

NORTH DAKOTA DEPARTMENT OF HEALTH

INTRADEPARTMENTAL MEMORANDUM

REF FILE: Proposed Grand Forks Municipal Solid Waste Landfill

TO: Scott A. Radig, P.E., Director
Division of Waste Management

FROM: Steven J. Tillotson, Asst. Director
Division of Waste Management

Diana A. Trussell, Env. Engineer
Brad J. Torgerson, Env. Scientist
Christy L. Smith, Env. Scientist
Solid Waste Program
Division of Waste Management

SUBJECT: Permit Application Review

DATE: December 10, 2008

Background:

On October 13, 2008, the City of Grand Forks, North Dakota (Grand Forks) submitted a permit application to the North Dakota Department of Health (Department) for a new municipal solid waste (MSW) landfill for a site located in Section 13, Township 152N, Range 51W of Grand Forks County, ND. The facility plans, prepared by Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) on behalf of Grand Forks, propose an MSW landfill developed in 10 cells that will eventually encompass 191 acres of the site. Some areas would also be used for borrowing cover soils and some areas would be used as a buffer zone.

The proposed facility is projected to accommodate about 85,000 tons per year (approximately 300 tons per day, 5.5 days per week). The City proposes the permit limit be no more than 350 tons per day on average. The design of the landfill would be appropriate for a facility that does not accept more than 499 tons per day of municipal waste. The design capacity when totally full is approximately 11,829,000 cubic yards and the anticipated life of the facility is over 80 years. As proposed, MSW, including putrescible waste that might attract birds, will be screened, baled and bagged at the transfer station facility prior to being transported to the proposed landfill facility.

The City of Grand Forks' current landfill is nearing capacity and must close due to its location adjacent to the Grand Forks Airport. MSW landfills historically attract birds, including sea gulls. The City has been working with the Federal Aviation Administration (FAA) and the Department for over 15 years to try to control imminent bird issues and to find a new site. The airport is one of the 50 busiest airports in the United States due largely to the University of North Dakota (UND)

aeronautics program, and bird strikes on aircraft have occurred. With construction of a new airport runway with a flight path right over the current landfill, the city must close the old landfill for MSW before the runway is operational in 2009.

The City has worked with the FAA and U.S. Department of Agriculture (USDA) animal control staff to control birds, and the recent implementation of bagging waste appears positive. Nonetheless, the FAA and the Department must require the current landfill be closed. With construction of a new airport runway with a flight path right over the current landfill, the City must close the old landfill for MSW before the runway is operational in 2009. The City staff has experience in controlling birds and the recent innovations are anticipated to help control birds at the new site which is within the purview of the FAA. While the proposed site is more than 15,000 feet away from the airport, the FAA has oversight to 5 miles from the end of any airport runway.

In addition to serving the state's third largest city, the Grand Forks landfill has been utilized by much of northeast North Dakota and northwest Minnesota.

Permit Application Provisions and Procedures

It appears that Grand Forks acquired access rights to carry out site investigations and is in negotiations to eventually purchase the property for which the permit is sought.

A permit application fee of \$5,000.00 was received on October 1, 2008. Six copies of the permit application were received on October 13, 2008 and the application appeared to be thorough and complete. Two Public Notices were published by the City in the Grand Forks Herald on November 5, 2008 and November 7, 2008.

The application appears to follow the order of the Solid Waste Management Rules (NDAC Article 33-20). Application amendments were received in November 2008 to address some changes in groundwater monitoring, landfill gas management and financial assurance. This amended information was included in our review and Draft Permit.

Sustainability, Waste Reduction, Recycling and Toxic Material Reduction.

Grand Forks' city-wide curbside recycling program has been in use for about 15 years, and it is the largest curbside program in North Dakota. The City shreds wood and is interested in using or providing it for use as a sustainable, renewable biomass fuel source. Grand Forks does not accept or dispose of yard waste in its landfill; instead, the City collects yard waste separately for composting. With some refinement, Grand Forks could process yard waste compost for use as a soil amendment which could be a significant potential resource if the proposed landfill is approved (see discussion later in this review).

