Montana Department of
ENVIRONMENTAL QUALITY
Brian Schweitzer, Governor
P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

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LEGISLATIVE ENVIRONMENTAL POLICY OFFICE

March 28, 2008

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William Redden, Route 1, Box 1199A, Hardin, MT 59034
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Environmental Quality Council, Capitol Complex, Helena, MT 59620
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State Historic Preservation Office, 225 N. Roberts, Helena, MT 59620
Montana Natural Heritage Program, P.O. Box 201800, Helena, MT 59620-1800
Jeff Rice, Maxim Technologies, P.O. Box 30615, Billings, Montana 59107-0615
Bruce Siegmund, Great West Engineering, P.O. Box 4817, Helena, MT 59604

Ladies and Gentlemen:

To comply with the Administrative Rules of Montana (ARM), specifically ARM 17.4.607(2), 608, 609 and 610, the Department of Environmental Quality (Department) prepared the enclosed Environmental Assessment (EA). This EA addresses the proposed expansion of the licensed boundaries at the existing City of Hardin Class II Landfill. The existing landfill is located approximately four miles east and ¼-mile south of Hardin off

Sarpy Road in the NW ¼ of Section 21, T1S, R34E, M.P.M, Big Horn County, Montana. The proposed landfill expansion will incorporate a 107-acre parcel immediately west of the current landfill. The proposed 107-acre expansion includes only 39.8-acres of useable property that will be utilized for the construction of a monofill for the disposal of coal combustion waste (CCW). The proposed CCW monofill will be constructed in two phases and will have a total capacity of 2,526,000 cubic yards (2,557,000 tons). The operating life of the proposed monofill is 25.7 years based upon a waste acceptance rate of 100,000 tons per year.

The purpose of this EA is to inform all interested governmental agencies, public groups, and individuals of the proposed action and to determine whether or not the action may have a significant effect on human health and the environment. The Department will not make a licensing decision until at least thirty (30) days after publication of the EA. A complete color copy of the EA may be viewed on the Department's website at *http://deq.mt.gov/ea/WasteMgt.asp*.

If you wish to comment on this proposed action within the 30-day period, please do so in writing by mailing your comments to the Waste and Underground Tank Management Bureau, Solid Waste Program, P.O. Box 200901, Helena, MT 59620-0901, or by E-mail to the mailbox *wutbcomments@mt.gov*. In addition, if requested, a formal public meeting may be held. However, requests for a public meeting must be submitted to the Department in writing by U.S. Mail at the address above, by E-mail to the mailbox *wutbcomments@mt.gov*, or by fax to 406-444-1374.

If you have any questions or need additional information, please contact me at the Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Program.

Sincerely,

Mary Louise Hendrickson
Project Lead
Solid Waste Licensing Program
Phone: 406-444-1808; Fax: 406-444-1374
Email: mhendrickson@mt.gov

Enclosure: Environmental Assessment—Hardin Class II CCW Landfill Expansion (28 p.)
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DEPARTMENT OF ENVIRONMENTAL QUALITY
Permitting and Compliance Division
Solid Waste Program
P.O. Box 200901
1620 E. Sixth Avenue
Helena, MT 59620-0901

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LEGISLATIVE ENVIRONMENTAL
POLICY OFFICE

ENVIRONMENTAL ASSESSMENT (EA)

Division/Bureau:

Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Management Section.

Project or Application:

The City of Hardin submitted a solid waste license application to the Montana Department of Environmental Quality (Department) for an expansion of the licensed boundaries at their existing Class II solid waste landfill (City of Hardin Class II Landfill). The proposed landfill expansion will incorporate a 107-acre parcel immediately west of the current landfill. The proposed 107-acre expansion area includes only 39.8-acres of useable property that will be utilized for the construction of a monofill for the disposal of coal combustion waste (CCW). The proposed CCW monofill will be constructed in two phases and will have a total capacity of 2,526,000 cubic yards (2,557,000 tons). The operating life of the proposed monofill is 25.7 years based upon a waste acceptance rate of 100,000 tons per year.

Description of Project:

Site Location: The site of the proposed license expansion area is situated near the northern boundary of the Crow Indian Reservation in the NW ¼ of Section 21, T1S, R34E, M.P.M, Big Horn County, Montana. The proposed expansion area property abuts the western boundary of the currently licensed City of Hardin Class II Landfill and is located approximately four miles east and ¼-mile south of Hardin off Sarpy Road (Figure 1).

Site Geography: The expansion area is located on the eastern flank of the Little Bighorn River valley. The area is characterized by non-glaciated, semi-arid, rolling high plains with limited surface water. The proposed expansion area is comprised of gently rolling southwest trending slopes that descend at an average rate of approximately 300-feet per mile. The nearest surface water occurs in the Little Bighorn River approximately ½-mile southwest of the proposed expansion area. A minor dry coulee trending from northeast to southwest drains the southern portion of the proposed expansion area property.

DEPARTMENT OF ENVIRONMENTAL QUALITY
Permitting and Compliance Division
Solid Waste Program
P.O. Box 200901
1620 E. Sixth Avenue
Helena, MT 59620-0901

ENVIRONMENTAL ASSESSMENT (EA)

Division/Bureau:

Permitting and Compliance Division, Waste and Underground Tank Management Bureau, Solid Waste Management Section.

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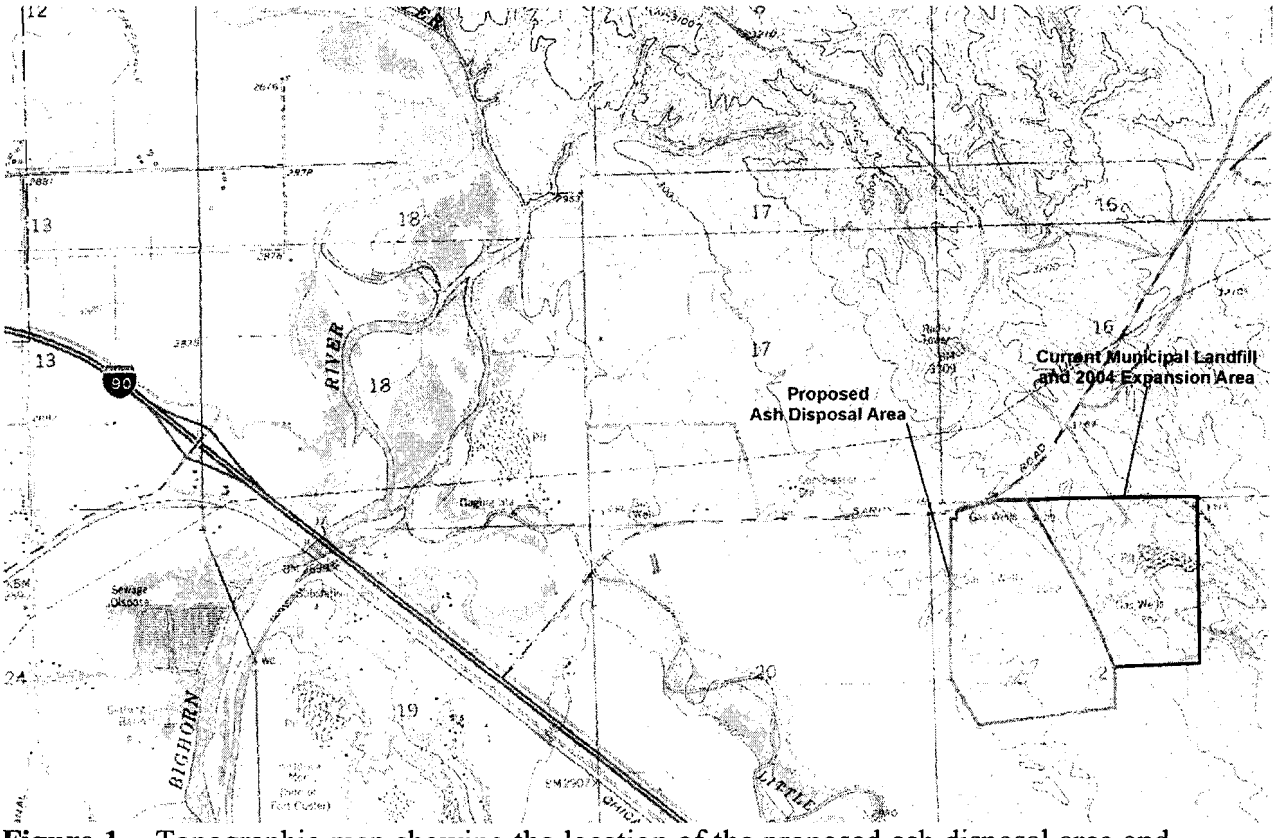

Figure 1 – Topographic map showing the location of the proposed ash disposal area and the existing City of Hardin Class II facilities. *(Source: Hydrometrics, Inc., December 2007)*

The semi-arid climate in the Hardin area is characterized by average annual temperatures ranging from a maximum of 62.1° Fahrenheit (°F) to a minimum of 31.8°F, and average annual precipitation of 11-inches. The statistical averages, however, do not reflect the climate extremes in the area. The temperature summary records for the period of record between 1948 and 2007 show temperatures as high at 112°F and as low as -47°F. During that same period, single precipitation events have yielded as much as 3.17-inches of rain. Based on a 1952 study at a location approximately three miles south of the proposed expansion area, evapotranspiration (ET) rates appear to exceed the annual precipitation rates. The study reported a total ET rate of 46.68-inches for the growing season. The low precipitation, combined with the high ET, restricts the rate of ground water recharge in the area.

