

March 5, 2007

Attn: Mr. Alex Moon  
Energy & Waste Management Bureau  
Iowa Department of Natural Resources  
502 East 9<sup>th</sup> Street  
Wallace State Office Building  
Des Moines, IA 50319-0034

RE: Comments on Proposed Rule 567-Chapter 113 “Sanitary Landfills for Municipal Solid Waste: Groundwater Protection Systems for the Disposal of Non-Hazardous Wastes”

Dear Mr. Moon:

HDR, Inc. (HDR) is an architectural, engineering and consulting firm with more than 140 locations world wide. For over 35 years, HDR has been an innovative leader in developing solid waste management programs, systems and facilities. We have been involved in all aspects of evaluating, planning, designing, and procuring both traditional and trend-setting facilities. This experience includes participation on more than 300 landfills nationwide. In 2006, *Engineering News-Record* ranked HDR at No. 2 of the top fifteen design firms in solid waste. As an international firm committed to sound solid waste management and extensive experience in landfill permitting and design, we welcome the opportunity to comment on Iowa’s proposed regulations for municipal solid waste landfills.

HDR has reviewed the proposed regulations referenced above and offers the following input and comments. In general, HDR does not believe that use of prescriptive criteria provides the best methods of protecting the groundwater and environment. Many of the prescriptive criteria can result in increased costs and reduced landfill capacity without significant benefit, and can hinder owners and engineers from optimizing site designs within reasonable costs. The U.S. Environmental Protection Agency (USEPA) purposely avoided prescriptive requirements and instead established minimum technical guidance, which they felt were applicable in most settings. As such, HDR’s general recommendations are that the Iowa Department of Natural Resources (IDNR) consider either eliminating prescriptive requirements or add provisions to allow design alternatives, based on engineering analysis and supporting documentation and subject to IDNR approval. Such alternatives should not require a variance. The following paragraphs provide additional specific comments on various sections of the proposed, revised regulations.

**Comment 1 – Purpose and Standards of the Revised Regulations.** Our review of the regulations identified numerous conflicts between the stated purpose in the Notice of Intended Action, statement of purpose under 567–113.1(455B), and the resulting regulations. Examples of these include the following:

1. “The [Department’s Solid Waste Rules Revision Plan] called for subsequent rule making to revise Department rules for MSW landfills so that they more closely mirrored the [USEPA] requirements found in 40 [CFR] Part 258.” Many of the rules are not derived from nor do they mirror Subtitle D. The basic differences include potentially conflicting language and the inclusion of prescriptive standards.
2. The first statement of purpose under 567–113.1(455B) Purpose, is “The purpose of this chapter is to protect human health and the environment through the implementation of minimum national standards pursuant to ... [RCRA] for all municipal solid waste landfill (MSWLF) units...” Many of the rules go beyond the “minimum national standards” and thus seem to exceed the stated purpose of the rules.
3. The use of prescriptive language by IDNR can add unnecessary costs for engineering, construction and operation, not intended by Subtitle D, with no documented certainty that they will increase groundwater protection or further protect human health and the environment beyond the Subtitle D standards.
4. The prescriptive standards can restrict or prevent the implementation of the most appropriate and most cost effective designs and monitoring standards. Each landfill site has some potentially unique requirements. As such, the prescriptive compliance requirements force the owner/operators to spend additional money to obtain variances and will increase IDNR costs to review these requests.
5. Numerous statements in IDNR’s Notice of Intent acknowledge incorporation of regulatory changes that are not addressed in the federal regulations. Based on our knowledge of the process that the USEPA went through in promulgating their regulations (and discussions in the preamble to Subtitle D), we believe that the USEPA recognized the limitation of prescriptive requirements when finalizing RCRA Subtitle D requirements and enacted performance based requirements to allow site-specific implementation of regulations.

**Comment 2 - 567-113.2 - Applicability and Compliance.** It is recommended that IDNR allow landfills currently designed, constructed and operated in compliance with USEPA Subtitle D regulations to be considered “compliant.” Examples of potential regulatory conflicts include the following:

1. In Paragraph ‘(1)’ it states, “All sanitary landfills accepting municipal solid waste must comply with the [new] provisions of this chapter.” Absent this recognition, current fully Subtitle D compliant sites would be required to close or expend significant money to demonstrate compliance (request variances) with the IDNR rules that go beyond Subtitle D.
2. Paragraph ‘(5)’ states that “MSWLF units that received waste after October 9, 1991, but stopped receiving waste before October 9, 1994, are exempt from all requirements of this chapter, except the final cover requirements specified in subrule ...”. The proposed regulations for the landfill cap exceed the requirements of federal Subtitle D. Since landfills closed following 1994 did not know of the more restrictive requirements of the proposed regulations, they could arguably be required to remove their landfill cover, modify the compacted layer, and reinstall the landfill cover to meet standards that go beyond Subtitle D. Appropriate language should be added to exclude landfills that were closed in accordance with the federal Subtitle D requirements.

