

James R. Deutsch
Director, Reclamation Division
North Dakota Public Service Commission
600 E. Boulevard Ave. Dept. 408
Bismarck, ND 58505-0480

March 15, 2011

**Re: South Heart Lignite Mine Application Informal Conference Request,
Comments and Objections**

Dear Mr. Deutsch:

We the undersigned individuals and organizations respectfully submit these comments on and objections to the mine permit Application (“Application”) submitted by South Heart Coal LLC (“Applicant”) and request an informal conference on the matter at South Heart, for the convenience of those most affected. We also request access for ourselves and our experts to the mine site (“Site”), for the purpose of gathering information relevant to the foreseeable impacts of the proposed mining activities. In addition, we request that a copy of an electronic or stenographic record of the informal conference be made available to the undersigned as soon as possible after the informal conference.

We identify ourselves as Objectors to the project, and our interests in the matter include:

- Detrimental impacts to our residences and personal health from the proximity of a massive strip mining operation (“Mine”), blasting, hauling, processing, fugitive dust, water access, water contamination, etc., caused directly by the mining operation;
- Detrimental impacts to local water recreational opportunities caused by disruption of a natural hydrological system and introduction of pollutants into local waters by the Mine;
- Detrimental impacts on our agricultural and business interests, including tourism attracted by the Badlands and Theodore Roosevelt National Park, as well as the health of livestock, by commencement of mining activities in proximity to an area that is currently a pristine and wild landscape, with attendant impacts to air quality and quality of life generally;
- Detrimental impacts on enjoyment of the Badlands, Theodore Roosevelt National Park, and other natural resources by North Dakota residents and visitors from around the country;
- The likelihood, given the pattern established to date by North Dakota coal mine operators, that reclamation activities will be wholly inadequate to restore the site to its current state and use, and the resulting prospect of permanent degradation of the land and water on and near the Mine; and

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- Global climate impacts caused by combustion of coal mined at South Heart and methane released during the mining process, including changes in weather patterns that will detrimentally impact agriculture in our region and increased likelihood of natural disasters due to disrupted climate patterns.

After many volunteer and professional hours spent reviewing the lengthy Application, we conclude that the Application in its current form is incomplete due to many omissions, oversights, and incomplete analyses, including the lack of other required environmental permitting that would provide important insight into the actual impacts to be anticipated. Therefore we request that the PSC revise its finding that the Application is complete and suspend the review pending completion of all relevant environmental permitting processes.

For ease of review, we include a Table of Contents as a guide to these comments:

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Coal Bed Methane Recovery Activities

The Application includes insufficient analysis of any methane present at the Site and of any coal bed methane recovery activities that may take place. If significant amounts of methane are present, either methane recovery will take place, which will cause quantifiable impacts, or recovery will not take place, which will result in release of a potent greenhouse gas directly to the atmosphere. Some discussion of the future of any methane contained at the site is appropriate in any event. If Applicants have determined that there are only negligible amounts of methane at the Site, those findings should be noted in the Application. We request an analysis of methane at the Site and how it will be handled.

Hydrological Impacts

Federal and state surface mining laws explicitly require protection of the hydrologic balance. Damage to the hydrologic balance must be minimized within the permit area. Outside the permit area, material damage to the hydrologic balance is prohibited. The hydrologic balance consists of the water quantity and quality of each element of the hydrologic balance (i.e., each aquifer, each spring, each stream, each pond, etc.), the flow among or between the individual elements, and seasonal variations of quality, quantity, and inter-element flows. The Application as submitted does not fulfill these minimum characterization requirements.

The Probable Hydrologic Consequences (PHC) statement is the Applicant's integrated statement of the expected consequences of the mining and reclamation operations proposed in the Application to reduce the damage to the hydrologic balance to acceptable levels. Without a thorough understanding of the hydrologic balance, any projections of consequences are speculative, with no basis for the operator to assert that damage to the hydrologic balance within the permit area is minimized and that material damage to the hydrologic balance outside the permit area will not occur. The PHC statement is, therefore, inadequate and precludes approval of the Application. We request modification of the PHC in response to these comments or rejection of the Application as inadequate.

Summary of Overburden Characteristics Is Inadequate

Testing conducted on overburden materials that will be disturbed during mining indicated high potential for SHLM to impair surface and groundwater quality within and outside of the permit area. Sodium adsorption ratio (SAR) testing was

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performed by the applicant on overburden soils located above the D coal seam as required by NDAC 69-05.2-08-05-2(c). Results of the SAR testing reported in the permit Application (Section 2.3.4.2) established that approximately 57% of the samples have SAR values greater than 12 and 35% have SAR values greater than 20. PSC Policy Memorandum No. 3 sets a SAR value of 12 as the threshold for toxic overburden materials. In cases such as this, where toxic overburden material is present, supplemental information is required to evaluate the hydrologic consequences of mining.

Synthetic Precipitation Leaching Procedure (SPLP) testing was conducted to evaluate further the potential for overburden materials to impact water quality. The SPLP is a non-buffered, short- duration, high liquid-to-waste, agitated, laboratory leaching procedure using an extracting fluid the approximate composition of precipitation. The test uses the analytical procedures of EPA Method 1312, an accepted United States Environmental Protection Agency method. While the SPLP provides an indication of the type and relative concentrations of contaminants that might be expected to leach from overburden materials as water travels through overburden, like the TCLP, it cannot predict the concentrations in leachate that does form. Among the findings of the SPLP analyses reported in Section 2.3.4.9 are:

