and hay from the buffer land surrounding the Crapo Hill site. The purchase of 430 acres of open space as buffer has protected the natural environment and rural character of the area. The District intends to maintain the Landfill as its disposal site for as long as possible. When the Landfill does close, the area could be turned into a recreational park with trails and a “ski slope”, or parcels could be selectively sold for residential development.

Facility Distinctiveness

The success of the Crapo Hill Landfill is due in large part to the management style of the fifteen employees. Operations are a team effort and many construction projects are handled “in-house”. The staff is cross-trained to operate machinery, maintain equipment, run the scalehouse, and construct the gas collection system. Outside contractors are hired only for specialized projects like building a new cell, capping an area or drilling a vertical gas well.

The District was a leader in voluntarily commencing to capture methane and landfill gases when the Landfill was only five years old. Subsequent construction of a 3.3 megawatt electric generating plant assures a reduction in green house gas emissions and a revenue stream that will continue for a decade after the Landfill ceases to accept solid waste. The District is researching with area businesses opportunities to utilize the excess heat from the generating plant for agricultural or other purposes.
March 20, 2010

Dear Committee,

I have been the Solid Waste Section Chief for the Southeast Region for the Massachusetts Department of Environmental Protection since 1993. Crapo Hill Landfill (operated by the Refuse District consisting of the City of New Bedford and the Town of Dartmouth) has been operating within my jurisdiction since 1995. Crapo Hill has been and continues to be operated a model, “State of the Art” landfill facility by its operator, Hank VanLaarHoven. His proactive approach in managing all aspects of the landfill operation has been a show case for others in the industry to see, how efficiently, effectively and successfully a facility can be run. Mr. Vanlaarhoven and his team have always minimized the potential for operational problems and have gone the extra mile in solving any issues they have encountered at the site, such as; nuisance conditions (i.e. odor). As we all know, managing a landfill without any nuisance odor conditions is a daily challenge. He has several operations at this facility that include MSW land filling, composting, and landfill gas to energy. Additionally, by Crapo Hill making this investment to go to gas to energy, opened the door to many innovative technologies. In discussions with Hank VanLaarhoven, since the gas to energy infrastructure is in place and taken into consideration the economics (high tip fee), some of the potential innovative technologies that otherwise would not be cost effective may be cost effective. Some of the technologies that have been discussed include solar, wind and anaerobic decomposition. The Department has recently had conversations with the Mr. VanLaarHoven to potentially develop the first Bio-Reactor (anaerobic decomposition) in the Massachusetts to increase methane production and increase decomposition of waste. The activities at this Facility are fully integrated and work well.

Regarding environmental compliance, there has been no higher level enforcement actions taken at this Facility since it began operation in 1995 and it is in compliance at this time. In my opinion, this Landfill is well-run and Mr. VanLaarHoven and his Staff are and have always been responsive to any of our questions and concerns.

It should also be noted, Mr. VanLaarHoven maintains a healthy community out-reach program that promotes education and public awareness. Several programs are tied into local community schools and local colleges allowing the Facility to be involved within classroom studies.

I continue to fully support Crapo Hill Landfill operation as it provides a critical service for the local communities. Mr. VanLaarhoven continues to strive to operate one of the best solid waste handling facility in the Commonwealth of Massachusetts. Should anyone have any questions, please call me at (508) 946-2833.

Very Truly Yours,

David B. Ellis, Chief
Solid Waste Management Section