3. Paragraph '(6)' states "Municipal solid waste landfill units failing to satisfy these criteria are considered open dumps." This is language from federal Subtitle D (40 CFR 258.1(g)), which applied to pre-Subtitle D landfills (i.e. unlined). However, the proposed IDNR regulations have prescriptive language requirements beyond Subtitle D. As such, the proposed regulations could be interpreted to place even Subtitle D compliant landfills in the category of "open dumps".
4. Paragraph '(9)b' states that "Existing MSWLF units that do not comply with the leachate collection and liner requirements ... shall close by October 1, 2007." This could be interpreted as requiring closure of fully Subtitle D landfills, because they don't have the added prescriptive requirements in new IDNR regulations.

**Comment 3 – Clarifications.** In the added prescriptive rules, there are design, construction and operating criteria that have been imposed that should be clarified. Examples of this include the following:

1. Paragraphs 113.2'(9)b' and 113.8(2)b(4) state that "At least 4 feet of waste, cover material, or alternative cover material...shall be placed over the top of the leachate collection system in the bottom of the MSWLF unit before December 31 of the year in which construction of the new MSWLF unit begins." It is recommended that the owner be allowed to include the 12 inches of drainage layer and that the actual physical separation be linked to a design code frost depth, which may vary from northern to southern Iowa.
2. Section 567-113.3 Definitions of Aquifer: The terms "appreciably" and "usable amounts" in the IDNR definition of aquifer should be defined or quantified. It is possible the non-continuous moisture pockets often found in Iowa's glacial till could be monitored as a result of a vague definition of an aquifer. This would thus not provide the desired protection to truly valuable groundwater. The concept of "usable" may be equally problematic in attempts to define an aquifer vs. an aquitard. Absent a quantification of yield, some might interpret usable as the ability to retrieve an amount of water, without regard to time or quality. As such, it is suggested that the concept be changed to reflect "economically useful". This then allows an analysis of yield vs. cost, to define the concept of usable. In Iowa, as with Nebraska and other surrounding states, regulators often take the first saturated zone to be an aquifer, without consideration of connectivity and flow characteristics. Because of the glacial nature of much of Iowa's geology, it is possible that monitoring wells would get installed in perched water formation. As a result, the monitoring does not, in fact, include the aquifer intended to be protected. While a fully compliant Subtitle D liner is, in USEPA's opinion, adequate for essentially all locations, the clear definition of an aquifer will allow the owner to consider such items as vertical and lateral conductivity in selecting the most appropriate monitoring systems and the owner will only need to monitor groundwater that requires protection. The definition of the terms "aquifer" and "uppermost aquifer" is critical, since groundwater monitoring systems at landfills are required to monitor the uppermost aquifer.
3. Section 567-113.6(2)g – Threatened or endangered flora and fauna. Item (1) under this heading requires "All MSWLFs and lateral expansions shall prepare a comprehensive listing of plants and animal species." It is suggested the term "comprehensive" be clarified since a full inventory can be quite costly and could change over time. Rather, it is

suggested that this list be clarified to include only threatened or endangered flora and fauna species (as the subheading suggests).

4. Section 567-113.9(2) – Landfill gas. Paragraph ‘a(3)’ requires that “Subsurface migration of methane gas does not occur beyond the property boundary of the facility.” Paragraph ‘a(2)’ requires that “The concentration of methane gas does not exceed the lower explosive limit for methane at the facility property boundary;” Paragraph ‘a(2)’ mirrors the Subtitle D regulations in 40 CFR 258.23(a)(2), while paragraph ‘a(3)’ exceeds the federal regulation and appears to contradict the proposed regulation in paragraph ‘a(2)’.