The proposed expansion area is part of the Central Grassland ecoregion within the Northwest Great Plains ecosystem. The grassland vegetation consists primarily of western wheatgrass, needle-and-thread, bluebunch wheatgrass, blue grama, prairie junegrass, green needlegrass, thickspike wheatgrass, and fringed sage. The grassland habitat at the proposed site is abundant and not unique.

Wildlife forage and habitat at the proposed expansion site is typical of native grassland found on the open rolling plains adjacent to the uplands of south central Montana. Lacustrine or riparian areas are very limited and generally consist of minor stockwater ponds. Because of the limited availability of surface water supplies, land use is dominated by livestock grazing on rangeland with some dryland wheat, alfalfa, and hay farming that may be occasionally supported by irrigation in the river bottoms. Transient populations of grazing pronghorn antelope, mule and white-tailed deer, and elk and wandering predators like coyote and red fox may occasionally inhabit the expansion area and surrounding grassland. Permanent residence by burrowing small mammals like hares, jackrabbits, and rodents, reptiles, and frequent residence by numerous prairie avian species including waterfowl, crows, ravens, and raptors are more likely. Development and human population of the local area surrounding the proposed site is extremely sparse, thus displaced species may easily migrate to adjacent habitat that surrounds the facility.

No-migration Demonstration: The City of Hardin has received approval from the Department for its certified no-migration demonstration for the proposed expansion area. The City provided certified, site-specific data demonstrating that the relevant ground water protection standards will not be exceeded well beyond the minimum 87-year requirement (25-year life of the ash disposal area, plus 32-year life of the current Class II facility expansion, plus 30-year post-closure care period).

The uppermost aquifer beneath the proposed landfill expansion area is found within the Cloverly member of the Lower Cretaceous Kootenai formation. This aquifer is located at depths exceeding 2,600-feet beneath the proposed expansion area. Time of travel calculations show that if leachate was even able to penetrate the multiple bentonite-rich beds that are known to occur beneath the site, it will take more than 8,000 years for the leachate to migrate to this aquifer.

Existing licensing conditions: The City of Hardin Class II Landfill has been licensed and receiving municipal solid waste since 1994. In 2006, the Department approved the City of Hardin's request to accept and dispose of CCW in their currently active Class II unit on the condition that it remain segregated from the municipal solid waste being disposed of in the same unit. The CCW is currently being disposed of in the northernmost portion of the original Class II disposal area. The proposed expansion will allow the City to continue to dispose of CCW, but will provide for that disposal in a separate unit designed specifically for that purpose. The remaining space in the Class II unit will be reserved for the continued disposal of municipal solid waste.

Landfill Features: The waste disposal areas are the dominant features of the landfill. The originally licensed area encompasses a total of 76 acres, of which 17 acres is being used for active landfilling. In 2005, the Department approved a 36-acre license expansion south of the originally licensed footprint. Of the 36 acres, only 20.3 acres will be used for active disposal of municipal solid waste. The City proposes to license the additional 107-acre parcel located adjacent to the western license boundary for the disposal of CCW. This 107-acre parcel contains only 39.8-acres of useable space. The areas where CCW will be placed in the proposed expansion will be the dominant feature of the

expansion. Areas located adjacent to the proposed expansion area will be developed for stormwater management ponds, soil borrow, and soil cover stockpile areas.

Cell Construction - According to the proposed plan, the expansion cells will be constructed in two phases beginning in the northeast corner of the proposed expansion area (Figure 2). The entire expansion will facilitate the disposal of at least 2,526,000 cubic yards of waste over an estimated 25.7 years. Once the two cells are complete, the contiguous body of waste mass will be tied together into a single, mounded disposal unit that will be filled on average by 50-feet of CCW and capped by a continuous 5-foot layer of final cover soil. The cells will be excavated to an average depth of 20-feet below the current ground surface. The side slopes of the interior cell will be 1:1, and the average slope on the base will be three-percent. The floor of the cells will consist of re-compacted native material. Construction and disposal will commence with Phase I.

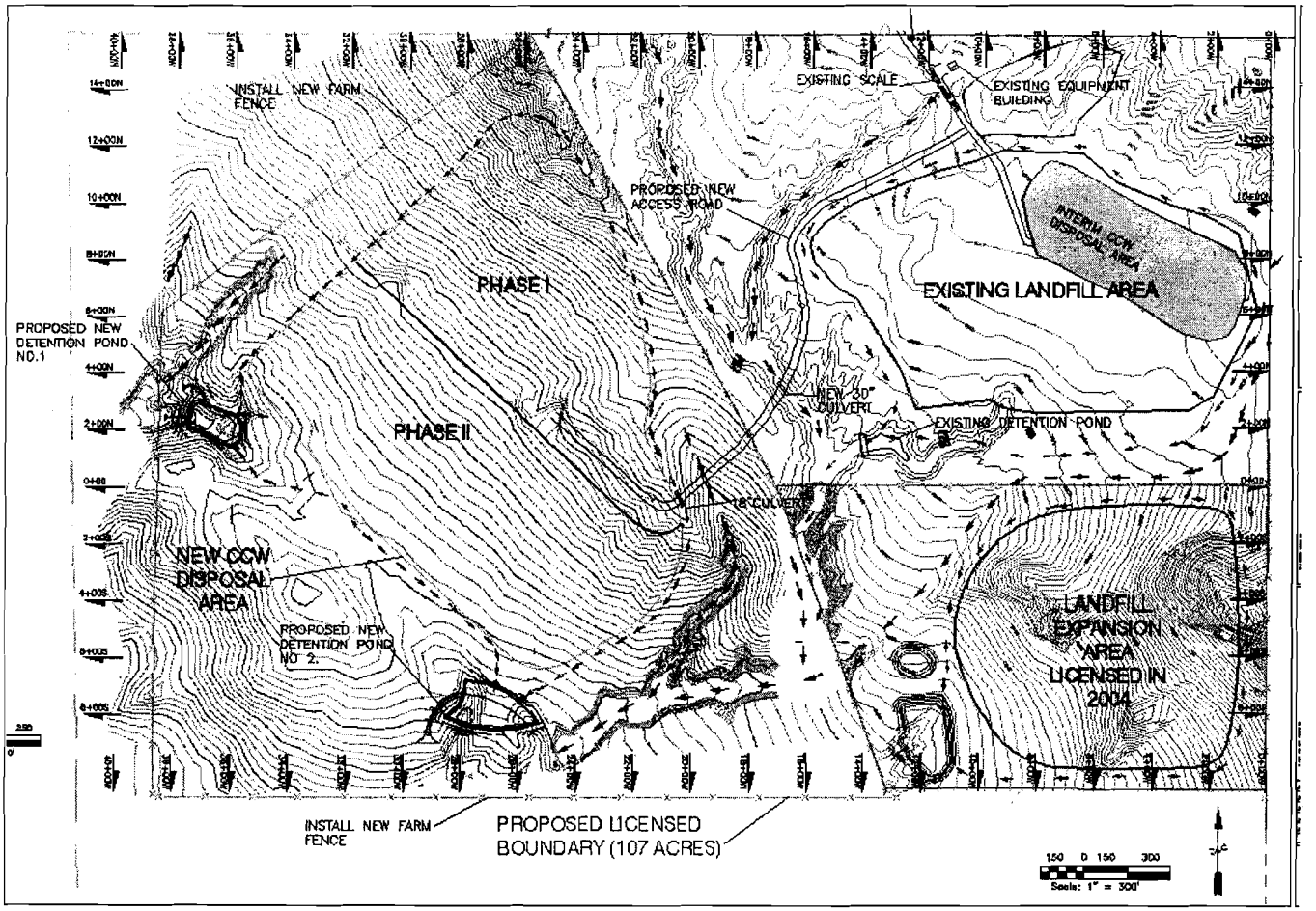

Figure 2 – Plan view showing the design features and phased construction of the proposed ash disposal area. *(Source: Hydrometrics, Inc., December 2007)*

The City of Hardin plans to fill each of the two phases (Phase I and Phase II) in five 10-ft high lifts. Each 10-ft lift will encompass an area approximately 300' x 200', will be filled in a northeast to southwest direction, and will take approximately 90-days to complete. The Department will require the application of a minimum of 6-inches of intermediate soil cover over the CCW on a quarterly basis.