- Elevated Total Dissolved Solids (TDS) concentrations, 16 of which were above the EPA Secondary Drinking Water Standard of 500 mg/l, were detected in the SPLP leachate. The Application acknowledges that an increase in TDS is expected due to dissolution of salts and minerals in the overburden materials.
- Selenium (2 samples) and zinc (43 samples) were detected in the SPLP leachate at concentrations greater than their North Dakota Acute Aquatic Life Standards (NDAC 33-16- 02.1). Other metals including cadmium, copper, lead mercury, and nickel were detected in concentrations in excess of the North Dakota Chronic Life Standards (NDAC 33-16-02.1). In each of these cases the Applicants theorize that mixing of the re-placed overburden will effectively decrease the concentrations of these metals in field leachate to below applicable standards. This postulation is curious because, a) the SPLP leachate concentrations are often significantly below the concentrations that actually form in the spoil due to the extremely long contact time (essentially forever) and high solid/liquid ratio experienced by groundwater flowing through reclaimed overburden relative to the test protocol, and b) the patterns of exceedances of groundwater and surface water quality standards, as is seen at other previously mined locations in North Dakota with similar overburden strata.
- Arsenic was detected in 105 of 122 leachate samples and 66 of those were above the EPA Primary Drinking Water Standard 0.01 mg/l. The Applicants hypothesize that actual field conditions like the rock/water ratio and higher pH of stockpile runoff will result in lower arsenic concentrations than were detected by the SPLP. Studies of arsenic mobility in geologic systems establish that neither higher rock-to-water ratios in the spoil nor higher pH

argue for lower arsenic concentrations than reported from SPLP tests. Further, other field conditions such as the presence of acid-forming materials in overburden, competing species for adsorption sites, and extremely long contact times may also produce more concentrated field leachate than SPLP leachate and result in water quality that exceeds standards more often or at higher levels.

Results of the SPLP test prompted the Applicants to develop and run the Ground Water Leach Procedure (GWLP) test.¹ GWLP is an unofficial and un-reviewed leaching test developed by Golder Associates and Northern Analytical purportedly to develop a better understanding of the high levels of leached arsenic from SHLM overburden. The GWLP used water obtained from one on-site well, rather than synthetic precipitation, as the lixiviant in the SPLP procedure. Results obtained from the GWLP showed lower, but still significant concentrations of arsenic in simulated leachate. The obvious understanding from the alternative test – that different leaching fluids leach different concentrations under laboratory conditions – does not help predict actual impacts. Unfortunately even the somewhat lower level of arsenic contamination predicted by the unofficial GWLP test is not likely to be realized.

For water quality after mining, the controlling fluid will be spoil leachate reacting with spoil at rock- to-water ratios 50-fold that of the laboratory conditions over virtually unending periods of time. The laboratory leaching tests confirm that TDS and metal mobility are a likely problem for these spoils. Post-mining groundwater will be of significantly different chemistry than the pre-mining groundwater used in the GWLP. The leaching and acid forming potential of reclaimed overburden, noted above, is likely to result in degradation of groundwater and surface water quality in the area of SHLM.

Applicants do concede that at least arsenic should be expected to be detected in the surface and groundwater monitoring programs at SHLM, even if no such concession is made with regard to other metals likely to degrade the groundwater and surface water systems in the area. The ability of the proposed monitoring system to detect contamination from SHLM will be discussed in a separate comment.

Baseline Monitoring and the Proposed Monitoring Plan Are Inadequate

Applicants' water level monitoring, which took place "monthly between November 2006 and October 2007 and quarterly from the first quarter of 2008 through the fourth quarter of 2009" is inadequate because the area was experiencing drought conditions during most of this period. During the few times when water was plentiful, a number of monitoring stations became inundated and likely provided

¹ The relationship between the GWLP of the Applicants and the synthetic groundwater leaching procedure (SGLP), a procedure developed in the mid-1980s by the Energy and Environmental Research Center at the University of North Dakota (David Hassett, 1987) has not yet been determined. The SGLP has similar design and has demonstrated similar problems to the SPLP and the TCLP.

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unreliable information. The Application discusses neither problem and does not appear to address these issues.

Upgradient and downgradient groundwater monitoring are required to provide a complete picture of the water access and quality impacts of mining activities. The Application provides insufficient evidence that monitoring sites adequately evaluate the hydrological function of the full area that may potentially be affected by mining activities.

The monitoring programs proposed in the Application are also inadequate. The monitoring plan must monitor at all places, at all times, and for sufficient durations that are necessary to identify where/when conditions of concern may exist or develop as a result of mining and reclamation. The monitoring plans must collect data at times and places that allow the applicant (and the agency and public) to verify that the actual impacts of mining and reclamation are consistent with the projected impacts laid out in the Probable Hydrologic Consequences (PHC) statement. In the event that the results of mining and reclamation depart from the projections of the PHC, the monitoring plan must be able to discern changes in quantity and quality that are of concern. Further, that “concern” must be quantified with numerical values, ranges of values or trends (*i.e.*, standards or trigger levels) that allow and cause actions to be taken *to prevent* material damage to the hydrologic balance outside the permit area. An adequate monitoring plan, in conjunction with the Hydrologic Reclamation Plan (HRP), will require that specific actions be taken when concerns are identified and what those actions will be. The monitoring programs delineated are deficient in, or simply missing, each of these elements.

Groundwater Monitoring

The Application describes groundwater flow in the Overburden – D Coal Aquifer as generally northeast toward the Heart River. Discharge from the Overburden – D Coal Aquifer is mainly to the Heart River through alluvium and subsurface outflow to the northeast (Section 2.5.2.7). Unfortunately, during active mining, groundwater flow in the alluvial and shallow bedrock aquifers (above the base of the D coal) will be dominated by pumping at the active mine pits. A cone of depression will develop that will induce groundwater flow toward the pits with excess water being discharged under a surface discharge permit. This inward flow toward the cone of depression will bring unimpacted water from surrounding areas, past the perimeter monitoring wells, effectively rendering the proposed groundwater monitoring system unable to detect groundwater degradation caused by mine operations until mining operations are complete and sufficient recharge has occurred to re-introduce outward flow from the mined area.

