Technical Memorandum

To: Scott Schwake and Brett Ballavance
From: Tom Radue, Sara Welna, and Nick Nelson
Subject: Minnesota Power Taconite Harbor Energy Center - Beneficial Use of Ash
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This memorandum outlines Barr Engineering Company's (Barr) opinion as to compliance of proposed beneficial use of ash at Minnesota Power's (MP) Taconite Harbor Energy Center (THEC) with objectives of the federal EPA Coal Combustion Residuals (CCR) rule and MPCA Industrial Solid Waste Landfill permit.

Background

The THEC landfill began operation in 2002 after issuance of MPCA Industrial Solid Waste Permit No. SW-503. The Permit was subsequently reissued in 2008 and again in 2014. The facility was reclassified as a regulated utility asset effective January 1, 2006. The facility consists of lined Cells 1A, 1B, 2 and 3. Two additional cells, Cells 4 and 5 are included in the long term facility development plan but are not yet constructed. The facility became inactive (ceased receiving CCR) on October 16, 2015 in anticipation of a future economic idling of THEC anticipated to occur in the fall of 2016, and in light of long term obligations under the CCR rule if the facility remained active on October 19, 2015 or thereafter. Further, THEC is projected to cease all operations by 2020, but per regulatory requirements, must remain available for restart during the idle period of fall 2016 to 2020. Therefore, a temporary cover will be placed to accommodate reopening of the landfill if Minnesota Power needs to do so sometime during the period between fall 2016 and 2020, after which the final cover will be placed if an alternate permitted use of the landfill is not identified.

At the time that the facility became inactive, two phases of final cover had been constructed at the landfill. Phase 1 final cover was constructed in 2008 and covered approximately the eastern 1.7 acres of the landfill. Phase 2 final cover was constructed in 2011 and covered approximately an additional 1.5 acres of the landfill immediately west of the Phase 1 final cover area. The remaining uncovered portion of the inactive landfill includes approximately 5.8 acres immediately west of the Phase 2 final cover area. This inactive and uncovered portion of the landfill will require ongoing control of leachate, ash-contact surface water runoff and fugitive dust until the final cover is constructed.

Minnesota Power envisions beneficially using CCR from THEC in grading open areas of the landfill prior to temporary cover construction. Grading would be performed to achieve necessary slopes and flow directions for surface water runoff. It is recommended later in this memorandum that this beneficial use

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be initiated following development of and request for MPCA approval of a Minor Permit Modification for a Modified Closure Plan.

Federal Regulations

On October 19, 2015 the federal coal combustion residual (CCR) rule issued by the EPA went into effect. The rule consists of regulations for disposal of CCR as solid waste under subtitle D of the Resource Conservation and Recovery Act (RCRA). The rule outlines standards for disposal of CCR in landfills and surface impoundments. Included in the standards are criteria for the beneficial use of CCR. To aid the evaluation of CCR beneficial use according to the CCR rule, definitions directly from the rule are included below.

40 CFR Part 257 Subpart D: Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments

§257.53 (Definitions)

Beneficial use *of CCR means the CCR meets all of the following conditions:*

(1) The CCR must provide a functional benefit;
(2) The CCR must substitute for the use of a virgin material, conserving natural resources that would otherwise need to be obtained through practices, such as extraction;
(3) The use of CCR must meet relevant product specifications, regulatory standards or design standards when available, and when such standards are not available, the CCR is not used in excess quantities; and
(4) *When unencapsulated use of CCR involving placement on the land of 12,400 tons or more in non-roadway applications, the user must demonstrate and keep records, and provide such documentation upon request, that environmental releases to groundwater, surface water, soil and air are comparable to or lower than those from analogous products made without CCR, or that environmental releases to groundwater, surface water, soil and air will be at or below relevant regulatory and health-based benchmarks for human and ecological receptors during use.*

Coal Combustion Residuals (CCR)*: means fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers.*