Leachate Collection System – Leachate is generated as a result of water flowing through or contacting waste. Water will be added to the CCW to control dust. The solidification of the CCW with the addition of water, combined with the application of 6-inches of quarterly cover, should minimize the production of leachate. Therefore, the majority of leachate generated will likely consist of runoff from the uncovered, but solidified, ash lifts. A temporary leachate collection sump will be built into the toe of the disposal cell adjacent to the cut face. The leachate sump will be used to collect the runoff from within the CCW landfill. During the first year of operations, the liquid collected in this sump will be sampled on a semi-annual basis and analyzed for Table 1 metals. The liquid will either be allowed to evaporate or will be pumped back onto the CCW. Depending upon the amount of leachate generated and the results of the semi-annual analyses after the first year of operations, the Department will evaluate the need for a permanent leachate removal system.

Storm Water Detention Ponds, Drainage, and Sediment Control — Typical landfilling operations produce considerable suspended sediment in runoff during storm events due to the absence of vegetated cover and borrow. The facility will follow erosion, drainage control, and sediment best management practices (BMPs). Water flowing through or contacting waste is considered leachate and will not be allowed to mix with storm water. The design plans call for ditches and berms along all sides of the expansion area to divert storm water runoff from the active landfill cells. All storm water drainage will flow to one of two permanent storm water and sediment detention ponds located at the northeast portion and south side of the expansion area. These detention ponds will be built with a capacity to capture all sediment and runoff from the active landfill expansion area for a single 25-year, 24-hour storm event. They are designed with an earthen dam, spillway and a valved drain line for use in the event that the capacity is overtopped or emergency discharge of water is necessary.

Interior roads will have bar ditches and culverts to aid in surface water control. Long-term intermediate- and final-covered disposal areas will have positive drainage so that surface runoff will not pond over the waste or infiltrate the area where waste is being placed. Surface runoff from the covered disposal areas, borrow areas, soil stockpiles, and materials handling areas will also be routed to the storm water detention pond where it will be held for evaporation or land applied for on-site irrigation. Vegetation will be encouraged wherever it will minimize flow, erosion, and sediment transport.

Gate House & Equipment Storage Buildings — The existing site entrance, access road, gate house and scale, and equipment storage and maintenance buildings will be used during operation of the expansion area.

Soil Stockpiles — The engineering design plan calls for the excavation of approximately 763,000 cubic yards of earthen material for the construction of Phase I and 960,000 cubic yards of earthen material for the construction of Phase II. The total volume of soils required for intermediate and final cover is estimated to be 454,000 cubic yards. This will result in a surplus of 1,269,000 cubic yards of soil that will have to be utilized or stockpiled in other areas of the landfill or off-site. Some of the earthen material excavated from the expansion and borrow areas will be given to the adjacent landowner who has expressed interest in accepting some of the excess soil. The remaining excess soil will be stockpiled on-site. The earthen material suitable for the final cover and topsoil will be stockpiled separately. All stockpiles will be seeded to prevent runoff and erosion.

Landfill Unit Cap — After the landfill unit has reached its ultimate capacity, a single laterally continuous, five-foot thick final cover, including a minimum of six (6) inches of topsoil at the surface, will be placed over the entire CCW disposal unit. After closure, the average elevation of the site will increase by approximately 50-feet. The finished side slopes of the final cover will be 25% (4:1) with an average top finished slope of 5%. The unit will have a peak elevation in the northeast corner of approximately 3,130 feet above MSL.

The cap surface will be graded for drainage, shaped to blend into the existing topography, and vegetated with native plant species similar to the surrounding grassland habitat. Vegetated benches and drainage swales, fiber matt, geofabric, aggregate rip-rap, or tri-lock downchutes could be used as necessary to control erosion by storm water runoff from the cap.

Operation and Maintenance Plan:

Personnel — The City of Hardin will be responsible for the administration of the proposed CCW monofill. The day-to-day administration and operation of the landfill would be the responsibility of the City Public Works Director who consults with the Mayor, City Council, landfill consultant, the Department, and EPA and Tribal authorities. Operations at the facility would follow the proposed Operations and Maintenance (O&M) Plan for waste acceptance and screening, recording waste tonnage, landfill disposal activities, leachate management, storm water control, and final cover. Landfill equipment provided by the City includes a scale, compactor, scraper, rubber-tired loader, and water truck. The Department regularly inspects the facility and reviews the required documents to ensure compliance with the approved procedures and Solid Waste Management laws and rules.

Four full-time employees and a part-time gate attendant currently operate the City of Hardin Class II facility. These employees will be responsible for the operation of the CCW monofill. They will operate the equipment to conduct CCW disposal, excavate and place borrow material for intermediate cover, apply water and soil cover for dust control, screen for unacceptable wastes, monitor leachate collection and storm water control

systems, and maintain all roads and facility structures. No additional employees are expected to be needed to operate the proposed expansion. Employees are trained by continuing education courses on solid waste management conducted by the Department, the Montana Association of Counties (MACo), the Montana State University Extension Office, and taught by various solid-waste professionals including Solid Waste Program staff.

Operating Hours — The current landfill facility is open to the public from 9:00 AM to 6:00 PM, Monday through Saturday, and closed on Sundays and holidays. These hours and days will be the same for the proposed CCW monofill.

Access Control —Operators will be on duty whenever the site is open to the public. The gate will be locked when the facility is closed. Signs at the gate inform the public of fees and unacceptable wastes. A new road will be constructed from the existing City of Hardin Class II Landfill to the proposed CCW expansion area. The CCW expansion area will be fenced and will be limited in access to the CCW hauling equipment and landfill personnel.

Acceptable Wastes —The proposed CCW monofill is for the sole disposal of CCW. Based upon the volume of CCW currently being disposed of in the original Class II unit, the following provides the details of the wastes acceptable for disposal in the proposed expansion:

Water Treatment Sludge:
This material consists of silts, sands, and suspended solids that are collected in the cooling water intake and discharge water filters. Neither the water nor the solids come in contact with the coal or CCW.

Coal Pulverizer Reject Material:
This is the material other than coal, such as rocks and petrified material, which the pulverizers are unable to crush. This rejected material is manually placed with the bottom ash. The amount of this material is very small and is typically +/- 1% of the total waste stream.

Bottom Ash:
This is the heaviest ash that falls to the bottom of the furnace as the coal is burned in the main furnace box. This material is collected in the bottom of the furnace, crushed, and removed with conveyors then transferred to a holding silo. The bottom ash represents approximately 20% of the total waste stream.

Fly Ash and Flue Gas Desulferization (FGD) Waste:
The fly ash is produced by the combustion of the coal in the furnace. The FGD waste is produced when ammonia is added to the flue gas just before it passes through the equipment to remove the NOx. The flue gas then enters another device where a lime solution is sprayed into the flue gas stream. The flue gas reacts with the lime solution to produce a calcium sulfate slurry - the FGD waste. The water in this FGD waste is then

evaporated before it reaches the fabric filter baghouse where it is combined with the fly ash. This fine, dry mixture is removed from the fabric filter bags and pneumatically transported to a storage silo. The fly ash/FGD mixture comprises approximately 80% of the total waste stream. To control dust during transport to and disposal at the landfill, water is added to the fly ash/FGD mixture as it is transferred from the silo to the haul truck.

Daily Landfill Operations — Landfill personnel will operate the scale and inspect incoming CCW loads for excluded wastes. The CCW will be placed in one-foot daily lifts, and compacted using the front loader to a minimum 95% of the maximum dry density. Water will be applied to the compacted CCW, as necessary, to control dust.

The City of Hardin plans to fill each of the two phases (Phase I and Phase II) in five 10-ft high lifts. The 10-ft lifts will be constructed from the individual one-foot daily lifts. Each 10-ft lift will encompass an area approximately 300' x 200', will be filled in a northeast to southwest direction, and will take approximately 90-days to complete. The Department will require the application of a minimum of 6-inches of intermediate soil cover over the CCW on a quarterly basis.

Soil Excavation — The engineering design plan calls for the excavation of approximately 763,000 cubic yards of earthen material for the construction of Phase I and 960,000 cubic yards of earthen material for the construction of Phase II. The average cut depth will be approximately 20 feet and the average fill depth, including intermediate and final cover soils, will be approximately 50 feet. The total volume of soils required for intermediate and final cover is estimated to be 454,000 cubic yards. This will result in a surplus of 1,269,000 cubic yards of soil that will have to be utilized or stockpiled in other areas of the landfill or off-site. Some of the earthen material excavated from the expansion and borrow areas will given to the adjacent landowner who has expressed interest in accepting some of the excess soil. The remaining excess soil will be stockpiled on-site. The earthen material suitable for the final cover and topsoil will be stockpiled separately. All stockpiles will be seeded to prevent runoff and erosion.

Dust Control — All incoming loads will be tarped. Water will be applied to the compacted CCW, as necessary, to control dust. At the present time, landfill personnel are using between 10,000 and 12,000 gallons of water per day to control the dust. In addition, landfill personnel will inspect each vehicle to ensure that CCW is not tracked from the vehicle to areas outside the landfill. Those vehicles containing visible CCW will be washed on-site before leaving the landfill. Landfill personnel will also maintain the on-site roadways to ensure that vehicles are not tracking CCW off-site. Finally, a minimum of 6-inches of intermediate soil cover will be placed over the compacted CCW on a quarterly basis.