Once mining is complete and pumping is terminated, groundwater will eventually rebound to equilibrium conditions, ultimately exiting the site past the permit boundary or into the South Heart River or its tributaries. However, by the time equilibrium flow conditions are re-established, the monitoring system will have

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been removed and bonds released, leaving the local residents and State to deal with the results. Hydrologic conditions must be monitored until the final equilibrium condition has been established if a true indication of the effects of mining on groundwater quality is to be obtained. The Application should be denied unless, among other things, the monitoring plan requires monitoring until equilibrium conditions are re-established and the fate and transport of contaminants is understood.

Surface Water Monitoring

The surface water monitoring plan provided with the Application provides a cursory description of a minimal surface water flow and quality monitoring that might be implemented unless *“an alternative (i.e., reduced) list of monitoring locations and parameters may be implemented if warranted and approved by the PSC.”* The surface water monitoring program described includes only one monitoring point on the Heart River located well downstream of the site in the town of South Heart. That monitoring point will be insufficient to detect depletion of baseflow in the Heart River near the site caused by dewatering activities at SHLM.

Monitoring of surface water is proposed to occur only through completion of the *“active (e.g., non-reclamation) mining period”*. Direct discharge from the reclaimed overburden aquifer is not expected to begin until equilibrium conditions are established, well after the planned discontinuance of surface water monitoring. In addition, there are no proposed monitoring locations along the Heart River adjacent to the SHLM to detect discharge from groundwater into the river. The proposed surface water monitoring plan will not sample at the appropriate times or locations necessary to detect impacts to the Heart River from mining at SHLM.

The Application provides no evaluation of the amount of expected Heart River baseflow depletion that will be induced by active mine dewatering. Neither does it contain an evaluation of the effect of discharge of contaminated groundwater on post-mining water quality in the Heart River. The Application should be denied until the surface water monitoring plan requires monitoring in the Heart River at times and locations capable of detecting depletion of baseflow during mining, and discharge of contaminated groundwater post-mining.

We therefore request modification of the proposed monitoring programs and augmentation of the baseline monitoring submitted, or rejection of the Application based on the lack thereof.

Impacts to Ground Water Quantity

The text describes a cone of depression that will result from dewatering the D Coal and overlying units that will extend to the depth of excavation (bottom of the D Coal) and claims that the extent of significant drawdown will *“likely be within one mile of the mine pits”*. No explanation of how this estimate was developed is provided. Withdrawal of groundwater does more than simply create a cone of depression. It reduces the actual quantity of groundwater within the area of impact

and it changes the direction(s) of groundwater flow. Each of these modifications to the hydrologic balance has the ability to materially damage the hydrologic balance or impact groundwater uses and users. A detailed evaluation of the decrease in groundwater quantity, including the distance that the cone of depression will extend past the permit area, as well as the effects that the withdrawal of groundwater will have on the South Heart River, other area surface water bodies, and human, animal, and environmental uses and users of the groundwater is needed to adequately develop the Probable Hydrologic Consequences of the SHLM.

Impacts to Ground Water Quality

The Application states that, “Based on literature and observations at other North Dakota coal mine operations, TDS concentrations may increase two to three times relative to pre-mining conditions”. This is the only quantification provided for the expected degradation of groundwater quality, even though the overburden testing performed by the Applicants confirms that metals will be leached from the overburden and critical soil chemistry properties, e.g., SAR, may be unacceptable. No evaluation or plans to mitigate these impacts are identified. No standards or trigger levels that cause actions to be taken before material damage to the hydrologic balance occurs outside the permit area, no standards or trigger levels that cause action to minimize damage within the permit area, and no specific actions are included that would be taken when trends indicate material damage is likely outside the permit area.

The time period over which groundwater quality will be impacted is described as being temporary, with eventual equilibrium water quality conditions being similar to pre-mining water quality. What is not mentioned is that the active mine life is planned to be 30 years and that returning the groundwater system to any equilibrium chemical conditions will require many decades after that, let alone returning it to conditions “similar to pre-mining.” In effect, the groundwater resource of the SHLM mine area and the South Heart River will remain impacted for several generations of North Dakotans.

A complete discussion of Probable Hydrologic Consequences must identify the expected flow direction, flow rates, contaminant concentrations, contaminant fates and seasonal variation thereof that are expected as a result of mining. It must then, in conjunction with the Hydrologic Reclamation Plan, identify steps to be taken to mitigate impacts to off-site groundwater resources sufficiently to prevent material damage to the hydrologic balance outside the permit area. None of this is in this Application. The Application is deficient and the agency is required by law to deny the permit until the mining plan actually addresses protection of the quantity and quality of groundwater.

Alluvial Valley Impacts

In the Application as accepted, Applicants have not substantiated their claims that the Site is not an alluvial valley floor. Objectors request a copy of any information

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submitted to the PSC on the question of alluvial valley impacts, and submit the following objections to the Application.

The structure of the mining operation (see Application Fig. 3.1-1) appears designed to allow convenient access to the first stripping and mining area with relatively lower overburden to coal seam ratio (eastern half of Pit No. 1 in Section 22) by siting haul road, holding ponds, and mining operations buildings within the South Branch Heart River (SBHR) alluvial valley. In furtherance of this goal, mine operators have (a) sought a declaration from the ND Public Service Commission (PSC) that the SBHR alluvial valley is not an alluvial valley for legal coal stripmining purposes, and (b) by positioning two relatively small proposed mining areas (No. 3, 2038-2040, and No. 4, 2040-2042) to the southeast side of the SBHR alluvial valley, expanding the contiguous proposed permit area to the opposite side of the valley from the much larger proposed mining areas, No 1 (2014-2021) and No 2 (2021-2038). Of particular note is a massive haul road proposed to be built through the SBHR alluvial valley with one section tightly wedged between portions of the SBHR and the eastern edge of proposed Pit No. 1, at the edge of which mining operations are slated to begin.