CCR Landfill *or landfill means an area of land or an excavation that receives CCR and which is not a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground or surface coal mine, or a cave. For purposes of this subpart, a CCR landfill also includes sand and gravel pits and quarries that receive CCR, CCR piles, and any practice that does not meet the definition of a beneficial use of CCR.*

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CCR Unit *means any CCR landfill, CCR surface impoundment, or lateral expansion of a CCR unit, or a combination of more than one of these units, based on the context of the paragraph(s) in which it is used. This term includes both new and existing units, unless otherwise specified.*

Existing CCR landfill *means a CCR landfill that receives CCR both before and after October 14, 2015, or for which construction commenced prior to October 14, 2015 and receives CCR on or after October 14, 2015. A CCR landfill has commenced construction if the owner or operator has obtained the federal, state, and local approvals or permits necessary to begin physical construction and a continuous on-site, physical construction program had begun prior to October 14, 2015.*

Inactive CCR surface impoundment *means a CCR surface impoundment that no longer receives CCR on or after October 14, 2015 and still contains both CCR and liquids on or after October 14, 2015.*

Inactive Landfill – not defined in CCR Rule

As a supplement to the CCR rule definition of beneficial use, the CCR preamble includes significant discussion of beneficial use and the basis for defining beneficial use in the final rule. The preamble includes the following:

Preamble Section B (page 21327): Final Regulatory Determination Regarding Beneficial Use:

EPA generally proposed to retain the May 2000 Regulatory Determination that beneficially used CCR did not warrant federal regulation under subtitle C of RCRA. As EPA stated in the May 2000 Regulatory Determination, ***"In the [Report to Congress], we were not able to identify damage cases associated with these types of beneficial uses, nor do we now believe that these uses of coal combustion wastes present a significant risk to human health and the environment. While some commenters disagreed with our findings, no data or other support for the commenters' position was provided, nor was any information provided to show risk or damage associated with agricultural use. Therefore, we conclude that none of the beneficial uses of coal combustion wastes listed above pose risks of concern." (See 65 FR 32230.)*** *EPA noted that since the original Regulatory Determination, the Agency had found no data or other information to indicate that existing efforts of states, EPA, and other federal agencies had been inadequate to address the environmental issues associated with the beneficial use of CCR that were originally identified in the Regulatory Determination. EPA explained that it had proposed this approach in recognition that some uses of CCR, such as encapsulated uses in concrete, and use as an ingredient in the manufacture of wallboard, provide benefits and raise minimal health or environmental concerns. Consequently, EPA preliminarily concluded that encapsulated uses of CCR, which are common in many consumer products, did not merit regulation based on the available information. However, EPA noted that the issues were more difficult with respect to unencapsulated uses of CCR and specifically solicited comment on whether such uses should continue to be included as "beneficial use" under the Bevill exemption. EPA explained that unencapsulated uses have raised concerns and therefore merited closer attention. For example, the placement of unencapsulated CCR on the land, such as in road embankments or in agricultural uses, presented a set of issues similar to those that caused the Agency to propose to regulate CCR destined for disposal. But the Agency also acknowledged that the*

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amounts and, in some cases, the manner in which CCR is used—i.e., subject to engineering specifications and material requirements rather than landfilling techniques—are potentially very different from land disposal. EPA is retaining the original 2000 Regulatory Determination for CCR that is beneficially used. EPA has made this determination based on consideration of the available information and the RCRA section 8002(n) study factors.

CCR Preamble page 21329 section B 5 c. *Benefits from Reducing the Disposal of CCR Beneficially using CCR instead of disposing of it in landfills and surface impoundments also reduces the need for additional landfill space and any risks associated with their disposal...*

CCR Preamble page 21329 section 7*. On balance, after considering all of the available information, EPA has concluded that the most appropriate approach toward beneficial use is to retain the May 2000 Regulatory Determination that regulation under subtitle C of the beneficial use of CCR is not warranted. EPA has also determined that regulation under subtitle D is generally not necessary for these beneficial uses.*

State Regulations

The THEC Industrial Solid Waste Landfill has an active Solid Waste Management Facility Permit No. SW-503. The permit, issued in accordance with Minnesota Administrative Rules Chapter 7035, Solid Waste, and Parts 7035.1590 through 7035.2500, Industrial Solid Waste, allows disposal of CCR at the landfill, in accordance with permit requirements, through April 4, 2024. That permit references closure criteria and cover specifications as listed below.