To help reduce the amount and the toxicity of the waste stream, Grand Forks conducts annual Household Hazardous Waste and Electronic Waste Recycling events. Grand Forks is also

implementing industrial waste procedures at its baling/transfer station facility regulated under solid waste permit 069. Education of waste generators, including residents, businesses, industries, and institutions as well as haulers and staff is essential for reducing the amount and toxicity of the waste stream. Education coupled with monitoring the waste stream can also help identify opportunities for waste reduction and recycling.

The Department supports all communities' development of sustainable practices, including waste reduction and recycling. Sustainable programs often hinge on incentives, and the interest of cities in "Volume Based Fees" or "Pay as You Throw" waste services recognizes the role of incentives for waste reduction and recycling. Pay as You Throw systems are perceived as more fair and are essential to help increase citizen and business participation. In a Pay as You Throw system, those who reduce waste, recycle, and compost grass and leaves produce less waste and therefore pay less in waste fees.

As with other recent facility permits, it is recommended that a condition be considered on appropriate waste education, further implementation of reasonable efforts to reduce, reuse, and recycle waste materials, and implementation of appropriate industrial waste procedures for any waste not handled through the baling/transfer station.

Location and Site Conditions

The proposed site is located on the nearly level Agassiz Lake Plain in the drainage basin of the Red River, which flows to the north. The application identifies:

"The uppermost unconsolidated subsurface materials at the site consist of clays and clayey silts of glacial Lake Agassiz (Hansen and Kume, 1970) in relatively uniform layering. Soils consist of moist, clayey silt with some fractures and gypsum crystals present from ground surface to a depth of approximately 15 feet below ground surface (bgs). Below this depth lies a zone approximately 20 feet (15 to 35 feet bgs) thick of wet, soft, silty clay with very thin (typically 0.1 inch thick) silt lenses. From 35 to 40 feet bgs, a stiff dark brown gray clay layer occurs. A wet, soft, highly plastic clay is present from 40 feet bgs down to approximately 80 feet bgs. Moist, sandy, gravelly clay till is present below 80 feet bgs."

The silt and clay glacial lake (glaciolacustrine) sediments are saturated at a depth of approximately 4.5 to 10 feet and the potentiometric surface trends northeastward, similar to the slope of the land. The Salt Water Coulee and Fresh Water Coulee drain northward.

Soils at the proposed site are predominantly Bearden soil and Bearden saline soil that are deep, level, somewhat poorly drained, and moderately fine-textured.

The proposed site is not within the 100 year floodplain. The proposed dike around the landfill development will keep out a 500-year flood and will essentially eliminate direct impacts from any

overland flooding, should it occur. The dike system also is developed to direct storm water runoff to a storm water pond.

Preapplication Reviews

Before an application is prepared, North Dakota's Solid Waste Management Rules require submission of a preapplication identifying site(s) that are to be considered for development of a solid waste disposal facility. The intent of a preapplication is to screen out sites that are obviously not suited for development. On December 31, 2007, the Department received a preapplication from the City of Grand Forks for a number of potential landfill locations in areas of north and south Grand Forks, including the proposed landfill site. The preapplications were routed for review to the North Dakota Geological Survey (NDGS), the Office of the State Engineer (NDOSE), the Department's Divisions of Water Quality (NDDHWQ), and Waste Management (NDDHWM).

The preapplication reviews indicated that the proposed area is underlain by clay-rich lake sediments and generally concur with Fred Anderson, geologist with the NDGS, who stated: "The proposed facility areas are located in areas underlain by offshore glaciolacustrine clays, silts, and silty-clay sediments of the Sherack and Brenna Formations. The sediments in these units generally have very low permeabilities, and as such, are generally well suited for waste disposal." The proposed site is in silts and clays of what was glacial Lake Agassiz and is generally saturated at a depth of about 10 feet. The clays generally have low hydraulic conductivity (potential for water movement).

Aquifers potentially of consideration in the some areas around Grand Forks include shallow sand or gravel aquifers or lenses, the Grand Forks aquifer and the deeper Dakota aquifer (saline water). Up-welling of saline water from the Dakota is characteristic of much of the area around Grand Forks and it affects the near-surface soils. The reviews generally concurred with Alan Wanek, hydrogeologist with the NDOSE, "In considering the geohydrologic setting of locations within a few miles of the City of Grand Forks, the two areas, in my opinion are suitable for further consideration in siting a landfill. Based on limited geohydrologic information, the north area being considered appears to be slightly more prospective for siting a landfill than the south area."