As part of stripmining operations, waters flowing into the active pit from surface and ground sources are removed (dewatered) to holding ponds for settling of suspended solids and then discharged to surface waters. Proposed Ponds No. 1 and No. 2 are located within the SBHR alluvial valley in Section 22 with short discharge ditches to the river.

Quality of waters pumped to holding ponds from pit dewatering can be inferred from analyses of groundwater in both overburden and the "D" coal stratum targeted for mining (Section 2.5.2.5). Overburden waters were variable in total salt load (measured as electrical conductivity, EC), but tended to have elevated sodicity, meaning that the anionic ratio of sodium to calcium plus magnesium (measured as the sodium adsorption ratio, SAR) is elevated. Waters in coal strata were highly variable, but many samples showed elevated EC and SAR values.

The quality of surface waters resulting from contact with stripmined overburden may be inferred from leaching tests (Section 2.3.4.9):

- 25% of samples showed SAR values greater than 12, an elevated benchmark value indicating lack of fitness for irrigation, animal, or human use;
- Total dissolved solids (TDS) of multiple samples were above EPA secondary drinking water standards;
- Multiple samples had maximum leachate concentrations of aluminum, iron, and manganese above EPA secondary drinking water standards;
- Relative to ND chronic aquatic life standards defined in the state Administrative Code, several maximum leachate tests exceeded set levels for the following elements: cadmium, copper, lead, mercury, nickel, selenium, and zinc; and

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- 66 out of 122 leachate tests yielded arsenic levels above EPA's drinking water maximum contaminant limit (MCL).

As noted above, proposed holding ponds are designed to receive pit waters and active pit zone runoff waters. After sedimentation is completed, discharge will occur. As noted in the draft permit narrative, in order to comply with water quality standards "... pond discharge water will be diluted with other sources."

In judging environmental risks from water control operations conducted as part of coal stripmining, one important consideration is the relative hydraulic conductivities of various soil and land types. Unmined alluvial lands, such as the SBHR alluvial valley, have relatively higher hydraulic conductivity, and holding ponds may in general be "leaky" unless provisions are made in their construction to achieve relative impermeability. Unmined uplands in the South Heart area have generally low subsoil permeability due to dominance by smectitic clay mineralogy, however permeability is conferred by such factors as deep root penetration and soil animal action. Sodic minespoils, the type that would potentially be created by the proposed mining activity, are relatively impermeable, but are subject to catastrophic piping erosion that can empty water impoundments very quickly.

Probable Hydrologic Consequences and Cumulative Hydrological Impact Assessment

The permitting agency is required to consider the hydrologic impacts of *all* anticipated mining in a cumulative hydrological impact assessment, or CHIA. NDCC § 38-14.1.21(3)(c). The 7000 acre footprint of the site rezoned for mining raises the possibility that the mining Application is incomplete in scope and does not evaluate the full impacts of mining activities contemplated by Applicants, including those that may affect federal coal at the site.

The Application describes considerable characterization of the current flow and chemistry of the Heart River, its tributaries, and other ponds springs and seeps. The current Heart River is described as a gaining stream in the vicinity of the proposed mine, meaning that groundwater discharges to river sediments and adds water to river flow.

Section 2.6.3 describes flow in the Heart River as having an average baseflow of 1.1 cubic feet per second (cfs), excluding the months of March and April when stream flow is dominated by snowmelt. The effect that dewatering of the Overburden – D Coal aquifer will have on flow in the Heart River is not included as a PHC.

Development of the cone of depression in the Overburden – D Coal aquifer will reduce groundwater head in that aquifer up to a mile (unsupported estimate, see comment on Section 2.5.3.1) away from the mine. The location of the Heart River immediately adjacent to the entire northern permit boundary, and within the cone of depression, will reduce groundwater discharge to the Heart River and potentially turn several miles of the Heart River into a losing stream. A losing stream is one in

which water is leaving the stream to recharge groundwater. Loss of baseflow in the Heart River to groundwater recharge induced by mine dewatering has the potential to significantly reduce and possibly eliminate flow in long stretches (miles) of the Heart River near the SHLM and impact downstream water rights with respect to quantity, timing, and quality. Interaction between the groundwater and surface water flow systems are not evaluated, nor even acknowledged, as PHCs of the proposed SHLM. The Application should be denied until the effect of dewatering the Overburden- D Coal Aquifer on flow in the Heart River is fully evaluated, quantified, and understood.

Equilibrium conditions will slowly redevelop in the reclaimed overburden aquifer once mining is complete and the dewatering pumps are turned-off. Groundwater discharge from the reclaimed overburden aquifer to the Heart River will transport contaminants into the river that, as discussed previously) has very low baseflow during much of the year. Direct discharge of contaminated groundwater into the Heart River is not evaluated, nor even acknowledged, as a PHC of the proposed SHLM. The Application should be denied until the post-mining effect of direct discharge of contaminated groundwater into the Heart River is fully evaluated, quantified, and understood.

Hydrological Damage Prevention Recommendations

A larger buffer zone should be considered between permit boundaries and the alluvial valley of the South Branch Heart River (SBHR) to the west side of this water body. We believe that proposed Pits Nos. 3 and 4, which appear to be serving as mere land positioners/holders, should be abandoned. Permit boundaries should also be drawn back from the Heart River to the north of proposed Pit No. 2 in Sections 9 and 10 with a buffer zone also established. Alluvial valleys and the water courses they bear are too important to local agriculture to be polluted and damaged by massive haul roads and mining support facilities. Sedimentation ponds holding pit waters and minespoil runoff must not be sited in such a manner that there is appreciable risk of their contents contaminating alluvial watercourses. Downstream uses in the Heart River drainage, whether animal or human, current or future, must be protected from pollution. Better and safer design of holding ponds must be required of Applicants, including siting ponds away from drainage ways that are subject to flooding and careful review of pond design to ensure safety under stress of higher volume storms.