Storm Water Control — Regular inspection and maintenance of the storm water control system by the operators will ensure that BMPs are routinely followed. If the storm water evaporation rates from the pond and withdrawal by on-site irrigation do not maintain at least one-third remaining capacity, the facility may need to discharge clean storm water

to the adjacent dry coulee via the pond drain line. In that case, a general industrial storm water or individual effluent discharge permit may be required from the EPA. The application would require an erosion control plan and storm water pollution prevention plan (SWPPP) update to the facility O&M plan.

Leachate Control — Leachate is generated as a result of water flowing through or contacting waste. Therefore, any storm water that contacts the CCW or any water used for dust control that drains from the CCW is considered leachate. The solidification of the CCW with the addition of water should minimize the production of leachate. It is anticipated that the majority of leachate generated will likely consist of runoff from the uncovered, but solidified, ash lifts. A temporary leachate collection sump will be built into the toe of each Phase adjacent to the cut face. The leachate sump will be used to collect the runoff from within the CCW landfill. During the first year of operations, the liquid collected in this sump will be sampled on a semi-annual basis and analyzed for Table 1 metals. The liquid will either be allowed to evaporate or will be pumped back onto the CCW. Depending upon the amount of leachate generated and the results of the semi-annual analyses after the first year of operations, the Department will evaluate the need for a permanent leachate removal system.

Benefits and Purpose of the Proposal:

The main objective of the proposal is to provide for the construction of a CCW monofill while also protecting human health and the environment. Expansion of the existing landfill boundaries to incorporate the CCW monofill appears to be in the best interest of the residents because it will extend the life of the Class II unit for the disposal of municipal solid waste by diverting the CCW from the Class II unit to a separate unit established for the sole disposal of that waste stream. The proposed expansion would allow for the disposal of CCW for approximately 25.7 years,

The site is close enough to Hardin to keep hauling costs down, but far enough away to reduce or eliminate complaints that could arise from a landfill operation. Historically, because of the remote location, few complaints have been raised concerning litter, odors, dust, or operations. There are no problems requiring remedial action at this time.

Description and analysis of reasonable alternatives whenever alternatives are reasonably available and prudent to consider

Following the Department's finding that the City of Hardin's application for the Class II CCW monofill expansion was complete, the Department considered two alternatives in the preparation of this EA:

Alternative A. Deny the license expansion as proposed by the applicant— the "no action alternative". If this alternative were chosen, the applicant could:

1. Continue to dispose of CCW in the original Class II landfill. The Department approved the disposal of the CCW in the original Class II landfill for a three year period. If the CCW continues to be disposed of in this area until March, 2009, the projected life of the existing licensed facility decreases from 51 years to 45 years. The City of Hardin would then be required to apply for an extension for the continued disposal of CCW or would have to locate, study, and apply for a license at another site suitable for a Class II CCW monofill.
2. Haul solid waste to another landfill when the current landfill reaches capacity. The Billings landfill, 46 miles west of Hardin, is the closest licensed Class II facility. Disposal at Billings would involve transportation costs as well as tipping fees, which could likely cause a significantly increased disposal cost to Big Horn County residents.
3. Locate, study and apply for a license at another site suitable for a Class II CCW monofill in Big Horn County.

Alternative B. Approve the license expansion as proposed by the applicant. Several factors support the viability of this option:

1. The area remaining on the City-owned site would allow for the additional disposal of 2,526,000 cubic yards of waste over 25.7 years of operation. The disposal of the CCW in a separate disposal unit will extend the life of the Class II landfill unit from 45 to 51 years.
2. The site has superior characteristics that satisfy the no-migration requirements.
3. The facility has a 14-year history of waste disposal in compliance with the Montana solid-waste laws and rules.
4. There is an ongoing need for economical disposal services of the CCW.
5. Development and population surrounding the landfill facility are extremely sparse, so the effects on human health and the environment are minimized.

In consideration of these alternatives, the Department reviewed various site-specific documents submitted to the Solid Waste Program by the City of Hardin, Entranco Engineers, and Damschen Consulting, such as: (i) the Application for Class II License Expansion, (ii) Hydrogeological and Soils Investigation Report, (iii) No-migration Demonstration, (iv) facility expansion design documents, (v) previously submitted license expansion documents, and (vi) the facility compliance history. Based on the information provided and Department research on the area surrounding the proposed expansion site, the potential environmental impacts of Alternative B were evaluated for the proposed project. The results of the Department's evaluation are summarized in Tables I and II. A discussion of the site-specific environmental impact analysis for Alternative B is provided in the Appendix.

A listing and appropriate evaluation of mitigation, stipulations and other controls enforceable by the agency or another government agency

The proposed landfill license expansion would meet the minimum requirements of the Montana Solid Waste Management Act and administrative rules regulating solid waste disposal. The required approvals are granted by the Department (DEQ) after the appropriate review of complete submittals, unless specified otherwise.

If the facility is licensed, the licensee (City of Hardin) shall meet the following license conditions:

(1) Compliance with the conditions of the no-migration demonstration and approval.

(2) No exceedence of relevant ground-water protection standards by leachate contaminants in the uppermost aquifer at no more than 150 meters from the waste disposal boundary.

(3) Adequate and approved ground-water monitoring and corrective action if landfill performance standard (2) is not adequately demonstrated.

(4) Conformance of all construction activities and test procedures with updated and approved specifications, plans, and quality assurance/quality control (QA/QC) procedures.

(5) Detention and evaporation of leachate removed from the landfill units by the on-site leachate collection trenches with potential recirculation to the CCW landfill.

(6) The collection and analysis of samples from each waste stream generated by the CCW generator using EPA Method 1311 for Toxicity Characteristic Leaching Procedure (TCLP) and EPA Method 1312 for the Synthetic Precipitation Leaching Procedure (SPLP). Samples are to be collected and analyzed on at least an annual basis. In addition, if the coal source changes, duplicate samples are to be collected on a quarterly basis during the first year from each waste stream, analyzed for TCLP and SPLP, and the results submitted to the Department.

(7) Semi-annual sampling and analysis of the collected leachate during at least the first year of site operation. The leachate will be analyzed for the list Table 1 metals found in ARM 17.50.708. The results of the analyses will be submitted to the Department within 90-days of collection. The Department will evaluate the need for additional leachate collection and analysis after the first year of site operation.

(8) No release of leachate to the storm-water detention pond or State waters unless approved and permitted by the U.S. EPA.

(9) No release of storm water from the detention ponds, except for approved on-site irrigation, without the appropriate permit from the U.S. EPA.

(10) No construction or disturbance of areas more than one acre without the appropriate permit from the U.S. EPA.

(11) Conformance with updated and approved financial assurance mechanisms for facility Closure, Post-Closure care, and Corrective Actions if necessary, prior to initial placement of waste in the new disposal unit.

(12) Compliance with appropriate provisions of the federal Air and Clean Water acts and associated regulations, as well as applicable County or Tribal Ordinances.

Recommendations:

The Montana Department of Environmental Quality is requesting comments from the public regarding this project proposal.

The Department found that the City has adequately shown through its No-migration Demonstration, in accordance with ARM 17.50.723 requirements, that there would be no potential for migration of hazardous constituents to the uppermost aquifer during the operational life and 30-yr post-closure period of the proposed landfill expansion.

In the absence of public or Tribal comments identifying significant issues or impacts that have not been addressed in this EA, the Department would approve the proposed Alternative B to expand the Class II facility license boundary to the west based on the following findings: (i) approval of the no-migration petition to waive the ground water monitoring requirements for the proposed western expansion area, (ii) conditionally waive the landfill liner requirements for the western disposal expansion, and (iii) accept the proposed site master plans as submitted with the stipulation that detailed construction plans are submitted, reviewed, and approved prior to construction. The license conditions for the facility expansion are listed above.

Due to the site's location in a culturally rich region with known historic and pre-historic occupation by Native American tribal peoples, we recommend that the City conduct a cultural survey for archaeological artifacts prior to breaking ground for the proposed license expansion.

If an EIS is needed, and if appropriate, explain the reasons for preparing the EA

Due to the absence of significant potential environmental impacts as indicated by this environmental assessment, the Department finds that an Environmental Impact Statement is not necessary.

If an EIS is not required, explain why the EA is an appropriate level of analysis

The Department finds that construction and operation of the proposed City of Hardin CCW landfill expansion would not significantly affect the quality of the human environment. Potential impacts to surface water resources, terrestrial and aquatic life, vegetation and other aspects of the physical and human environment are expected to be minor. Potential impacts to the ground water and surface water resources would be minimal due to the low average annual precipitation, high evaportanspiration rates, the extended thickness of highly impermeable material beneath the proposed expansion area, the extensive depth to the uppermost aquifer, and engineering controls designed for the proposal. Thus, an Environmental Assessment is an adequate document to address potential impacts of the proposed landfill expansion.