**Comment 4 – Section 567-113.6(2)i – Groundwater.** There are prescriptive provisions in the new rules related to groundwater that can add costs and not result in greater protection. Examples of this include the following:

1. Separation from groundwater requires that “The base of an MSWLF unit shall be situated so that the base of the proposed unit is at least 5 feet above the high water table ...”. This provision does not mirror the federal Subtitle D regulations, which require the facility to show that the groundwater will not be impacted by the operations (40 CFR 258.40(a)(1)), and might otherwise suggest a site-specific determination. Establishing this seemingly arbitrary value may have economic impacts to landfills by unnecessarily reducing the usable capacity of a site or adding unnecessary construction features. Subtitle D does not use the concept of vertical separation. There are very clear arguments, based on principles of physics, that would support construction of landfills below the groundwater table. These would suggest such options might better protect groundwater, because any flow would be inward, infiltration would be treated as leachate, and leachate generated in the landfill would not likely be released to the surrounding groundwater. Additionally, because groundwater migration is a function of geology, the engineer would need to consider such things as leachate transport (rather than a fixed value) in establishing if a physical separation is required.
2. It is suggested that a definition be provided for the term “high water table”. Seasonal fluctuations over long periods of time can result in variations greater than 10 feet at many sites. If such variations occur within 15 feet of the surface this could prevent excavation. In many locations in Iowa, the Loess overlying the glacial till is less than 10 feet and still can act as an aquitard; see also discussion of “aquifer” definition.
3. Additional clarification or guidance is requested on the proposed requirement of “The separation of the base of an MSWLF unit from the high water table shall be measured and maintained in a manner acceptable to the department.” The prescriptive requirements for vertical separation, measurement and maintenance are not a part of Subtitle D. In many cases, measurement may be impractical and any effort to achieve this would be at an added cost to the landfill.
4. If the separation requirement is retained, the definition of “base of an MSWLF unit” needs to be clarified. Is this “base” the bottom of the liner system or is it the bottom of the waste?

**Comment 5 – 567-113.6(3) – Soil and Hydrogeologic Investigations.** This section prescribes the minimum number of borings, the depth of borings, and frequency of sample collection during the investigation, without regard to a site’s geology or physical attributes.

1. Requiring a specific number of borings, specific boring depths, and specific sampling frequencies does not ensure an adequate site or “hydrogeologic characteristics of the facility and surrounding land”. For example, only by examining soils within a drainage-way can such issues as settlement or stability be fully evaluated. Existing regulation IAC 567-110 (455B) already provides that “All sanitary disposal projects shall conduct a soil and hydrogeologic investigation which conforms to the requirements of this chapter.” (567-110.2(2)).
2. The conflicts/contradictions between existing 567-110 and proposed 567-113 should be resolved. These exist in the areas of number of borings, depth of borings, and sampling of borings. It is suggested that regulations require an adequate characterization to allow for design, settlement, stability analysis and hydrogeologic characterization. Then, through guidance, IDNR can suggest typical patterns of investigation that would allow owners and IDNR to communicate clearly on the goals and adequacy of any investigation.

**Comment 6 – 567-113.7(5) – MSWLF Unit Liners and Leachate Collection Systems.**

This section prescribes minimum liner and leachate collection attributes, not prescribed in Subtitle D. These requirements may not consider site-specific or design specific considerations. It is possible that greater or lesser standards could be more applicable and can be economically beneficial to landfills. Examples of potential conflicts from these criteria include the following:

1. Paragraph ‘a(1)4’ states that “The composite liner must slope toward the leachate collection pipes at a slope greater than or equal to 2 percent.” This may be appropriate if geology is not prone to consolidation, which would cause problems with differential settlement; but in areas with more highly compressible subgrades, greater slopes may be necessary. Conversely, it is possible to construct cross-sloped areas on a herringbone pattern at a lesser slope that would function at a slope of less than 2 percent and would not result in head build-up on the liner. This assumes the granular drainage layer is properly designed and adequate consideration is given to collection pipe spacing.
2. Paragraph ‘a(1)4’ states that “The side slopes of the composite liner shall not exceed a slope of 33 percent.” Given the angle of repose of many of the soils typical to Iowa this does not appear to be based on slope stability criteria. Engineering techniques exist to construct stable liners at steeper slopes without risk of instability. It is suggested that proposed language be added to allow for the design of steeper slopes if adequate engineering analysis is provided to demonstrate the stability of the subgrade, liner and cover system. Steeper side slopes allow for a greater volume of waste to be disposed within the same size footprint, thus increasing the design life of the landfill.
3. Paragraph ‘a(2)4’ requires that the “alternative liner” must meet the same requirements for floor slope and side slopes as the standard liner design. If IDNR is going to allow for a true alternative liner design, it would seem prudent to allow flexibility in the design provided they are supported by sound engineering analysis.