As a general comment, the whole system of managing surface and groundwater in coal stripmining needs to be rethought. Pit dewatering and runoff capture ponds should be kept separated if water quality differences in these two types of water can be shown to warrant it, as appears likely. The PSC should actively study and promote the concept of pit waters being reintroduced to coal seam aquifers to the extent that this can be shown to lower environmental risks without raising countervailing risks. Runoff and sediment control ponds should be designed to feed designed wetland areas, spreading water so that evaporation is maximized, wildlife is supported, and downstream pollutant risk is lessened.

The kind of problems and contradictions uncovered in the examination of the proposed reclamation of Pit No. 1 indicate the need for thorough redesign of the basic plan for this area. Perhaps the plan could start with a longer initial cut along a northeast-southwest axis located more near the middle of the pit area. Shaped spoil dumps and surface materials stockpiles could be located nearer to north and south boundaries than in the present permit draft. Higher risk dewatering ponds could be located upgradient of active cut and spoiling or material piles for maximum risk reduction. Longer cuts oriented on a more northeast-southwest or east-west axis than the present plan would cut across local areas with a greater diversity of reclamation depth requirements and suitable respread material depths than the current plan, perhaps allowing greater opportunity for shortening stripping/stockpiling/respreading cycles. Cutting/spoiling would proceed to the east and the south or to both the east and the west. Such a plan would afford much greater protection to the SBHR alluvial valley.

Other Impacts of Mining Activity

Uranium Release

Local residents have expressed concern about the presence of buried uranium at the Site and the potential public health impacts of constant exposure to airborne uranium released by mining activities. We request inclusion in the Application of a literature search about the public health impacts of uranium released during surface mining activities, and proposals for mitigation of any known risks.

Paleontological Resources

A 100 foot avoidance zone around areas with known paleontological or archeological value appears inadequate in light of the heavy industrial activity – blasting, hauling, etc. - to be conducted. Fossils and artifacts have been recovered at and near the Site. We request documentation supporting the 100 foot avoidance zone and demonstrating that it will be protective of these resources.

Climate Impacts

The proposed production of the South Heart Lignite Mine is 2.4 million tons per year of lignite coal, which will produce roughly 218.8 pounds of CO₂ per million Btu when combusted,² barring use of CO₂ capture technologies that have not yet proven economic. The energy content of lignite consumed in the U.S. averages 13 million Btu per ton. Based on that average, South Heart lignite will release more than 3 million tons of CO₂ per year. Strip mining will also release methane, a far more potent greenhouse gas than CO₂. The Mine therefore has the potential to be the source of annual greenhouse gas emissions roughly equivalent to those of Nepal, or approximately .01% of current annual US greenhouse gas emissions, for the next 30

² http://www.eia.doe.gov/cneaf/coal/quarterly/co2_article/co2.html

years. This is a nontrivial source of greenhouse gas emissions that should be considered in the permitting decision. We request such an analysis.

Reclamation Issues

Hydrologic Reclamation Plan Is Inadequate

Federal and state surface mining laws explicitly require protection of the hydrologic balance. Damage to the hydrologic balance must be minimized within the permit area. Outside the permit area, material damage to the hydrologic balance is prohibited. The Probable Ground Water Hydrologic Consequences (Section 2.5.3.2) are incomplete and are not adequately addressed in the Ground Water Hydrologic Reclamation Plan (2.5.3.3). Interactions between groundwater and surface water systems have been particularly neglected. Inadequately addressed groundwater hydrologic consequences include:

- The cone of depression caused by dewatering of the Overburden–D Coal aquifer will diminish and potentially remove groundwater from alluvial and Overburden – D Coal aquifers in areas on and adjacent to the permit area. The Hydrologic Reclamation Plan does not address hydrologic changes to these aquifers or protection of the hydrologic balance outside the permit area. The HRP merely commits to provide alternative water supplies for users of the resource. There is no activity described in the HRP to prevent reduction in groundwater quantity in areas off the mine permit under anticipated mining operations and nothing described in the event that the monitoring program shows that impacts from mining are greater than those anticipated in the PHC.
- The cone of depression caused by dewatering of the Overburden-D Coal aquifer will reduce flow on and around the permit area in the alluvial aquifers associated with the Heart River and South Branch Heart Rivers. This reduction in groundwater flow has not been addressed in either the Probable Ground Water Hydrologic Consequences or the Ground Water Hydrologic Reclamation Plan.
- Groundwater flow during active mining will be primarily toward the active pit. Once dewatering is stopped flow directions will eventually reestablish equilibrium and migration from the mined area will begin. The Probable Hydrologic Consequences acknowledge that downgradient groundwater quality will be impacted by mining, but with no assessment as to the degree of impact. The Ground Water Hydrologic Reclamation Plan identifies no actions as part of mining operations to minimize damage to the hydrologic balance within the permit area and no actions to prevent material damage to the groundwater components of the hydrologic balance outside the permit area. The HRP for groundwater is similarly silent on further measures that would be available as part of the reclamation plan to remediate impacts were data from the monitoring plan to indicate groundwater impacts beyond those projected in the PHC.