Other groups or agencies contacted or which may have overlapping jurisdiction
Crow Tribe
City of Hardin
Big Horn County
Montana Natural Heritage Program
Montana Historical Society
United States Environmental Protection Agency (EPA)

Individuals or groups contributing to this EA
Barry Damschen Consulting, LLC, Helena, MT
Hydrometrics, Inc., Helena, MT

EA prepared by
Mary Louise Hendrickson
Waste and Underground Tank Management Bureau
Solid Waste Program

Date
March 28, 2008

TABLE I. Potential Impacts on the Physical Environment
[See appendix as indicated for a specific resource analysis]

RESOURCE	LEVEL OF IMPACT					
	Major	**Moderate**	**Minor**	**None**	**Unknown**	**Appendix**
1. Terrestrial and Aquatic Life and Habitat			X			X
2. Water Quality, Quantity, and Distribution			X			X
3. Geology and Soil Quality, Stability and Moisture			X			X
4. Vegetation Cover, Quantity and Quality			X			X
5. Aesthetics			X			X
6. Air Quality			X			X
7. Unique, Endangered, Fragile or Limited Environmental Resources					X	X
8. Demands on Environmental Resources of Water, Air, and Energy			X			X
9. Historical and Archaeological Sites					X	X

CUMULATIVE AND SECONDARY IMPACTS — The cumulative impacts from the proposed Class II Solid Waste Management Facility are minor. The proposed facility is adjacent to the existing landfill and exhibits similar physical, terrestrial, and aquatic characteristics. Natural site conditions combined with engineering controls would eliminate any impact from leachate. Conditions that minimize leachate seepage were fully evaluated by the City of Hardin in its No-migration Demonstration and determined to adequately meet the requirements of the state and federal solid waste laws, regulations, and rules. There are no recognized secondary impacts.

TABLE II. Potential Impacts on the Human Environment
[See appendix as indicated for a specific resource analysis]

RESOURCE	LEVEL OF IMPACT					
	Major	Moderate	Minor	None	Unknown	Appendix
1. Social Structure and Mores				X		
2. Cultural Uniqueness and Diversity					X	X
3. Local and State Tax Base and Tax Revenue			X			X
4. Agricultural or Industrial Production			X			X
5. Human Health				X		X
6. Access to and Quality of Recreational and Wilderness Activities				X		
7. Quantity and Distribution of Employment			X			X
8. Distribution of Population				X		
9. Demands for Government Services			X			X
10. Industrial and Commercial Activity			X			X
11. Locally Adopted Environmental Plans and Goals				X		

CUMULATIVE AND SECONDARY IMPACTS — The cumulative impacts recognized from the proposed licensing of the CCW monofill are minor. The net potential impact of the proposed facility expansion on the human environment is probably very minor. Development and population surrounding the proposed site are extremely sparse. The increased employment that may be generated by the construction of the expansion would have a very minor but positive effect on the local income and tax base of the county. An archaeological survey of the expansion area has not been conducted so the potential impacts to cultural uniqueness and diversity remain unknown. There are no recognized secondary impacts.

APPENDIX
COMMENTS REGARDING THE POTENTIAL IMPACTS OF THE PROPOSED CLASS II SOLID WASTE MANAGEMENT SYSTEM (ALTERNATIVE B)

I. POTENTIAL IMPACTS ON THE PHYSICAL ENVIRONMENT

1. Terrestrial and Aquatic Life and Habitats

The proposed CCW expansion site occupies the central grasslands ecoregion of the northern high plains and is surrounded by predominantly grassy rangeland and minor cultivated cropland. Low and erratic precipitation is the principal source of water for agriculture. Water for livestock is stored in small reservoirs, but supplies are inadequate for significant irrigation. Irrigation water in quantity is available only from the rivers. Potable ground water is scarce in most of the area, but shallow alluvial sand and gravel deposits along the Little Bighorn and Bighorn rivers may yield small to moderate amounts. A minor dry coulee trending from northeast to southwest drains the southern portion of the proposed expansion area property.

There are no wetlands or permanent surface water bodies located on the CCW expansion site. With no continuously active aquatic systems within the boundary of the proposed expansion, it is unlikely there is any significant aquatic life or habitat anywhere on the site. Lacustrine and riparian habitats and associated aquatic species or waterfowl that occupy the existing storm-water detention pond at the licensed facility would not be disturbed by development of the expansion any more than by current operations at the active disposal unit. Thus, any impacts to aquatic life due to the proposed expansion would likely be very minor.

Wildlife forage and habitat at the proposed expansion site is typical of native grassland found on the open rolling plains adjacent to the uplands of south central Montana. Lacustrine or riparian areas are very limited and generally consist of minor stockwater ponds. Because of the limited availability of surface water supplies, land use is dominated by livestock grazing on rangeland with some dryland wheat, alfalfa, and hay farming that may be occasionally supported by irrigation in the river bottoms. Transient populations of grazing pronghorn antelope, mule and white-tailed deer, and elk and wandering predators like coyote and red fox may occasionally inhabit the expansion area and surrounding grassland. Permanent residence by burrowing small mammals like hares, jackrabbits, and rodents, reptiles, and frequent residence by numerous prairie avian species including waterfowl, crows, ravens, and raptors are more likely. Most terrestrial species currently inhabiting the area proposed for expansion would be displaced by the landfill during the period of operation. Due to the extremely sparse development and human population surrounding the proposed site, however, there is adequate acreage of similar habitat available in the vicinity to accommodate any terrestrial or avian species that may be forced to relocate.

2. Geology and Soil Quality, Stability and Moisture.

Site Soils and Geology

The soils at the site consist of silty clay loams of the Harvey, Heldt, and Lohmiller series (USDA, 1977) Soil types are shown on Figure 3 and are described in more detail in Table 1 (Maxim, 2006). These soils were developed from the colluvial debris eroded from the sedimentary bedrock buttes located east of the Class II landfill site and tend to be deep and well-drained with moderate to slow permeability and moderate to high available water capacity. A ridge along the eastern site boundary (Figure 3) is characterized by a Midway series silty clay loam (USDA, 1977; Maxim, 2006). This silty clay loam is a shallow, well-drained soil with a slow permeability and very low available water capacity. All soils at the site are characterized by medium to rapid runoff and moderate to severe erosion hazard. The compaction characteristics of the soils make them adequate for use as daily landfill cover material.

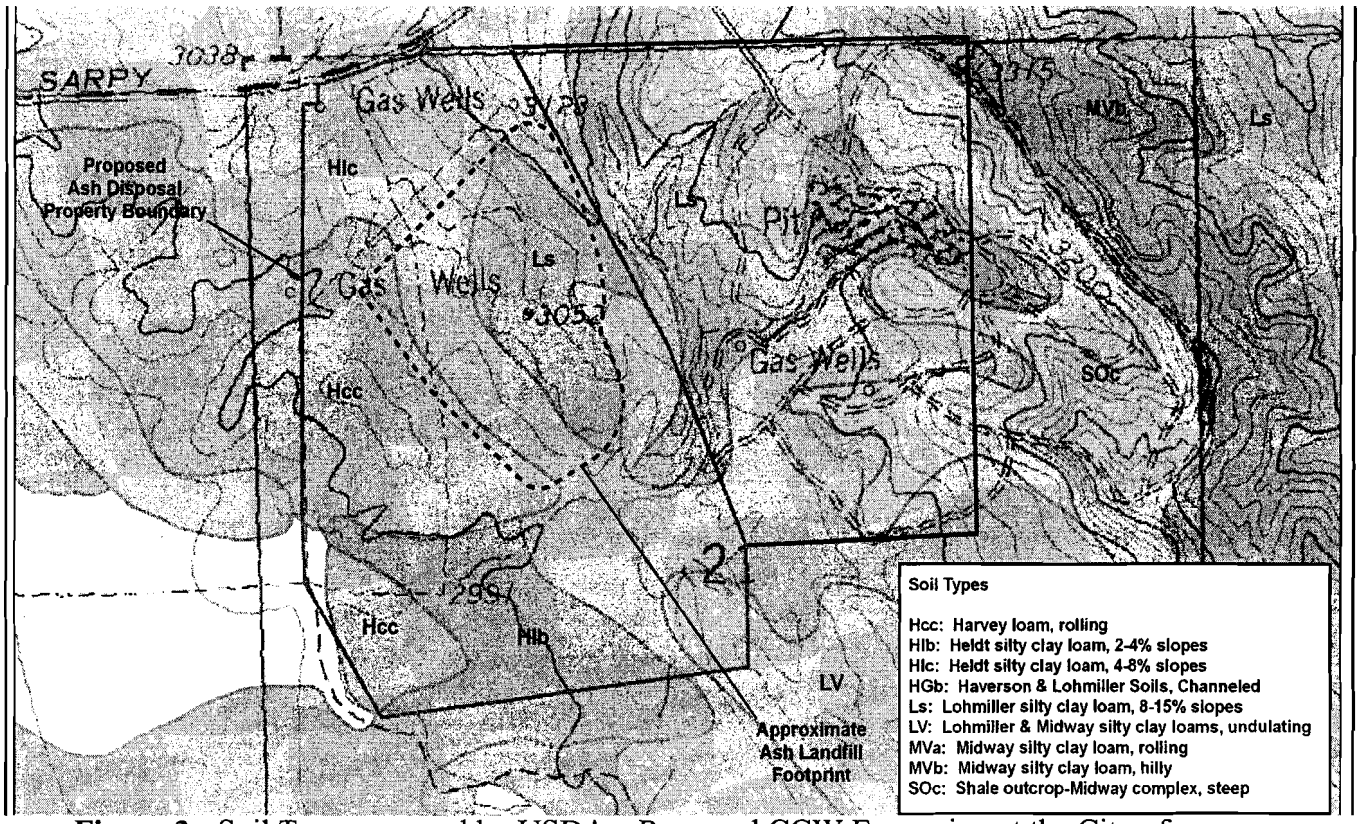

Figure 3 - Soil Types mapped by USDA – Proposed CCW Expansion at the City of Hardin Class II Landfill (USDA, 1977)