4. Paragraph 'b(7)' requires "Components of the leachate collection system shall have a minimal carbonate content." The word "minimal" is subject to interpretation. If IDNR is concerned with calcification or precipitates plugging the leachate collection system, it is suggested that the rules ban the use of limestone or dolomite and/or state a specific/quantified value that would be used to limit the carbonate content. If this measure is designed to prevent ion exchange concerns where geosynthetic clay liners (GCLs) are employed, it is only necessary to restrict "calcium" carbonate.

**Comment 7 – 567-113.7(5) Relevant Point of Compliance.** Paragraph 'a(2)2' requires that "The relevant point of compliance specified by the department must be within 50 feet of the planned liner or waste boundary ..." Such a short distance exceeds Subtitle D requirements (150 meters (492 feet)) and can conflict with drainage structures and vehicular traffic. Further, there may be no certainty that such a closer point would in fact provide better detection. Examples of potential conflicts from these criteria include the following:

1. The Subtitle D regulations require the State Director to "consider at least" eight (8) factors listed under 40 CFR 258.40(d). The justification provided by IDNR in their Notice of Intended Action, Item 13, does not address any of these eight federal factors. IDNR states that they considered the "known soil types and hydrology of this state" [emphasis added], but the first factor in the federal regulations requires they consider "The hydrogeologic characteristics of the facility [emphasis added] and surrounding land". Consideration of proximity to a potential "leak" might suggest that an offset would allow better detection, whereas a close proximity may allow a leak to by-pass undetected. In any circumstances it appears that consideration of site-specific hydrogeologic characteristics and such items as preferential pathways may better serve as guidance in defining an appropriate point for monitoring or compliance.
2. Paragraph 'b(3)' requires "an additional measuring device shall be installed to measure leachate directly on the liner but not in the sump or within the collection trench." It is unclear why there needs to be "an additional" device and why it wouldn't be placed at the hydraulically low spot in the site (e.g. the sump). It is suggested that, if IDNR would like physical monitoring and evidence that head criteria has not been violated, a continuous monitoring system be installed in the sump or at an equivalent low point. A reading at any other location would only serve to allow one to infer the actual depth of leachate (possibly incorrectly) and where the sump is adequately sized such a remote monitoring point may not accurately reflect true head on the liner. In Iowa's climatic setting, it is most likely that with a properly designed and constructed leachate collection system, the worst case flow in the leachate collection system will occur in conjunction with initial filling activities and diminish as fill height progresses. Absent automated pumping or full gravity discharge it is also likely that head build-up will occur within an unmonitored or inadequately pumped sump. As such, anything less than continuous in-fill monitoring would be of limited utility. The exceptions may be monitoring at a site that attempts to operate as a bio-reactor. In the later case, measurements may have applicability to demonstrate/validate that operational practices associated with leachate injection do perform in accordance with the modeled design. Provided that monitoring is continuous, there would be no reason for redundancy ("additional measuring devices"); the current concept of quarterly monitoring

is the least likely to ensure head on the liner is not violated. Across the U.S., landfill designs approved under Subtitle D regulations have routinely used transducers in the sump or collection trench to measure leachate levels.

**Comment 8 – 567-113.7(5)b(7) –Leachate Collection Systems.** Paragraph ‘b(7)’ dictates requirements for the design and construction of the leachate collection system which are beyond both Subtitle D regulations and USEPA guidance. The proposed leachate collection system criteria will almost certainly be more costly and difficult to construct, and could increase heavy equipment operating hours in proximity to the HDPE liner component, increasing damage risks. Furthermore, good engineering practice has shown that a single homogenous layer can provide an adequate leachate collection system without the inherent concerns with the prescribed multilayer system. Examples of potential concerns from these criteria include the following:

1. IDNR is requiring the leachate collection system to be constructed of 4 components. This will make construction of the leachate collection system more difficult and problematic, and could result in negative impacts to the effectiveness of the leachate collection system. Item 1 under paragraph ‘b(7)’ requires a geotextile cushion over the FML, which is assumed to be required for puncture protection. However, this is not necessary in most applications where small, well-rounded gravel is used and large loads are not imposed on the FML. Calculations can be prepared to determine the potential for puncture of the FML by the overlying granular material and to determine if a geotextile cushion is needed.
2. Item 3 allows the use of a geonet with a thickness to be determined using appropriate design calculations, as long as it is at least 300 mils thick. Since the regulations allow design calculations to be performed, it is suggested that the requirement for the minimum thickness should be determined by design analysis. In fact, some states have discouraged the use of such high conductivity media on the floor on the landfill due to plugging concerns, which could then significantly raise the head on the liner.
3. Item 4 requires that a geotextile be installed between the high hydraulic conductivity material and the coarse granular material. This is contrary to standard practice in many states and is not required if calculations shows adequate flow capacity through the high hydraulic conductivity leachate collection layer. Such an installation will almost certainly result in higher costs for construction and potentially greater risks to the FML, without certainty of any additional benefit. Also, history has shown that filter geotextiles have the potential for biologic and fine particle plugging. It is suggested that IDNR remove this requirement and where such a geotextile is used, require an experienced engineer to provide appropriate plugging analysis. Furthermore, it is not clear that 2 inches of cover, as a prescriptive requirement, will protect the integrity of a pipe, especially from construction related loading. Cover depth should be established by engineering design of the system and not prescriptive methods. This recommendation is made because the strength of the pipe is a function of diameter, wall thickness, deflection, possibly bedding, and method of load applications. As such, 2 inches over the collection pipe does not provide certainty of protection.
4. Item 5 requires that a coarse granular material be installed over the high hydraulic conductivity material. Use of a coarse material increases the potential for waste and fine

particle intrusion and thus increases the risk for plugging of the coarse layer and the geotextile. It is suggested that IDNR allow the use of a homogeneous 12-inch leachate collection layer, without the inter-bedded geotextile. Also, because of limitations inherent in the USEPA HELP model, it will be difficult to demonstrate the 12-inch head requirement when the upper layer of the proposed system must be modeled as a vertical flow path.

5. We recommend that IDNR also allow continued use of Subtitle D compliant designs that are currently constructed and previously approved by IDNR, and shown to operate effectively.

**Comment 9 – 567-113.7(6) – Quality Control and Assurance Programs.** Simpler, less costly, less time consuming, and equally (or more) efficient options may be available than currently described. Since the inception of Subtitle D, the use of double-ring infiltrometers has become less common because of associated problems and limitations. Examples of potential concerns from these criteria include the following:

1. Paragraphs ‘b(2)1’ and ‘b(2)2’ require testing the compacted soil liner with a double-ring infiltrometer. This technique is no longer common in the landfill industry for several reasons, including:
  - it is a destructive method, which could create a pathway in the recompacted clay liner;
  - the test is time consuming; and
  - equally reliable results can be obtained by alternate means.

This destructive test can easily be avoided by:

- borrow source testing;
- continuous monitoring by experienced professionals; and
- use of demonstrated construction methods, such as a test pad prior to liner construction.

Continuous observation can do far more to ensure quality and consistency than does large-scale intrusive test methods. The use of complex field or laboratory testing of hydraulic conductivity, at the time of construction, can also significantly slow a project’s progress, thus increasing costs. IDNR may wish to consider allowing the use of the Acceptable Zone Methods (Daniel and Benson 1990), as discussed in EPA/625/4-91/025. While validation of field construction techniques is appropriate, a landfill can also develop a database of testing that would allow liner performance to be validated by controlling borrow soil type (frequent Atterberg Limits and percent sand and gravel), and validation of construction methods (clod size, disking, bonding, compaction, etc.), through observation (by trained professionals, as recommend by USEPA), and through less intrusive testing (field density and moisture content). Where landfills are set in a relatively homogeneous geologic setting, such methods can be cost effective and save time.

2. Paragraph ‘c’ requires the QC&A officer to develop and implement the sampling and testing program. The QC&A officer is frequently not the same person or firm that develops the designs or writes the CQA plan (i.e. sampling and testing program) for the

permit. Furthermore, the QC&A officer may change with each phase of construction. Therefore, it is suggested that the CQA plan be a part of the permit and that the QC&A officer be a professional engineer, who oversees implementation and signs the resulting documentation of compliance. As such, it is suggested that Paragraph 'c' be revised as follows: "... shall be ~~designed and~~ implemented by the QC&A officer as part of the ...". Also, it is recommended that Paragraph 'c(2)' be revised as follows: "Be designed by ~~the QC&A officer~~ a professional engineer (P.E.) registered in Iowa and approved by ..."