The Probable Surface Water Hydrologic Consequences (Section 2.6.5) are incomplete. No Surface Water Hydrologic Reclamation plan is provided with the Permit application. Unaddressed surface water hydrologic consequences include:

- The cone of depression caused by dewatering of the Overburden-D Coal aquifer will reduce baseflow in the off-permit Heart River and the on-permit South Branch Heart River. Reduction in baseflow in these streams due to dewatering is not addressed nor quantified in the permit application as a probable hydrologic consequence. The permit application is similarly silent with respect to remedial plans as part of the proposed mining operations or contingent plans in the event of unanticipated impacts that become documented in data from the surface water monitoring plan.
- Surface Water Probable Hydrologic Consequences included in the application do not include contribution of contaminants from groundwater that will discharge to the Heart River and South Branch Heart River once dewatering is complete and the mine spoil has recharged to its post-mining equilibrium levels, levels that presumably will again discharge to these rivers. The effect of discharge of contaminated groundwater on surface water quality is neither quantified nor acknowledged in the application as a probable hydrologic consequence. The permit application is similarly silent with respect to remedial plans as part of the proposed mining operations or contingent plans in the event of unanticipated impacts that become documented in data from the surface water monitoring plan.

Soil Reclamation Plan Is Inadequate

The mining and reclamation process begins with determination of depths of developed soil materials (suitable plant growth materials, SPGM) that are to be stripped off the land and stockpiled prior to mining (or in favorable circumstances, stripped from one tract of land and respread on another area where stripmining, backfilling and reshaping of overburden has been completed). Topsoil and subsoil materials are stripped and stockpiled separately, and depths of topsoil and subsoil to be stripped are marked in inches on the soil survey map for each soil mapping unit (see Figs. 2.4-2a and 2.4-2b).

The total depths of soil and soil-like materials that must be respread on any particular piece of land is determined from analysis of the chemical and physical properties of the overburden material and reference to standards set in North Dakota Administrative Code (NDAC). Particularly relevant here is NDAC 69-05.2-15-04. If there is an insufficient depth of regular soil materials (SPGM) available at a given location, then additional suitable overburden material (SOBM) must be stripped, stockpiled, and respread after mining.

The draft permit has an estimate of depths of additional SOBM material that needs to be used for the entire 5-pit, 30-year mining plan in Section 3. Calculated by two different methods, this depth was either 1.1 feet or approx. 1/3 foot. The first area proposed for production is Pit No. 1, and we have made an estimate here of depths

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of additional SOBM material needed for operations in the pit because of insufficient depths of regular SPGM to satisfy respread depth requirements mandated by provisions in NDAC.

First, a map of the locations of overburden sampling (Fig. 4.1-10a) was examined along with the tabulation of relevant overburden characteristics (Table 4.1-1). The draft permit has indicated in this table that depths between 2.5 and 10 feet are being considered as source for SOBM. Each sampled location was examined to determine if overburden in this depth interval met principal suitability criteria, which are: salinity (EC less than 4) and sodicity (SAR less than 10). An additional criterion was examined: saturation percentage (Sat%), a measure of water adsorption. High Sat% has been shown to render soil materials undesirable for support of plant growth, and Sat% greater than 90 was used here, with accounting of suitability being made with and without this criterion.

It was found that overburden characteristics of the east side of the Pit No. 1 area were somewhat different from those on the west side of this pit, and so accounting was carried out separately for the two portions of the pit area. For each overburden sampling location, the percentage of overburden above 10 ft. depth that met suitability criteria was determined. Depths of SPGM designated for stripping and stockpiling were determined from the soil survey maps (Figs. 2.4-2a and 2.4-2b) by sampling over a grid pattern at approx. 30 points. Depths of overburden below SPGM stripping depths that met suitability criteria were then determined. Finally, required total depths of soil respread material (SPGM plus additional material (SOVM)) were tabulated for each sampling location in Pit No. 1 from Fig. 4.1-10a.

For the eastern half of Pit No. 1, the average total depth of soil and near soil materials required to be stripped is 3.50 ft. The average depth of soil materials (SPGM) designated from soil survey as available is 2.18 ft. This leaves a difference of 1.32 ft. that requires additional suitable overburden (SOVM). Of overburden material at depths less than 10 ft. on the east side, we calculate that 43.8% meets the suitability standard, which leaves a depth of 3.42 ft. of SOVM, more than enough to meet the need for 1.32 ft.

On the west side of Pit No. 1, the average total depth of surface materials required to be stripped is 3.75 ft., and the average depth of SPGM available is 1.51 ft., leaving a difference of 2.24 ft. needing to be supplied. However, by the most realistic set of suitability standards that includes the 90 Sat% cutoff criterion, only 6.3% of the overburden above 10 ft. depth but below SPGM is suitable (18.8% is suitable without the Sat% criterion). This means that only 0.53 ft. of overburden above the 10 ft. depth is suitable for reclamation purposes, creating a need for 1.71 ft. of additional SOVM to be brought from the east side of Pit No. 1 to meet the respread requirements.

Thus, the soil scientific, legal-administrative, and engineering logic of the proposed reclamation plan for Pit No. 1 requires the removal, transport, stockpiling,

retransport, and respreading of some 1,100,000 tons of additional suitable overburden material (SOVM) from the east side to the west side of the Pit No. 1 area (assuming an average moist bulk density of 1.8 g per cm³). This is the equivalent of 7300 150-ton dump truck loads or 20,000 44-cubic yard motor tractor scraper loads. If the Sat% criterion is not used for determination of overburden suitability, then approximately 40% of this amount of material needs to be transported from the east to west sides of the mining area. Assuming a multiplier of 1.5 for road tortuosity, the total distance haul vehicles would travel to make one average length round trip from the east side of Pit No. 1 to SOVM stockpiles sited (according to the draft plan, Fig. 3.1-1) approx. 1/2 mile north of the section boundary plus another average round trip from a stockpile to the west side would amount to 7.4 miles. This is all in addition to any of the other forms of materials transport involved in mine operation.