Table 1 - Soil Types and Characteristics – Proposed CCW Expansion at the City of Hardin Class II Landfill (Hydrometrics, 2006)

Soil Type	Depth	Drainage	Permeability	Available Water Capacity	Runoff	Erosion Hazard	Compaction Characteristics
Harvey loam, rolling	deep	Well-drained	Moderate	Moderate	Medium	Severe	
Heldt silty clay loam, 4-8% slopes	deep	Well-drained	Slow	High	Rapid	Moderate	Fair
Heldt silty clay loam, 2 – 4% slopes	deep	Well-drained	Slow	High	Medium	Moderate	Fair
Lohmiller silty clay loam, 4-8% slopes	deep	Well-drained	Moderately slow	High	Rapid	Severe	Fair
Midway silty clay loam, rolling	shallow	Well-drained	Slow	Very low	rapid	Severe	Fair

Bedrock underlying the proposed CCW expansion area consists of the Late-Cretaceous age Gammon Formation shale (Vuke, et al., 2000). Table 2 provides a summary of the bedrock stratigraphy beneath the proposed CCW landfill. Results of the Maxim 2006 site investigation show that Gammon shale at the site is mantled by colluvium that ranges in thickness from a few inches to more than 50 feet. This colluvium generally consists of unconsolidated sandy clay that is generally massive and commonly contains secondary gypsum, indicative of long-term dry conditions in the shallow subsurface.

Grain size analysis of five samples of the colluvium resulted in silt- plus clay-sized fractions varying from 65.2 to 91.1 percent. Grain size distributions at the proposed ash landfill site are similar to those encountered at the City of Hardin Landfill Expansion Site (Entranco, 2003).

The Gammon shale is a brownish-gray, calcareous, silty marine shale that weathers to a yellowish-brown. The formation was deposited in an offshore environment and is up to 860-feet thick. The upper portion of the Gammon shale immediately beneath the colluvium is deeply weathered. The weathered shale varies from approximately 10 to more than 25 feet thick and is comprised of light brown to dark brown, relatively soft, laminated claystone, with interbedded siltstone and very fine-grained sandstone laminae of a lighter color. Yellow oxides of iron are prominent on bedding surfaces of the weathered shale. The unweathered shale is dark gray, fissile, moderately hard to hard, and also contains the lighter-colored, coarser laminae.

Both weathered and fresh shale in the formation show platy fracture when disturbed by excavation or drilling. The flat surfaces of the plates appear to be bedding planes, with conchoidal fractures around the edges. The blocky fracture pattern, typical of naturally fractured rocks, was not commonly observed during the Hydrometrics 2007 investigation.

Geologic Unit	Thickness	Unit Description	Hydrogeologic Properties
Gammon Formation	300 to 500 feet	Yellowish-brown, calcareous siltstone interbedded with yellowish-brown weathering, brownish-gray calcareous silty shale. Contains several yellowish-brown, fine-grained sandstone beds and a zone of reddish-orange ferruginous concretions in sandy shale.	Slightly permeable. May yield small quantity of mineralized water.
Niobrara Formation	~400 feet	Dark brownish-gray fissile shale with abundant thin bentonite beds and medium light-gray to pale yellowish-brown concretions up to two feet in diameter. Upper half calcareous with thin beds of very calcareous laminated sandstone, siltstone, and sandy limestone near the top.	Relatively impermeable. Contains some highly mineralized water.
Carlile Shale	265 feet	Very dark gray to dark bluish-gray fissile shale with dark gray sandy shale at the base and in the middle. The lower sandy shale contains two bentonite beds 2 to 3 feet thick. The upper part contains medium-gray closely spaced calcareous septarian concretions, with thick veins of dark brown calcite.	Relatively impermeable. May contain some highly mineralized water.
Greenhorn Formation	100 feet	Dark bluish-gray, calcareous, fossiliferous, poorly resistant shale that weathers very light brownish-gray. Locally contains numerous light-gray calcareous septarian concretions and a thick zone of bentonitic shale or bentonite at the base.	Relatively impermeable. May contain some highly mineralized water.
Bell Fourche Shale	460 feet	Dark gray fissile shale an dsandy shale. Contains ferruginous concretions and a bentonite bed that is six feet thick in the lower part; the Soap Creek bentonite bed in the middle that is 6 to 29 feet thick; and a bentonite bed that is 6.5 feet thick and light gray and brownish-gray concretions in the upper part.	Slightly permeable, may contain some highly mineralized water in upper part; middle par may yield small amounts of water; lower part is slightly permeable, may contain some highly mineralized water.
Mowry Shale	285 feet	Light gray to medium-gray siliceous, ver-fine to fine-grained sandstone and siltstone with silvery sheen, interbedded with dark-gray fissile shale. Contains abundant fish scales on bedding surfaces.	Relatively impermeable except perhaps alon joints and bedding surfaces. May yield some highly mineralized water.
Thermopolis Shale	430 feet	Dark gray to black shale with beds of ironstone concretions and bentonite up to 4 feet thick. Basal 75 feet is black shale; middle 40 feet is dark gray shale cut by numerous gray, fine-grained sandstone dikes with tabular cross-bedding.	Relatively impermeable. Probably contains highly mineralized water.
Cloverly Formation	450 feet	Basal 65 feet is chert-bearing conglomeratic sandstone; middle 145 feet is red and gray shales with interbedded siltstones; upper 240 feet is interbedded siltstones, dark gray shales, and thin-bedded sandstones.	Upper part may have locally developed water-bearing zones. Basal part is uppermost widespread aquifer, wells flow mineralized water high in sodium salts.

Table 2 – Cretaceous Bedrock Stratigraphy – Proposed CCW Expansion at the City of Hardin Class II Landfill (Hydrometrics, 2006)

Underlying the Gammon Formation are other calcareous shales, including the Upper Cretaceous Niobrara Formation (390-410 ft thick) and the Carlile Shale (280-285 ft thick) (Vuke et al., 2000). The wireline log from the Carter Oil, #1 Crow Tribal oil and gas test well, located one mile south of the site, was studied by Maxim (2006) to determine the thickness of rock units underlying the site and to identify porous zones capable of producing water. The shallowest zone considered to be a widespread, continuous porous zone is the basal Cloverly conglomerate, which occurs under the proposed ash landfill site at a depth greater than 2,650 feet (Moulder et al., 1960). Numerous bentonitic layers occur in the 1,400-ft thick stratigraphic sequence of marine shales that underlie the Gammon shale and overlie the Cloverly Formation (Vuke et al., 2000).

The existing landfill and proposed expansion area are located over the eastern margin of the Hardin natural gas field. Well logs for these borings report that the wells are completed in the Frontier Formation. However, recent geologic mapping by Vuke et al., (2000) does not recognize the presence of the Frontier Formation in this area. Maxim's (2006) review of the well logs for these gas wells concluded that the Frontier Formation noted on the logs is actually the sandy shale of the Carlile Formation

Site Hydrogeology and No-migration Demonstration

During the Maxim 2004 and 2005, and Hydrometrics 2006 site-specific investigations, a total of 19 test pits or 27 soil borings were installed at the site (Figure 4). Water was observed in only one of the borings (HB-5) drilled at the site. The water was encountered in a thin (~1 foot thick) sand and silt layer directly overlying the gray-black shale bedrock at a depth of approximately 30 to 31 feet. The water was blown out of the hole at about 0.5 to 1.0 gallons per minute. No water bearing zones were encountered in any of the other site borings or test pits, suggesting the water encountered occurs in a perched zone of limited areal extent. None of the test pits or borings contained groundwater in the colluvium. In addition, three deep borings (B-5A, B-6A, and B-7A) were drilled to depths ranging from 35 to 50 feet below ground surface. The temporary wells were left open to allow for the accumulation of groundwater and were checked approximately 42 hours later. No groundwater was detected in any of the wells. This absence is interpreted as evidence that a saturated zone does not exist within 50 feet of the ground surface in the colluvium or the weathered shale under the landfill site. Similarly, a saturated zone was not present under the adjacent City of Hardin Class II Landfill site (Entranco, 2003).