Section 1.7 (Closure Criteria)

Facility Closure (1.7.1)

1.7.2: *The permittee must close each waste activity, or the entire facility as appropriate, as specified in the approved plans and specifications, and in accordance with Minn. R. 7035.2625.*

(Note: Minn. R., 7035.2625 includes a closure performance standard to close the solid waste management facility in a manner that eliminates, minimizes or controls the escape of pollutants to ground water or surface waters, to soils, or to the atmosphere during the postclosure period. Additional references are made to the closure plan.)

Closure Procedures (1.7.3)

1.7.4 *The permittee must perform closure for each waste activity as specified in the approved plans and specifications, and in accordance with Minn. R., 7035.2635.*

(Note: Minn. R. 7035.2635 outlines completion of closure activities – includes beginning final closure activities according to the approved closure plan within 30 days after receiving the last shipment of waste; closure procedures; and certification of closure.)

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> ***1.7.5****: The permittee must complete closure activities for the waste activity area in accordance with the closure plan within 180 days following the beginning of closure as specified in the closure procedures above.*

Section 2.1.11 (Intermittent and Intermediate Cover (2.1.12): *Intermittent and intermediate cover shall meet the requirements of Minn. R. 7035.1700. Intermittent cover shall consist of applying water, leachate, or covering with new coal ash to manage blowing and dusting of any waste material. If disposal areas are at final elevations and will be exposed to the elements for a period of 120 days or longer, an intermediate cover totaling at least 12 inches of compacted soils must be provided and maintained.*

(Note: Minn. R. 7035.1700 outlines required practices for maintenance and operation of industrial solid waste land disposal facilities.)

Per state regulations and the facility permit, Minnesota Power may continue to place CCR at the THEC landfill through April 4, 2024. At the state level, CCR used to facilitate closure does not need to be classified as beneficial use: it is ongoing utilization of the THEC landfill for disposal of a permitted industrial solid waste.

Closure Approach

The preceding sections of this memorandum provide background information on the status of the THEC CCR landfill, the federal rules, and state permit requirements potentially influencing the closure approach. Use of newly generated CCR to facilitate temporary and final closure at THEC is reasonably defensible, in Barr's opinion, under the following recommended path forward:

1. Prepare request for Minor Permit Modification for Modified Closure Plan – The permitted Closure Plan for THEC provides for incremental closure of the landfill, proceeding from east to west as areas of the landfill are filled with CCR to permitted final grades. Final grades generally consist of 4-horizontal to 1-vertical (25-percent) side slopes and an 8-percent top slope. The configuration (locations, grades, geometry) of surface water runoff controls for the final cover are integrated with the proposed final cover slopes. With the cessation of CCR disposal at THEC, the planned final cover slopes and surface water runoff controls configuration will not be achieved with CCR from THEC. Therefore, Barr recommends an immediate action of preparing a request for Minor Permit Modification for a Modified Closure Plan for MPCA review and approval. The Modified Closure Plan would consider the existing grades at the landfill and the additional filling required to achieve revised temporary and final cover foundation grades having adequate slope and flow direction for surface water runoff control upon construction of cover, be it temporary or final. The revised grades would meet MPCA slope requirements and be achieved by a combination of excavation, relocation of previously placed CCR, and beneficial use of additional CCR as needed to

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meet slope objectives and to integrate the previously covered portion of the landfill with the Modified Closure Plan.