Jim Horner, Environmental Scientist with the Groundwater Program of the NDDHWQ, concurred that the sites were geologically suited and stated the north area has "low hydraulic conductivities, the potentiometric surface is approximately 10 feet below land surface, it's a discharge area of ground water from the Dakota Group, and there is some mixing with water percolating downwards from precipitation."

The NDDHWM concurred with the reviews, and the February 1, 2008 letter from Steve Tillotson identified potential settlement, prudent design, surface water drainage issues, relatively shallow depth to saturated sediments and the potential for overland flooding as issues that needed to be addressed. Additionally, Tillotson stated: "Providing adequate soil to support good native grass growth necessary for landfill closure and reclamation needs to be considered... Careful planning, segregation of adequate material, assessment of borrow areas, amendment of soil with well prepared

yard waste compost, and other prudent measures should be addressed.” Tillotson also stated that “the proximity of the proposed site within five miles of the airport and the control of bird hazards must be carefully addressed in accordance with the Federal Aviation Administration (FAA), the Grand Forks Airport Authority and the Department.”

The Department approved the preapplication on February 1, 2008.

Airport and Bird Control

Grand Forks has been working with the FAA, the Grand Forks Airport Authority, the Department, and the Wildlife Biologist for the USDA Animal and Plant Health Inspection Service to control and abate wildlife hazards for years at its current landfill. A program for bird control must be in place for any new facility if it is approved at the site included in this proposal. The City is currently working with the various entities and believes its efforts to bag the baled MSW will significantly enhance bird control. Information on Habitat Alteration, Harassment, Program Management and Monitoring was included in the application.

Federal Aviation Administration Review

In a letter dated April 28, 2008 from Steven J. Obenauer, a Manager with the Bismarck Airport’s District Office, FAA, to Todd Feland, the Public Works Director for the City of Grand Forks, stated that the FAA has no objection to the establishment of the MSWLF as proposed, provided:

1. The MSWLF is constructed and operated in a manner that does not significantly attract hazardous wildlife, specifically birds.
2. The MSWLF is located greater than 15,000 feet from the airport’s air operations area.
3. The City incorporates the recommendations included in the WS Wildlife Hazard Site Visit and Assessment report dated November 21, 2007, specifically:
 - a. Use of various repulsion methods.
 - b. Use of exclusion devices - overhead wires and baling as further described in Options 1 and 3 of the assessment report.
4. The City incorporates the “Bird Control/Mitigation at Potential North End Grand Forks Municipal Solid Waste Landfill Sites Plan” dated October 23, 2007 and the “City of Grand Forks Landfill Bird Control Plan” dated May 3, 1999 into the new MSWLF operations. The bird control plan shall be reviewed regularly to determine if control measures are effectively keeping bird activity at a minimal, nonhazardous level.

5. The City monitors the landfill to assure that any increase in bird activity that might be hazardous to safe aircraft operations will result in prompt action to mitigate the hazard or close the landfill. During the first year of operation, quarterly reports summarizing the daily bird activity at the new MSWLF are sent to the Bismarck Airport's District Office. The report should include estimated numbers and types of birds and action taken.
6. The Grand Forks Regional Airport Authority updates its Wildlife Hazard Management Plan (WHP) to reflect the new landfill and other wildlife habitat modifications in the area.
7. After one year of operation, the City shall re-assess the wildlife hazard risk imposed by the new MSWLF in relationship to airport operations. This assessment must be conducted using a qualified wildlife biologist in accordance with FAA advisory circulars. The City shall incorporate additional mitigation if required by the re-assessment.
8. The landfill operator will be required to report any future development beyond the original proposal to the airport and FAA for review of potential impacts to airport operations.

Site Soils and Suitable Plant Growth Material (SPGM)

As required under the Solid Waste Management Rules, a detailed soil survey was completed by Dr. Bruce Selig, a Professional Soil Classifier with Earth Resources Analytic, LLC (ERA). The information was provided in Appendix M of the Permit Application Report. Section 2.0 Site Characterization and Location Standards, Subsection 2.1.2 Site Soils of the Permit Application Report states, "The ERA report identifies areas of the site where surface soils are most appropriate for use as suitable plant growth material (SPGM) topsoil and areas where the soils are most appropriate for use as SPGM subsoils." The requirement for segregation of SPGM was also discussed in the permit application.