Water-bearing porous zones were not encountered in the upper portion of the Gammon shale in any of the soil borings drilled at the site. However, thin, low-permeability sandstones have been described in the Gammon, Niobara, and Mowry formations. If water is present in any of these sandstones, it can be expected to move along these beds in a downdip (northerly) direction.

The results of laboratory permeability testing on materials collected during both site investigations indicated that, with the exception of a small area in the western portion of the proposed landfill footprint near Maxim site TP-7, consistently low permeabilities were obtained, ranging from a maximum of 1.0×10^{-7} cm/sec at boring B-3 down to a minimum of 8.0×10^{-9}

cm/sec at TP-12. The sample collected by Maxim from site TP-7, classified as a sandy clay, yielded a permeability of 1.0×10^{-5} cm/sec. Since this sample showed a much higher permeability than other areas of the site, Maxim installed additional soil borings in the vicinity of TP-7 to further investigate. The additional investigation conducted around test pit TP-7 yielded permeabilities in the colluvium and weathered shale ranging from 3.5×10^{-6} to 6.0×10^{-5} cm/sec, indicating that the area of relatively high permeability exceeds 100 feet in diameter. However, a core of unweathered shale collected from boring BTP-7 at a depth of approximately 45 to 50 feet yielded a permeability of 7.3×10^{-10} cm/sec, indicating that the higher permeabilities are limited both areally and vertically and do not present a risk of leachate migration. In addition, Hydrometrics completed one soil boring (HB-4) about 200 feet north of the "higher-permeability" area surrounding test pit TP-7, and submitted a split spoon sample (15-17 feet bgs) for permeability testing. The results of laboratory analysis for this sample (3.6×10^{-8} cm/sec) support Maxim's conclusion that the lateral and vertical extent of the higher permeability zone is limited.

The uppermost aquifer beneath the site lies within the Cloverly Group (equivalent to the upper Kootenai Formation), which is located over 2,000 feet below the surface. This aquifer lies beneath the gas sand and is overlain by a 1,400-ft thick confining layer of primarily marine shales with numerous beds rich in bentonite clay content. These multiple strata of very low permeability materials would function as multiple barriers for the migration of liquids to this deep aquifer.

The Department determined that the certified *No-Migration Demonstration* adequately demonstrates that there are no fluid migration pathways that might allow any landfill leachate to escape the waste fill area and reach the uppermost aquifer under the waste or a relevant point of compliance within 30 years of the closure of the facility. Therefore, any impacts to geology, soil quality, stability and moisture are anticipated to be minor.

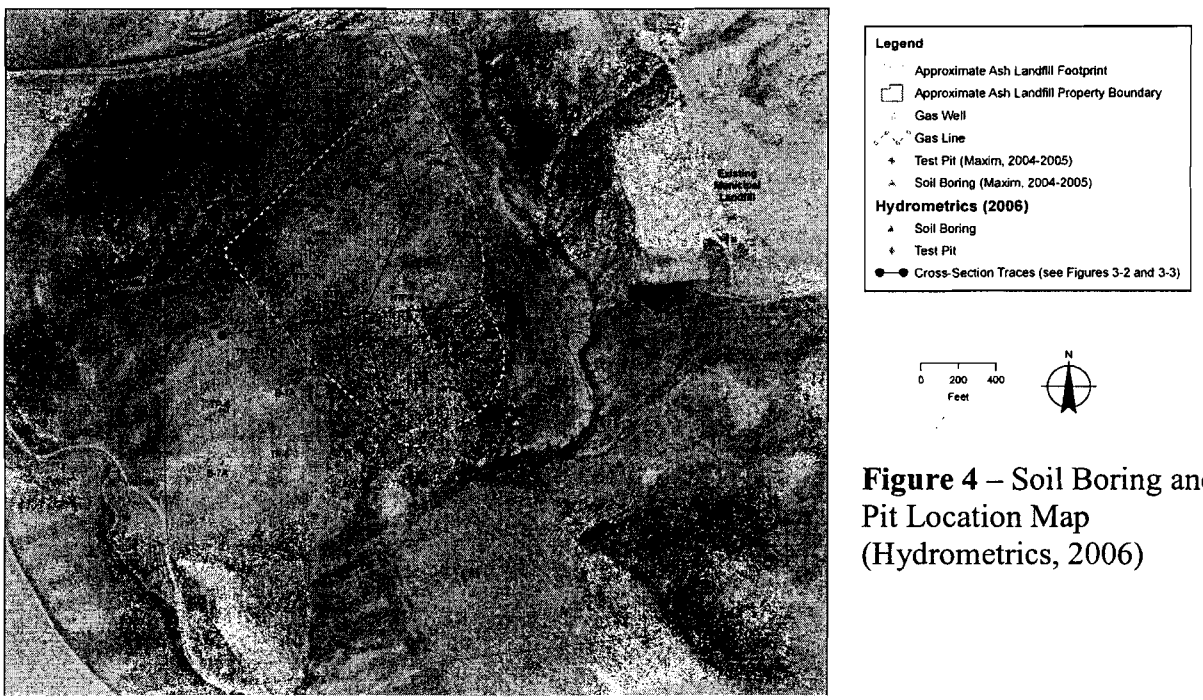

Figure 4 – Soil Boring and Test Pit Location Map (Hydrometrics, 2006)

3. Water Quality, Quantity and Distribution.

Climate

Big Horn County's climate is affected by the Pacific Ocean air masses, which superimpose a late spring maritime influence on the typical continental climatic regime of the Great Plains. Moisture from the Gulf Coast may be drawn north during periods of low pressure. The Desert Research Institute, Western Regional Climate Center, reports an average annual precipitation of 11.74 inches per year (including equivalent average annual snowfall) for the Hardin area.

Surface Water

The proposed CCW expansion area is situated in the Little Bighorn Sub-basin (hydrologic unit code 10080016, Montana Hydrologic Unit Map, 1974). The Little Bighorn Sub-basin has an average elevation of 2,882 feet and drains an area of approximately 1,294 square miles. The predominant water supply for the City of Hardin is a shallow alluvial aquifer associated with the Bighorn River and Little Bighorn River. Sands and gravels associated with alluvial terrace deposits of the Little Bighorn River are approximately one-half mile to the west of the site. The surface drainage feature nearest the site is a minor dry coulee trending from northeast to southwest. The coulee drains south and west toward the Little Bighorn River. There are no known springs in the immediate area of the landfill or the proposed expansion area.

Natural runoff from the expansion area mostly drains into a small coulee that meanders from the northeast to the southwest on the southern portion of the site. Two detention ponds will capture storm-water runoff from the landfill footprint. The ponds will have the capacity to contain storm water from a single 25-year, 24-hour storm event. A discharge permit would probably not be necessary since all storm water runoff from the active facility should be detained on site and pond water levels may be lowered as needed by using the water for dust control. Minor surface water impacts are anticipated by capturing the natural runoff in the storm water ponds.

Ground Water

The uppermost aquifer beneath the site lies within the basal conglomerate of the Cloverly Formation, which is located over 2,600 feet below the surface. This aquifer lies beneath the gas sand and is overlain by a 1,400-ft thick confining layer of primarily marine shales with numerous beds rich in bentonite clay. These multiple strata of very low permeability materials would function as multiple barriers for the migration of liquids to this deep aquifer.

Nearby Ground-water Supply Wells

The nearest water supply wells are located approximately 1.2 miles southwest of the proposed expansion area and are screened in the shallow alluvial aquifers associated with the Little Big Horn River. Based on a review of the Montana Bureau of Mines and Geology (MBMG) database of existing water supply wells, there are no water supply wells located in any bedrock formations within a one-mile radius of the site. One stock well, located approximately 2 miles

east of the proposed expansion area, was drilled to a depth of 2,490 feet and is screened in a confined bedrock aquifer (most likely the Cloverly Group).

Hydrologic Evaluation of Landfill Performance (HELP) Models

The HELP models predict that during the Phase I of landfill operations, average annual percolation rates through the base layer are very low, approximately 0.195 inches, and remain fairly consistent throughout the active life of Phase I of landfill operations. An additional post-closure HELP model simulation was run to evaluate the 30-year period following closure of the landfill. The total length of the post-closure simulation was 44 years, to account for the 14 years required to fill and complete Phase II of the landfill. The only differences between the 44-year post-closure model and the final 2-year active landfill model were changes in the vegetative characteristics of the final soil cap. The 46-year post-closure HELP model results indicate an average annual percolation rate (0.01 gpm per acre) identical to the active landfill models. Given the very low percolation rates and the conservative model assumptions, no significant transmission of any landfill seepage through the more than 2,600 feet of unsaturated, low-permeability shale overlying the nearest usable aquifer would be expected.