**Comment 10 –567-113.7(7) – Vertical and Horizontal Expansions of MSWLF Units.** The regulatory language in this section would impact landfills which were built and operated in full compliance with Subtitle D by imposing additional requirements. As such, it also has potential economic impacts to landfills. Examples of potential concerns from these criteria include the following:

1. Paragraph '(1)' states "A vertical expansion of an MSWLF unit shall not be allowed if the MSWLF unit does not comply with subrules 113.7(4), 113.7(5) and 113.7(6)." The regulations found in 113.7(5) and 113.7(6) are more restrictive than the federal Subtitle D regulations. As a result, one could interpret this as to prohibit existing landfills built in full compliance with the federal Subtitle D regulations to expand vertically. It is suggested that this regulation be changed to read "... does not comply with ~~subrules 113.7(4), 113.7(5) and 113.7(6)~~ the federal Subtitle D regulations."

**Comment 11 –567-113.8(2)b. – First Lift.** If the intent of this regulation is frost protection of the recompacted clay layer, less stringent standards or more cost effective options could be employed. Additionally, depths of cover criteria should include consideration of the leachate collection layer, moisture content and material types. An example of potential concern from these criteria includes the following:

1. Paragraph 'b(4)' requires "At least 4 feet of waste, cover material, or alternative cover material... shall be placed over the top of the leachate collection system in the bottom of the MSWLF unit before December 31 of the year in which construction of the new MSWLF unit begins." The 100-year frost depth criteria, often used on building construction, may not be applicable since the waste may act as an insulating layer (see ASCE publication 32-01 on shallow foundation protection). Additionally, full frost penetration does not typically occur until late winter (e.g. late-January/early-February), and maximum predicted frost-line depth also varies from north to south across Iowa, which suggests that one criteria is not always applicable to all sites.

**Comment 12 –567-113.8(2)f(2) - Intermediate cover.** This regulatory criterion exceeds Subtitle D standards and likely cannot be shown to provide additional environmental protection. Additionally, landfills that adhere to these prescribed standards tend to use far more soil than necessary and unnecessarily fill usable air space with un-recoverable soil. While the intermediate cover soil is theoretically all recoverable, actual practice indicates that this is not realistic. Additionally, landfills incur added costs to install such soils and can incur additional costs to remove them. An example of potential concern from these criteria includes the following:

1. 40 CFR 258.21 requires the daily placement of 6-inches of soil cover in order to control disease vectors, fires, odors, blowing litter, and scavenging. The concept of requiring an intermediate cover is usually related to establishing a vegetative cover based on concerns with controlling erosion or airborne dust particulates. To comply with IDNR criteria, landfills will require a potentially larger borrow site (e.g. potentially more disturbed area) and require covering activities during months when vegetative growth is not possible. As such, the concepts of intermediate cover for an area not receiving waste for 30 days may be counter-productive and costly, particularly when there are other methods available to address these concerns.

**Comment 13 –567-113.10(2) – Groundwater monitoring systems.** Existing regulation IAC 567-110 (455B) already addresses this requirement. As such, the proposed 567-113.10(2) is redundant, and contains contradictory provisions to the existing 567-110. These areas of contradiction are generally more restrictive. If the proposed regulations are put into effect, existing monitoring wells that had been constructed in accordance with the existing regulations in 567-110 could arguably be considered in violation of 567-113.10(2). Examples of potential concerns from these criteria include the following:

1. Grouting the annular space of monitoring wells in existing 567-110.11(5) requires sealing with expanding cement or bentonite grout. Proposed 567-113.10(2)c(8)2 requires sealing with only bentonite grout.
2. Spacing between down-gradient monitoring wells in existing 567-110.10(2) allows a maximum spacing of 600 feet. Proposed 567-113.10(2)e(2) allows a maximum spacing of 300 feet. Prescriptive intervals in general do not assure an appropriate monitoring system, since flow may occur along specific or preferential pathways. In a theoretical argument, the better the liner construction, the smaller/fewer the leaks, thus the closer the well spacing required to detect that leak. However, IDNR may wish to consider the converse of this argument; the better the liner construction and QC program, the less likely the leak. Thus monitoring of a liner and leachate collection system employing the stringent subtitle D guidance should require less monitoring (wells and well spacing). The placement of wells should be based on hydrogeologic data that targets clearly defined flow paths versus fixed spacing intervals. Modeling as a means of establishing well placement and spacing will require IDNR guidance. The appropriateness of selected models and the interpretation of results, coupled with potential costs of obtaining input parameters and addressing variability (preferential pathway inclusions in a glacial till) can also make reaching consensus between modelers and regulators costly and subjective. As such, some guidance on acceptable demonstration techniques would be appropriate.
3. Abandonment of monitoring wells in the existing 567-110.12(2)a regulations allows the casing to be left in-place and grouted. Proposed 567-113.10(2)d(2) requires removal of the casing prior to grouting.