Section 2.0 Site Characterization and Location Standards, Subsection 2.1.2 Site Soils of the Permit Application Report states: "Soil excavated from the site during landfill development and operation will be segregated and stockpiled according to its most appropriate use." The diagrams and plans need some further clarification and the soil segregation procedures could be somewhat difficult.

Dr. Seelig's report showed parts of the proposed landfill and borrow site are underlain by discontinuous strips or areas of Bearden silty clay loam intermixed with Bearden silt loam saline soil. Most, but not all of the surface layer of Bearden silty clay loam soil qualifies for SPGM topsoil that must be saved for the upper 6 inches (topsoil) needed for site reclamation. The amount of SPGM topsoil available is about 170,000 cubic yards, which is short of the amount required for landfill closure. In addition, without supervision and oversight by a soil scientist (classifier), it will be difficult to separate the suitable topsoil SPGM from more saline soil and subsoil layers.

Segregation of subsoil SPGM necessary for the plant root zone will also need careful segregation. Some better SPGM subsoil materials exist at greater depths. Dr. Selig suggested that deeper soil materials could be used for subsoil SPGM, if carefully identified, segregated, and amended (e.g., with compost).

There also exists recently disturbed soils, some of which support wetland vegetation in the excavated ditches along the roads surrounding the proposed site. These areas should not be disturbed except for road and access construction.

Separation and management of SPGM topsoil and subsoil will take coordination between soil scientists, construction engineers, equipment operators, facility engineers and landfill staff to ensure all materials are saved. Such coordination will also help guide amendment of soils with compost or other approved materials, and ensure proper management and use of SPGM materials for site closure requirements. Amendment by compost or other organic material may be the most effective means of addressing any shortfalls. It is recommended a permit condition be proposed requiring coordination and oversight of SPGM topsoil and subsoil management by a professional soil classifier. In addition, a plan should be required detailing how adequate SPGM will be provided.

Revegetation, Grass Growth, Seeding, Cover Crops, etc.

On August 13, 2008, Mr. Scott Martin, of Burns & McDonnell, electronically submitted proposed information and a seeding mixture to be incorporated into their '*Soil Loss Prevention and Seeding Plan*' (to be included as an appendix in the application). On August 14, 2008, Ms. Christy Smith, NDDHWM, replied to Mr. Martin with feedback regarding the seeding mixture, cover crops, and the use of straw mulch. Mr. Scott Martin electronically submitted revised proposed information related to a seeding mixture after consulting with the NRCS field representative, Mr. Dwight Tober. Ms. Smith concurred with Mr. Tober's recommendations, and the Department received a PDF of the "Soil Loss Prevention and Seeding Plan" electronically on August 25, 2008.

It appears the proposed erosion control, seeding and final cover maintenance plan is in accordance with the Solid Waste Management Rules and the Department's guidance. The applicant worked closely with the Department, soil scientists, and vegetation specialists from the NRCS, using current guidelines. The timely establishment of cover crops on disturbed areas, application of mulch on erosion-prone areas, weed control, and the establishment of permanent native grass are appropriate for solid waste facilities in order to protect soil covering the disposal areas.

Groundwater and Hydrogeology

Burns & McDonnell conducted a hydrogeologic investigation in the spring and summer of 2008 at the proposed landfill site. A total of 55 borings were drilled, including 31 shallow (approximately 15 feet below ground surface, or "bgs") and intermediate (approximately 25 feet bgs) borings and 6 deep (60-115 feet bgs) borings. Of the 31 shallow and intermediate borings, 21 of them were used as piezometer wells and all six of the deep borings were used as piezometer wells. In two of the

borings, a vibrating wire piezometer cluster was installed with sensors at approximately two-foot intervals bgs to a depth of 70 feet. Groundwater samples were collected in late June and early July 2008 from all 27 piezometer wells. Water levels were measured in June, July, and August 2008 and will be continued to be measured monthly for a one-year period.