4. Vegetation Cover, Quantity and Quality

The proposed expansion area is part of the Central Grassland ecoregion within the Northwest Great Plains ecosystem. Because ground cover is scarce, much soil is exposed, yet many species of grasses and herbs grow in this province. Vegetation is strongly associated with available soil moisture and soil type due to uniform climatic conditions across this community. The grassland vegetation consists primarily of western wheatgrass, needle-and-thread, bluebunch wheatgrass, blue grama, prairie junegrass, green needlegrass, thickspike wheatgrass, and fringed sage. Most other grasses and grass-like plants are only minor community components or are dominants in very restricted areas. The grassland habitat at the proposed site is abundant and not unique.

Wildlife forage and habitat at the proposed site is typical of native grassland found on the open rolling plains adjacent to the uplands of south central Montana. In terms of biomass, forbs in plains grassland communities tend to be highly subordinate in most conditions. Certain subshrubs, including fringed sage, broom snakeweed, and prickly pear may become dominant members of some communities following overgrazing. Varying amounts of shrubs such as big and silver sagebrush, greasewood, Rocky Mountain juniper, rubber rabbitbrush, aromatic sumac, snowberry, and Nuttall saltbrush may occur throughout the central grasslands grading into the sagebush steppe ecotype with increasing abundance of shrubs (FWP, 2005).

Heavy grazing increases blue grama, fringed sage, clubmoss, prairie junegrass, and cheatgrass at the expense of wheatgrass and sometimes needle-and-thread. Loss of the proposed expansion acreage as flora habitat would not be considered critical, as it is not a unique or rare plant environment. Due to the extremely sparse development and human population surrounding the proposed site, however, there is adequate acreage of similar habitat available in the vicinity to preserve continuity of the central grassland ecosystem.

After final closure of the entire proposed CCW landfill disposal unit is achieved, the cap would be re-seeded with native plant species appropriate to the area as recommended by the Natural Resource Conservation Service. The spectrum of native plant species would not be as broad as the natural grassland vegetation currently developed on site, but would gain in diversity as natural re-introduction proceeded during the 30-year post-closure period. Such re-vegetation would then make the area again suitable for wildlife habitat and livestock grazing. In order to assure the integrity of the landfill cover re-vegetation process, grazing will be restricted sufficiently to allow the cover vegetation to become fully established.

The overall impacts of the expansion construction, operation, and closure activities on the prairie vegetation would be relatively minor, but will largely depend upon natural re-introduction to mitigate impacts to natural plant species diversity. Because the final topsoil will be derived from soil stockpiled from the naturally developed soil already existing on site, the latent seed bank will provide a source for some natural species re-introduction. Noxious weeds will be adequately controlled as needed.

5. Aesthetics

Visual

The proposed expansion will likely have only minor, if any, impact on aesthetics because the expansion area is nearly a mile and a half from Interstate 90, approximately one-half mile from Highway 384 adjacent to the existing landfill. There are no nearby residences or businesses.

6. Air Quality

Air quality concerns related to sanitary landfills are frequently associated with increased dust from landfill traffic, construction and maintenance activities and open burning at the site.

Additional traffic on the road from Highway 384 to the landfill, related to the construction of the landfill expansion, may cause an increase in the levels of airborne dust. If this occurs, dust suppression methods such as watering the road will lessen the impact. Construction of new landfill cells will cause an increase in internal landfill traffic that may cause an increase in airborne dust during the period of excavation and construction of the base. Since the construction periods will be short in relation to the operating life of the facility these effects will be minor. If dust from construction were to become a problem, dust control measures such as wetting the surface before working on it, will be initiated. Normal operational traffic on the site may cause a minor increase of suspended dust particles in the air during the dry months of the year. If this becomes a problem, it will be mitigated by adequate dust control measures on the interior roads such as applying a dust palliative or water.

The excavation and placement of cover material will increase the dust in the air. If it becomes a problem, the cover material will be wetted prior to its lay-down so that the net effect will be minor. All long-term soil stockpiles will be seeded to prevent erosion and airborne dust.

7. Unique, Endangered, Fragile or Limited Environmental Resources

Search of the Montana Natural Heritage Program website indicated the Bald Eagle listed as threatened, the Western Hog-nosed Snake, Milksnake, and Sauger listed as sensitive, and Merriam's Shrew and Peebles Shrew listed as species of concern in the general area of Big Horn County. No intensive site survey was conducted to study the presence of sensitive, unique, endangered, or fragile species within or adjacent to the proposed expansion area; therefore the impact to these resources remains unknown. Due to the extremely sparse development and human population surrounding the proposed site, however, there is adequate acreage of similar habitat available in the vicinity to accommodate any terrestrial or avian species that may be forced to relocate.

8. Demands on Environmental Resources of Water, Air and Energy

Energy demands related to landfill operation are primarily due to the hauling of waste to the facility. Lesser demands are from excavation and construction of new cells, and the compaction, covering and other routine landfill activities. At the present time, CCW is being hauled to the currently licensed facility and will be hauled to the expansion area, adjacent to the current operation. Construction and operation of the proposed expansion will cause an unavoidable minor increase in fuel use. These energy demands are not expected to impose excessive burdens on environmental resources.

9. Historical and Archaeological Sites

As part of their review of site information, Maxim (2006) queried Montana Historical Society records and Montana Natural Heritage Program records, to determine the presence of any historical sites and/or special status species on the proposed ash landfill property. Based on Montana Historical Society records, the Cultural Records Manager of the State Historic Preservation Office recommended that a cultural resource inventory be conducted at the proposed landfill site. Entranco (2003) also investigated potential natural and cultural resources in the vicinity of the proposed landfill during their study of the adjacent municipal landfill expansion site, and observed that there were no data to indicate the presence of any historical sites or species of concern on or adjacent to the property.

II. POTENTIAL IMPACTS ON HUMAN ENVIRONMENT

2. Cultural Uniqueness and Diversity

As part of their review of site information, Maxim (2006) queried Montana Historical Society records and Montana Natural Heritage Program records, to determine the presence of any historical sites and/or special status species on the proposed ash landfill property. Based on Montana Historical Society records, the Cultural Records Manager of the State Historic Preservation Office recommended that a cultural resource inventory be conducted at the

proposed landfill site. Entranco (2003) also investigated potential natural and cultural resources in the vicinity of the proposed landfill during their study of the adjacent municipal landfill expansion site, and observed that there were no data to indicate the presence of any historical sites or species of concern on or adjacent to the property.

3. Local and State Tax Base and Tax Revenue

Because construction of the proposed CCW expansion has additional costs to the City, a future increase in the cost of waste disposal is possible. Thus, a minor potential impact would be the local increase in CCW landfill tipping fees. Since there would be a few additional workers hired during the construction phases of the proposed expansion, construction of the proposed facility could have a very minor positive effect on the local tax base because of the additional jobs created during the construction phases.

4. Agricultural and Industrial Production

In the past, the area proposed for the landfill expansion has been cultivated for growing of cereal grains. However, the area is currently listed as fallow crop and grazing acres. Operation of the facility is anticipated to have a very minor effect on agricultural production by elimination of this acreage for grazing. The possibility of using the vegetated cover of the landfill for grazing land will be possible after closure, and the establishment of cover vegetation.

5. Human Health

The most common potential for impacts to human health from the proposed CCW expansion arise from potential release of contaminants to surface or ground water. The criteria for the construction of the leachate collection system protects the surface water. Approval of the no-migration petition protects the ground water.

There are no nearby residences downwind of the facility that would be impacted by dust resulting from operations, but dust control is required to protect potential customers. During the transfer of the CCW from the storage silo to the haul trucks, water is added to control dust during transportation and disposal. The addition of the water to the CCW results in the solidification of the material, so the amount of water added is controlled to inhibit the formation of a solid mass of waste. However, because the material solidifies with the addition of water, fugitive dusts are controlled. Consequently there would be no impacts to human health.

7. Quantity and distribution of employment

During the construction phases of the landfill expansion there could be a very minor increase in local employment due to the need for contractors and associated support. Between construction phases there will be no additional impact, because the landfill will continue to operate with the same number of employees currently working at the facility.

9. Demands for Governmental Services

The potential impact of the proposed facility is anticipated to be minor. Department personnel must spend time reviewing the proposal and licensing the expansion. The Department will perform inspections of the site during and after construction in addition to continuing the regular inspections that are already conducted on the existing landfill. During the construction phases, there will be slightly increased traffic on roads leading to the landfill, but the impact is expected to be minor because very little added wear and tear or traffic enforcement is anticipated due to the limited number of contractors briefly involved over several weeks.

10. Industrial and Commercial Activity

Construction of the proposed facility will cause a minor increase in the industrial activity of the area during construction due to the need for contractors and associated materials and machinery repairs. Since the immediately surrounding area is undeveloped rural land with no commercial or industrial activity other than grazing and limited farming, no additional secondary impact to industrial or commercial activity of the area is expected.

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