4. Proposed paragraph ‘a(3)’ requires that “Each groundwater underdrain system that discharges to surface water shall be included in the groundwater monitoring system, and the maximum drainage area routed through each outfall shall not exceed 10-acres unless approved by the department.” Unless there is some reason to support a 10-acre value, it is suggested that the landfill designer/engineer/hydrogeologist be allowed to determine the area, based on drain flow capacity, site development sequencing, and the ability to monitor the landfill using the drains.

**Comment 14 –567-113.10(3) – Surface Water Monitoring Systems.** This regulation is more restrictive than the federal Subtitle D regulations. The language in 40 CFR 258.27 is clear, simple, and requires that a MSWLF unit does not cause a discharge into waters of the U.S. that violates any requirement of the Clean Water Act, including NPDES requirements, or violates any requirement of an area-wide water quality management plan. All sites are required to have an NPDES permit. Surface water requirements are adequately addressed by the requirement that MSWLF units shall not cause a discharge in violation of the NPDES requirements (113.10(1)a). Proposed CWA – NSPS rules (Part L) address discharges from MSW landfills and discharge limitations.

**Comment 15 –567-113.10(5) – Detection Monitoring Program.** It is suggested that the language from federal Subtitle D, 40 CFR 258.54 (a)(1), be added, stating: “The Department may delete any of the monitoring parameters in Appendix I if an owner or operator of a solid waste disposal area can show that the removed constituents are not reasonably to be in or derived from the waste contained in the MSWLF unit.”

**Comment 16 –567-113.12(455B) – Closure Criteria.** The new requirements are more restrictive than Subtitle D regulation in that they establish increased thickness for both the infiltration and erosion layers. This requirement also adds cost to the landfill construction and financial assurance costs. It is unclear if there is any real benefit that is proportional to the added costs since the primary barrier to infiltration is the FML, followed by proper drainage. Examples of potential concerns from these criteria include the following:

1. Reducing the requirement for hydraulic conductivity of the infiltration layer and increasing layer thickness 6 inches beyond Subtitle D standards (e.g. Paragraph ‘(1)a’ “... have a permeability no greater than  $1 \times 10^{-7}$  cm/sec...””) is not expected to provide any significant benefit because the soil infiltration layer is still in the range of 5 orders of magnitude more permeable than the overlying FML. We recommend using the Subtitle D language for the infiltration layer.
2. Paragraph ‘(1)(c)’ requires that the erosion layer “... contains a minimum of 24 inches of earthen material...”. Unless IDNR is attempting to establish an evapotranspiration (ET) cap, we have found no documented evidence that 24 inches is significantly better than 18 inches. The thickness should be adequate to support vegetation, and there is evidence that many grasses do not require 24 inches. Furthermore, a 24 inch erosion layer can be shown to be inadequate to serve as an ET cap. However, in combination with a 24-inch infiltration layer without compaction and without an FML, the combined 48-inch erosion layer could serve as an ET cap.

3. Paragraph '(1)e' requires that the final cover system "Have a slope between 5 percent and 25 percent." There are numerous examples where steeper slopes can be constructed on landfills. IDNR should consider allowing steeper slopes, provided an engineering analysis demonstrates that the slopes are stable and not exceeding USEPA or local soil loss criteria. Steeper side slopes allow for a greater volume of waste to be disposed within the same size footprint, thus increasing the efficiency of the landfill space and thereby reducing the frequency for landfill expansions.
4. We recommend that IDNR also allow continued use of Subtitle D compliant, final cover system designs that are currently constructed and previously approved by IDNR.

We appreciate IDNR's time in considering these comments. If you have any questions, or wish to further discuss the issues identified, please contact me at (402) 399-4904.

Sincerely,

HDR Engineering, Inc.

A handwritten signature in cursive script that reads "Lori J. Calub".

Lori J. Calub, PE  
Project Manager/Project Engineer