2. Submit Request for Minor Permit Modification for Modified Closure Plan – Prior to taking any action to relocate previously placed CCR and to beneficially use newly generated CCR to achieve modified closure grades, Barr recommends meeting with the MPCA to present the proposed Modified Closure Plan, then submitting the associated request for Minor Permit Modification. Approval of such modifications is required by Permit No. SW-503 and MPCA Solid Waste Rules. Since use of temporary cover is contemplated by Minnesota Power, the Modified Closure Plan should provide drawings for and specify the schedule for placement of temporary cover relative to the schedule for placement of final cover. If in the future final cover design varies from what is accomplished by the temporary cover, then final cover drawings should be submitted to the MPCA prior initiation of final cover construction.

3. Implement Modified Closure Plan and Beneficial Use of CCR – Upon receipt of MPCA approval of the Modified Closure Plan and/or other MPCA concurrence that the Modified Closure Plan is acceptable, ash relocation and CCR beneficial use could proceed. The January 14th meeting with the MPCA wherein a draft of the Modified Closure Plan was presented and generally accepted by the MPCA may constitute the necessary agency concurrence with the Modified Closure Plan. As noted previously however, submittal of a formal request for the associated Minor Permit Modification is recommended, including a request that the MPCA provide written approval of the plan upon completion of their review. A request for a minor permit modification for temporary closure of the landfill was submitted to the MPCA by Minnesota Power on January 27 as a follow up to the January 14 meeting.

Barr Opinion as to CCR Beneficial Use at THEC

It is Barr's opinion that, relative to the CCR rule definition of beneficial use, placement of newly generated THEC CCR at the THEC Industrial Solid Waste Landfill is justified as beneficial use as follows:

(1) The CCR must provide a functional benefit;

Beneficial use of the THEC CCR as recommended provides a functional benefit. The THEC CCR, once placed and compacted, provides a structurally sound foundation material for landfill final cover. Under MPCA rules and the facility permit, final closure grades for a solid waste landfill must be equal to or greater than 2-percent to facilitate surface water runoff, but not steeper than the permitted grades. When placed to grades permitted by the Modified Closure Plan, the beneficially

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used CCR will facilitate surface water runoff; a critical function of the final cover system of the THEC landfill.

(2) *The CCR must substitute for the use of a virgin material, conserving natural resources that would otherwise need to be obtained through practices, such as extraction;*

Beneficially used CCR will substitute for use of virgin material. Construction materials will be required to be placed at the THEC landfill to achieve the final cover grades to be specified in the Modified Closure Plan. In lieu of establishing a soil borrow source for obtaining these materials, potentially disturbing several acres (depending on borrow pit depth and pit accessibility) of the land surface in the process, the CCR from THEC are readily available and will reduce the need for extraction of natural soil materials that would otherwise be used to produce necessary final cover grades.

(3) *The use of CCR must meet relevant product specifications, regulatory standards or design standards when available, and when such standards are not available, the CCR is not used in excess quantities;*

The CCR will meet project-specific specifications and regulatory standards and will be used only to the extent needed to grade the THEC landfill in preparation for final cover construction, consistent with the Modified Closure Plan. The Modified Closure Plan will attempt to minimize the amount of additional CCR material needed to meet closure requirements which will protect against using CCR in excess quantities. The final cover subgrade must have sufficient strength and stability to support final cover construction activities and to maintain long term stability. It has previously been demonstrated at this site that the THEC CCR are a suitable final cover subgrade construction material, and its use is preferred over importing soil materials from a distant soil borrow source location.