According to the hydrogeologic investigation report for the proposed site, clayey silt was encountered within the soil borings from the surface to 10 to 15 feet below ground surface. Gray silty clay extends 10 or 15 feet below grade to depths of 32 to 40 feet below grade. From 32 and/or about 40 feet below grade, a stiff dark brown-gray clay was encountered in most soil borings for about 5 feet. At a depth of 40 to 47 1/2 feet below grade a high plasticity clay was encountered. According to the report, glacial till was encountered at a depth of 83 feet below grade in the deepest soil boring ((B-28D) advanced at the site. The till consisted of a dark, grayish-brown, silty clay with minor sand and gravel.

Based on information presented in the application report for the site, the Grand Forks Aquifer appears to be located more than one mile laterally southeast of the site and the Dakota Aquifer appears to be located west of the proposed landfill site.

Groundwater samples were collected this past summer from monitoring wells installed at the site. Sulfate, chloride, and TDS were the principle inorganic constituents measured within the groundwater samples. Groundwater samples collected from the shallow and intermediate wells installed at the site exhibited sulfate concentrations from 500 parts per million (ppm) to 14,000 ppm. Chloride concentrations generally ranged from 270 ppm to 13,000 ppm from samples collected at the site. TDS concentrations ranged from 1,300 ppm to 33,000 ppm from groundwater samples collected at the site.

Surface water samples were collected from the Fresh Water Coulee, Salt Water Coulee and the Downgradient Coulee this past summer. The Downgradient Coulee water sample showed elevated levels of chloride. The sample collected from the Salt water Coulee appeared to exhibit elevated levels of chloride and sulfate. The water sample collected from the Fresh Water Coulee exhibited unremarkable results.

The application identifies the hydrogeology at the proposed landfill site is dominated by very low groundwater flow velocities and horizontal hydraulic gradients. Hydraulic conductivity values for in-situ testing in the shallow interval (5 to 15 feet bgs) range from 2.0×10^{-7} cm/sec to 2.9×10^{-4} cm/sec, the intermediate interval (15 to 25 feet bgs) range from 2.6×10^{-7} cm/sec to 3.7×10^{-5} cm/sec, and the deep interval (50 to 60 feet bgs) range from 1.2×10^{-7} to 6.0×10^{-7} cm/sec. Laboratory tests showed values ranging from 1.4×10^{-8} cm/sec to 1.4×10^{-7} cm/sec for the samples at depths 10.5 to 12 feet bgs and 22.5 to 24 feet bgs, respectively. This information shows that a network of soil fractures exists and that the hydraulic conductivity of the soil fracture network is in the range of 2.9×10^{-4} cm/sec to 2.6×10^{-7} cm/sec, which also corroborates visual observations of soil fractures observed. The overall low hydraulic conductivities for the proposed site show the

presence of swelling clay materials which squeezes shut fractures, considerably reducing their hydraulic conductivity.

The groundwater flow beneath the proposed landfill site appears predominantly horizontal based on the hydraulic head measurements made at various depths and locations in piezometers installed during the hydrogeologic investigation. The groundwater that is closest to the ground surface typically flows northeastward. The water table is typically anywhere from 4.5 to 10 feet bgs throughout the site. Overall, there is a slight downward hydraulic gradient beneath the site, with the exception of a slight upward gradient from the 50-foot depth zone that would influence any leachate movement, if a release were to occur, by restricting its flow to largely horizontal flow within the shallowest groundwater flow zone. The overall hydraulic gradient within the shallow zone is approximately 0.001 feet/feet, meaning the average linear groundwater velocity for the site is in the range of one to five feet per year. The steepest hydraulic gradient within the shallow zone occurs in the southern portion of the site and is approximately 0.003 feet/feet. The highest calculated linear groundwater velocity for the site is approximately 15 feet per year.

The proposed groundwater monitoring plan will be constructed and sampled in a phased approach to monitor the landfill as the individual cells are developed over time. The initial system includes one nested set (shallow, intermediate, and deep) of upgradient wells and two temporary shallow downgradient wells close to the proposed facility. As additional cells are constructed, replacement wells will be implemented according to their plan. The final proposed groundwater monitoring network includes two nested sets of upgradient wells and six nested sets of downgradient wells. Currently there are 17 existing wells and an additional 7 wells are proposed to be installed over time to provide a total of 24 wells in the proposed final system. To summarize, groundwater flows slowly near the site in a northeastward direction.