These figures bring out a problematic contradiction. Difficult to reclaim sodic minespoils require greater depths of respread soil materials to achieve a given level of soil productivity. However, areas of North Dakota in which sodic minespoils are likely to be generated by mining tend to have a lower percentage of good quality, deeper type soils. Achieving the soil depths required by law will be costly and the proposed mining plan does not begin to address the scale of reclamation efforts needed. Major modifications to the plan will be necessary to comply with state and federal law. We request such modifications or rejection of the Application in light of the lack thereof.

North Dakota Has a Pattern of Inadequate Contemporaneous Reclamation

It is our understanding that strip mine reclamation efforts elsewhere in North Dakota have been less than fully successful, to say the least, in returning land to its prior use or a better one, and in many circumstances have not been contemporaneous, as required by state and federal law. This pattern demonstrates a need for a heightened level of scrutiny for any new reclamation plan. We request from the agency a comparative discussion of the success and timeliness of reclamation efforts undertaken elsewhere in the state.

Economic and Social Impacts

Impacts to Agriculture

As described in greater detail above, significant impacts to surface waters and alluvial valley surface and associated streambed groundwaters will be felt. These natural resources are important to area agriculture because of restricted groundwater quantity and quality. Currently, crop producers are under economic stress due to volatile markets and escalating input costs. Livestock producers face price cycles and market domination by a very small number of corporations empowered by decades of federal non-enforcement of the Packers and Stockyards Act. Integrated crop-animal agriculture offers a path forward for producers to make progress in overcoming problems of external market forces and input costs.

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However, a fully developed integrated crop-livestock system depends on local availability of quality animal feed such as corn and alfalfa. In a semiarid, northern local area with restricted acreage of higher quality cropland, the availability of alluvial valley lands becomes very important to the effective functioning of sustainable integrated crop-animal agriculture. We request an analysis of impacts to agriculture prior to any permitting decision.

Impacts to Tourism

Many local residents rely in whole or in part for their livelihoods on the 475,000 visitors who come to the Badlands and Theodore Roosevelt National Park every year. No serious analysis has been performed on the likely effect on the tourism economy of a massive strip mine and associated processing facilities visible from the approach to North Dakota's most valuable tourist sites. The effect of tourists from other parts of the country going home to tell tales of dust clouds blowing across the interstate, blasting shaking the earth, and iconic views clouded with fugitive dust can only be imagined. According to U.S. Bureau of Labor Statistics, as of December 2010, mining and logging together employed only about 12,000 North Dakotans, a figure that increased 75% in the last year. At the same time, leisure and hospitality businesses employed over 35,000 North Dakotans, up 3% over the last year.

The numbers tell us that tourism is both a much larger and a much more stable source of employment for North Dakotans. To compromise the state's largest tourist attraction for the sake of a mining facility is economically foolish indeed. We request an analysis of impacts to tourism prior to any permitting decision.

Impacts on Local Community, Infrastructure, Social Services

Job impacts claimed by Applicants are exaggerated. Statistics provided by the City of Dickinson indicate that mining, quarrying, and oil and gas extraction together employed only 11% of local men from 2005 to 2009, and only 3% statewide. While the poverty rate in the Dickinson area hovers around 10%, the influx of out-of-state workers for the fossil fuel extraction industry has caused housing prices to shoot up in the last decade. The median price of a local house or condo in 2000 was \$70,500, while in 2010 the median price was \$182,000. The phenomenon has become even more pronounced in the last year. Median gross rent in 2009 was \$532, but currently, at a trailer park site in Belfield, FEMA cabins are renting for \$1200 plus utilities. In the greater Dickinson area, including South Heart, there is a shortage of housing, rental units, and day care services.

Social services and public schools are also strained by increased demand, including a quickly growing special needs population that is especially costly to local school districts. The local tax base is not growing quickly enough to provide the infrastructure associated with a sudden boom. Another way to say the same thing is that the oil and gas industry is not bringing enough money into the community to pay for the services the industry and its employees require. We see little indication that the local community would profit sufficiently from the Mine to counterbalance

the social infrastructure needs the mining operation will create. The Applicant has offered no analysis of the housing, educational, and social services needs likely to be created by the mining operation, nor any discussion of how social infrastructure requirements will be paid for. We therefore request such an analysis prior to the permitting decision.

Coal Value Is Overestimated

If, as seems possible, the proposed coal-to-hydrogen-to-electricity project proves not to be viable, then the Mine will serve as a source of export coal in regional, national, and perhaps international markets. The economics of this scenario are weak. According to GTL Energy’s own published results for its coal-drying process, dried lignite is not competitive with Powder River Basin coal.

Even with the GTLE drying process, lignite’s energy value is merely on par with or slightly higher than PRB coal, while the cost per ton for lignite remains more than 50% higher. A significant additional cost – not publicly disclosed to date, as far as we are aware – is likely also associated with the drying process. In market competition with PRB coal, South Heart lignite, even dried, will be far more expensive on a per BTU basis and therefore uncompetitive. This is an important reason to ensure the viability of the proposed gasification plant, or a reliable market for GTLE’s dried lignite, before approving the Mine or investing any more taxpayer dollars in what may be a losing proposition.

GTL Energy Drying Process Results³

| Type of coal | Original BTUs | Reduction of moisture | Increased BTUs by % | Final BTU Value | Average 2009 cost per short ton ⁴ |
|--------------------|---------------|-----------------------|---------------------|-----------------|--|
| ND Lignite I | 6000 | 71% | 53% | 9200 | \$19.61 |
| ND Lignite II | 6600 | 67% | 42% | 9400 | \$19.61 |
| Powder River Basin | 8600 | 67% | 25% | 10800 | \$12.49 |

Economic & Technical Feasibility of Coal Processing Plans Are Questionable

We object to the Application in part because it is based on the developer’s unsupported assertions that a coal-to-hydrogen facility will be feasible at the Site and add value to what is otherwise low-value natural resource extraction that will be a net loss to the local economy and our quality of life.