(4) *When unencapsulated use of CCR involving placement on the land of 12,400 tons or more in non-roadway applications, the user must demonstrate and keep records, and provide such documentation upon request, that environmental releases to groundwater, surface water, soil and air are comparable to or lower than those from analogous products made without CCR, or that environmental releases to groundwater, surface water, soil and air will be at or below relevant regulatory and health-based benchmarks for human and ecological receptors during use.*

The CCR rule in Part 257.53 Definitions fails to define *unencapsulated.* Similarly, the CCR preamble fails to define unencapsulated through examples of unencapsulated uses. Per Part 257.53 Definitions, *encapsulated beneficial use* means a beneficial use of CCR that binds the CCR into a solid matrix that minimizes its mobilization into the surrounding environment. While the proposed beneficial use may not

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be an encapsulated use, the following characteristics of the recommended Modified Closure Plan are of note:

- It is unlikely that the Modified Closure Plan will entail the placement of 12,400 tons or more of CCR at the THEC landfill. Of the roughly 30,000 tons of THEC CCR generated from today through plant idling in late 2016, a substantial portion will be directed to Laskin Energy Center (LEC) for use as admix material to stabilize LEC Cell E CCR for closure. The remainder will be beneficially used to achieve Modified Closure Plan cover foundation grades at THEC.

- In the event that greater than 12,400 tons are used, environmental releases to groundwater, surface water and soil will continue to be controlled by CCR placement within the existing lined Cells 1 through 3. Releases to air will continue to be controlled by moisture conditioning the CCR prior to transport and discharge in Cells 1 through 3 and by watering exposed ash as necessary to control air emissions. With transport of CCR on paved and gravel surfaced roadways, and within a confined area of Cells 1 through 3, it is expected that air emissions will be no greater than would be experienced from transport of alternate materials from distant soil borrow sources.

- The CCR rule threshold of 12,400 tons of CCR placed in a concentrated area is concerned with beneficial uses "associated with the placement of CCR in quarries and sand and gravel pits, and with large scale fill operations used to re-grade the landscape."[1] EPA views these uses as disposal but acknowledges that some large scale fill operations can be beneficial use.[2]

Note also that beneficial use of CCR to facilitate closure would not make THEC a CCR Landfill under the CCR Rule. As stated previously, the definition of *CCR Landfill* per the CCR Rule is:

> *CCR landfill or landfill means an area of land or an excavation that receives CCR and which is not a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground or surface coal mine, or a cave. For purposes of this subpart, a CCR landfill also includes sand and gravel pits and quarries that receive CCR, CCR piles, and any practice that does not meet the definition of a beneficial use of CCR.*

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[1] Federal Register Vol. 80, No. 74 page 21351.
[2] Ibid. EPA contrasting certain large scale fill as a beneficial use. (By contrast, EPA has not definitively concluded that "large scale fill operations," per se, constitute the disposal of CCR. This is because EPA agrees with commenters that, if constructed correctly, large scale fill operations can meet all of the criteria for a beneficial use.)

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Based on this definition, use of THEC CCR for achieving the objectives of a Modified Closure Plan can reasonably be demonstrated to meet the definition of beneficial use and therefore, within the construct of the CCR Rule, the THEC Industrial Solid Waste Landfill, when receiving THEC CCR for beneficial use to fulfill Modified Closure Plan objectives, is not a CCR Landfill.

Summary

The THEC landfill is an inactive landfill not subject to CCR Rules because it stopped receiving CCR prior to the effective date of the rule. MP plans to close the THEC landfill, however additional material is needed to achieve adequate slopes prior to regrading and construction of temporary and final cover. Newly generated CCR would be an appropriate material for this purpose, and this usage meets the CCR Rule criteria for beneficial use of CCR. Provided that beneficial use criteria of the CCR Rule are followed, beneficial use of newly generated CCR is also not subject to the CCR Landfill rules.

MPCA Industrial Solid Waste Permit SW-503 sec. 1.7.1 through 1.7.5 requires closure activities to be completed in accordance with approved plans and specifications. Closure activities that are initiated must be completed within 180 days of initiation. The planned placement of THEC CCR in the landfill to aid in achieving temporary and final cover foundation grades remains a permitted activity in accordance with Permit No. SW-503. However, submittal of and receipt of MPCA approval and/or other MPCA concurrence that the Modified Closure Plan is acceptable is recommended prior initiation of CCR beneficial use at the THEC landfill.

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