Application Reviews By Other Agencies

The Hydrogeologic Investigation Report and the Permit Application were sent to the reviewing agencies for any further consideration.

Fred Anderson, in NDDGS's letter of November 17, 2008, stated "the existing hydrogeologic conditions have been well characterized at the site." He also felt that shallower depths should receive the main attention with respect to the design of the ground-water monitoring program "since the flow in this zone is dominantly horizontal and has a general tendency towards more, rather than less permeable sediments (i.e. increased silt content), additional ground-water monitoring program design considerations should be afforded to this interval."

Alan Wanek, in NDOSE's letter of November 26, 2008, stated "the well monitoring plan appears sufficient for leachate detection at the site."

Surface Water

The proposed site is outside of the 100-year floodplain, thus meeting the state's siting criteria. The applicant's proposal is to use a dike around the fill area that will keep out a 500-year flood and to control overland flooding should it occur. The dike will also serve as a diversion for stormwater within the area to control sediment and runoff. Runoff will be diverted to a stormwater basin where sediment can be settled.

The proposed facility will need a permit for stormwater in compliance with the Department's Water Quality rules. NDDHWQ indicates they would like a copy of the Stormwater Pollution Prevention Plan (SWPP). The plan should describe how maintenance of the sediment basin will be accomplished without causing damage to the basin and the inspection and maintenance frequency of selected erosion and sediment control measures (i.e., filter fabric fences) used on-site. The Department will recommend a condition in the permit requiring the pond be designed to facilitate periodic cleanout of sediment and a copy of the SWPP be submitted. Combined with the emphasis on erosion control discussed earlier, the facility, if approved, should control sediment and water quality impacts. Grand Forks proposes to connect the leachate collection system directly to the City's sanitary sewer, so the ability to manage and treat leachate should be well afforded.

Design

The proposed landfill has a liner system that consists of 6 inches of prepared clay-rich soil sub base immediately overlain by a 60-mil HDPE-textured flexible membrane liner (FMIL), 6 oz. double-sided geocomposite drainage layer, 60-mil HDPE-textured FML, 6 oz. double-sided geocomposite drainage layer, and 12 inches of protective cover material. The 6 oz. double-sided geocomposite drainage layer meets the specification of having a hydraulic conductivity of 1×10^{-3} centimeters per second or greater and a transmissivity of 3.0×10^{-2} centimeters squared per second or greater. The proposed liner system provides leachate collection efficiency exceeding 99% through the active landfill life and postclosure period. The materials used for the liner system are resistant to leachate and potentially saline groundwater. The projected settlement ranges from near 0 at the edges to up to 9 feet in the center. The strain on the liner is expected to be less than or equal to 0.12%, which is far less than the allowable strain on the liner of greater than 1%. The settlement of the landfill could help with the efficiency of the leachate collection system as the bottom of the cells will slope inwards towards the leachate collection sump.

The proposed leachate collection system consists of the two geocomposite drainage layers between the two liners and the floor of each cell slopes 1% in the longest direction and 2% in the shortest direction to the central sump. The leachate collection system for the proposed landfill will have a collection efficiency of greater than 99% and appears to be capable of maintaining a hydraulic head of 12 inches or less on the liner. A 48-inch diameter HDPE leachate sump riser, located in the middle of the sump, will be installed in each cell. The leachate sump riser will be installed in phases as the cell is built up. Leachate will be collected in each sump and removed by a pump in the riser. The leachate will then be pumped through a 4-inch force main along the top of the liner to a lift

station located on the west side of the cell. The lift station will pump the leachate through another force main and then to an influent line to the City's wastewater treatment plant (WWTP). It appears that the leachate collection system meets the requirements of the Department.

It appears that the proposed double liner-double leachate collection system meets and even exceeds the requirements of the state and federal solid waste rules. In addition, the compacted clay layer underlying the lower FML liner, could significantly reduce flow from any leaks (one per acre was used in modeling) in the lower liner. Other MSW landfills in North Dakota have a single liner with single leachate collection system.

To protect the liners from damage due to waste placement, operations, etc., the application proposes to place 12 inches of protective granular cover that has a maximum of 15% fines. Visual oversight of placement of materials is outlined as "continuous in the construction area" and the testing frequency will follow the construction specifications in table 5 of the CQA Plan; a Particle Size Analysis (ASTM D 1140) at 1 per 15,000 cubic yards, and a Hydraulic Conductivity (ASTM D 2434) 1 per 15,000 cubic yards. The Department agrees with the particle size characteristics and continuous oversight (should be a person experienced with soil properties); however, the testing frequency could be greater, and should address additional testing if any significant changes in material or material source are noted. This is proposed as a Draft Permit condition.

The proposed landfill has a collection sump and vertical riser in the center of each landfill cell, the lowest elevation and the area where waste will be highest. Thus, the sump should always be the lowest point and settlement should facilitate leachate flow to the sump. Sump settlement will eventually be into saturated soils. Such characteristics are not uncommon. Any leakage into the zone of saturation should be inward where it can be collected by the leachate collection system. As long as leachate is managed by the City, leachate levels and the potential for outward leakage should be minimal. If leachate recirculation is pursued, the quality of leachate should gradually improve and gas issues would abate (similar to a bio-reactor landfill). If a permit is to be issued, it is recommended that a condition require a commitment from the owner/operator that they will maintain the leachate system and pump leachate for as long as needed to show the facility and leachate conditions have stabilized.

Operations

Most of the waste screening and waste acceptance issues will be done at the baling/transfer station, not at the proposed landfill. Grand Forks has an adequate number of experienced staff that are well trained and certified by the state's Landfill Operator Training program. The state's certification program requires repeat training and certification every three years.

The proposed landfill operation was reviewed and appears acceptable for a landfill primarily receiving baled and bagged municipal solid waste. The bagged waste has been managed at the current landfill for some months. It appears to function as an alternative cover and addresses issues

of windblown litter, fly and rodent control, etc. It is proposed to have a condition in the Draft Permit stating:

“The cover frequency identified in the plan of operation is acceptable as long as the bagged bales act similar to a landfill tarp or alternative cover and solid waste vectors are controlled; however, the Department reserves the right to require modifications in cover materials, cover procedures and processes if it deems necessary.”

A condition is also suggested requiring an industrial waste management plan for any acceptance of any non-putrescible waste, ash, contaminated soil or similar waste proposed for disposal. This is intended to ensure adequate characterization and management of such materials.

The application includes self-inspection procedures and checklists. It is recommended the permit specify that the applicant meet with the Department to coordinate inspection procedures. It is also recommended that all personnel involved in solid waste handling and in the facility operation or monitoring be provided a copy of the permit and be instructed in specific procedures to ensure compliance with the permit, the facility plans, and the Solid Waste Management Rules.

Closure

The proposed final cover consists of 18 inches of compacted clay liner/cap on top of the waste, 12 inches of clay-rich material (SPGM subsoil) as a plant root zone above the clay liner and 6 inches of vegetative soil layer (SPGM topsoil). The proposed final cover appears to have a precipitation rejection efficiency of 98.66% according to the HELP model. This exceeds the required minimum of a site efficiency of 95%. Also proposed for the final cover are 4:1 slopes. It was shown that with 4:1 slopes, the proposed landfill cover will not have surface soil loss of more than one-tenth of one percent per year for the first year, and one-hundredth of one percent per year thereafter; meeting the current erosion allowances in the Solid Waste Management Rules.

Some landfills are considering alternative covers that rely on good to excellent stands of native vegetation combined with good soils to control surface water infiltration through evapotranspiration. Recent research on allowing some water to get into the waste, combined with leachate management, helps promote waste decomposition in a controlled manner, which can reduce long-term liabilities. Grand Forks' proposed final cover system will use an 18-inch compacted clay layer overlain with 12 inches of subsoil SPGM and 6 inches of topsoil SPGM. The final cover system will not rely on a synthetic component. Compacted clay layers are subject to frost and root damage, allowing water infiltration. There are advantages of a cover system that relies on good grass growth and some water infiltration, and the design could facilitate waste breakdown in a controlled manner. Recent research on the advantages of allowing some water to get into the waste, combined with leachate management, suggests that promoting waste decomposition in a controlled manner can reduce long-term liabilities. The City is considering leachate recirculation, which can hasten breakdown of waste and allow for collection of gas. Recent research indicates leachate quality significantly improves over time if waste is allowed to break down. If this facility is approved, the Department would work

with the City to address leachate recirculation and gas control. It is recommended the permit have a condition requiring long-term maintenance of the leachate collection system and a commitment from the City to collect leachate as long as it is necessary. If operated with leachate recirculation and well maintained, the leachate quality should improve over time.

For the type of proposed cover, it will be very important that the soils used in the cover are suited for growing and sustaining a vegetative cover. The application indicates soils for the closure area will come from cell construction plus borrow pits on-site. A soil survey was performed and showed that there is approximately 171,126 cubic yards of SPGM topsoil, 896,650 cubic yards of SPGM subsoil, and 915,727 cubic yards of deep subsoil (clay layer). The proposed site appears to have enough deep subsoil and SPGM subsoil in order to meet the requirements for daily cover and the final cover. There appears to be a deficit of approximately 40,000 cubic yards of SPGM topsoil. It has been proposed that the deficit can be overcome by removing additional SPGM topsoil from areas of the site that are not currently expected to be disturbed or by amending the soils that do not currently meet the SPGM criteria in order to make suitable SPGM topsoil. Any additional borrow areas must be identified for approval by the Department unless they are remote from the site. There are industrial sources of topsoil in the area. Additionally, with some modifications, the City's current composting operation at the existing solid waste facility could be adapted to manufacture suitable compost for making topsoil SPGM suitable for use in final cover. Compost could also be used in establishing vegetation on borrow areas. The services of a soil classifier would be needed on a regular basis to monitor topsoil SPGM and subsoil SPGM segregation and management, and to coordinate additional borrow activities and soil amendment.

Financial Assurance

Grand Forks submitted additional information on financial assurance on November 26, 2008. The City meets the financial assurance provisions using a financial test pursuant to Section 33-20-14 NDAC.

Draft Permit Preparation

On November 26, 2008, the Department prepared a rough draft of a proposed permit with 39 conditions, many of which are general to most permits for MSW landfills and some specific for the proposed facility. The Department understood that the North Dakota Newspaper Association would have it published on December 2, 2008. A PDF copy of a rough Draft Permit was sent to the Solid Waste Program staff, the applicant, and its consultants prior to the Thanksgiving break and publication of the Public Notice. On December 1, 2008, the Department spoke with the applicant and the consultant about nine of the conditions. The Department learned the Public Notice had been published on November 29, 2008.

As a result of discussion with the applicant, the Department agreed that some changes appeared appropriate for eight Draft Permit conditions. In addition, one condition could be eliminated as it was duplicative.

The changes proposed for the final Draft Permit included adjustments or clarification of dates and timelines on conditions **E.12.**, **E.16.**, and **F.6.** In addition,, Draft Condition **E.14.** was changed to clarify intent to limit any expansion outside of the approved area. Condition **F.4.** on waste education, reduction, and recycling was revised to better reflect the activities and needs of the area and to clarify the voluntary goals of the state law on recycling.

The City indicated the maximum approved amount of waste allowed for disposal specified in Condition **F.3.** could be reduces from 499 tons per day to 350 tons per day.

The rough Draft Conditions **F.14.** and **F.15.** that would have required preparation and submission of plans on revegetation and erosion were revised to remove the requirement for plan submission. These plans had already been completed as part of the application packet and the Department agreed they appeared sufficient. The revised final Draft Permit conditions still allow or facilitate coordination with the Department on these issues.

Finally, Draft Condition **F.21.** was deleted as it was a duplicate of Draft Condition **F.17.**

The Department has a document comparing the November 26, 2008 rough Draft Permit conditions with the changed December 2, 2008 final proposed conditions. A copy of the December 2, 2008 Draft Permit is available from the Department. The Department would also provide a copy of the November 26, 2008 rough Draft Permit upon request.

Conclusions

Based on review of the Grand Forks “Application for a Solid Waste Management Facility Permit” dated October 13, 2008, and amendments, supporting documents, site reviews, guidance documents, and correspondence listed in the attached Draft Permit, it appears the proposed City of Grand Forks MSW landfill is in accordance with Solid Waste Management Rules subject to issues outlined in this review and conditions proposed on the Draft Permit, subject to public review and comment.

SJT:ljl
Attach.