³ <http://www.gtlenergy.com.au/technology/technical-results.html>

⁴ <http://www.eia.doe.gov/aer/txt/ptb0708.html>

The 175 MW coal-to-hydrogen-to-electricity facility contemplated in the South Heart Energy Development, LLC (SHED) letter of intent filed December 13, 2010 with the PSC is only the latest in a series of pie-in-the-sky ideas floated by Great Northern Power Development (GNPD) and its various subsidiaries, whose identities seem to shift as frequently as its project visions. The first letter of intent, dated August 18, 2005, contemplated a 500 MW lignite-powered electric generating station at the site. Then on January 23, 2008, another LOI envisioned a coal-to-synthetic natural gas facility. The only consistent things about these letters of intent are the South Heart site and the lack of any technical specifications or financing details.

At this point, the only proven feasible project is a lignite mine. There is little information currently available about the pollution profile of proposed minemouth facilities. We are not aware of any analysis of the potential economic impact of air quality regulations anticipated to take effect prior to final permitting for facilities proposed at the mine site, which could potentially render the proposal uneconomic due to the unacceptably high cost to public health and the environment.

Procedural and Ethics Issues

Omitted Analysis of BLM Unsuitability Determination and Federal Coal Impacts

The Application provides insufficient information about the Mine's probable impacts on federal coal and adjacent land designated by BLM as unsuitable for coal mining. A March 3, 2011 letter from the Bureau of Land Management's Phillip Perlewitz to Jim Deutsch states:

Unleased federal coal lies adjacent to proposed mining operations in T139N, R98W, Sections 14, 20, 28, and 34. It was not discussed in the permit application how the operator will prevent the federal coal bearing formations from being wasted, damaged, or degraded when the proposed mining operations approach the boundary lines adjoining federal coal. The current mining plan of operations cannot hinder the future mining of federal coal. It is BLM's determination that this discussion be included in the permit application.

With this letter, BLM has determined that the Application is incomplete. Objectors have requested in separate correspondence that the PSC declare the Application incomplete in light of BLM's position. The Application is incomplete for this and many other reasons. It is unclear whether or not BLM is aware that GTL Energy's minemouth coal processing plant has already been constructed atop federal coal resources and what impact this fact may have on the legality of a mining permit. In addition to the modification required by BLM, we request a full analysis of impacts on areas designated unsuitable for surface mining, and further opportunities for public comment and hearing when these analyses have been submitted to the PSC.

Corporate Disclosure

The use of newly formed corporate entities may in some cases obscure developers' past SMCRA violations that should be a legal barrier to permitting a new mine. Because so many newly formed entities are parties to the proposed development, we request that the PSC require all parties with ownership interests in the Mine to disclose fully any other mining ownership interests, past or present, no matter what the corporate or personal form of ownership.

GTL Energy Coal Drying Plant Is a Minemouth Facility Improperly Excluded from the Application

Beginning in July 2008, GTL Energy (GTLE) has repeatedly asserted in filings before the PSC that its South Heart coal drying plant is not a minemouth facility and therefore should not be evaluated as part of the South Heart mine application, as federal and state law would otherwise require. In spite of the PSC's jurisdictional findings in GTLE's favor, GTLE's own filings confirm:

After the South Heart Mine has been permitted and is in operation, a majority of the coal will likely be supplied by that mine.

SHC (South Heart Coal) is an entity owned and controlled by associates of Great Northern Power Development LP (GNPD) and Allied Syngas Corporation (Allied). SHC will be seeking a coal mining permit from the North Dakota Public Service Commission for the South Heart Mine. Coal will then be supplied to the plant by SHC.

Representatives of GTL Energy have stated in public on several occasions, including in meetings with BLM, that they plan to move their coal-drying plant to the minemouth as soon as the mine is operational. The plant is clearly intended to be a coal preparation plant, either for on-site coal use or for shipping of South Heart coal. We ask that the PSC revisit its decision that the GTLE plant is not a minemouth facility and require analysis of this facility as part of the Application.

PSC Commissioners' Conflicts of Interest

In the last three years, Commissioners Cramer and Kalk have together accepted campaign contributions from parties with direct financial interests in the development of the South Heart mine and adjacent facilities totaling at least \$16,650. One contributor, Corbin Robertson, the managing partner of the entity that owns Great Northern Power Development, of which South Heart Coal is a subsidiary, is the source of \$15,800 of those funds. These are significant sums in campaigns whose total election year contributions were \$174, 772 (Cramer in 2010) and \$159, 836 (Kalk in 2008).

Parties with a direct financial interest in the proposed South Heart development made contributions in the last three years equal to at least 6.3% of Cramer's 2010 campaign contributions and 3.4% of Kalk's 2008 contributions.

Contributions to Cramer Campaign by South Heart Financially Interested Parties:

| Contributing Party | Nature of Interest | Contribution Amount | Date |
|---|---|----------------------------|-------------|
| Brian Bjella, <i>Bismarck, ND</i> | Counsel to GTL Energy | \$600 | 10/13/2010 |
| Corbin Robertson <i>Houston, TX</i> | Managing partner, Quintana Capital Group, owner of Great Northern Power Development. Applicant is a subsidiary of GNPD. | \$4800 | 9/7/2010 |
| Robert French, <i>Wellington, CO</i> | GTL Energy CEO | \$250 | 8/25/2010 |
| Corbin Robertson | See above | \$2500 | 8/6/2009 |
| Barbara Robertson | Spouse of Corbin Robertson | \$2500 | 8/6/2009 |
| Corbin Robertson | See above | \$500 | 8/14/2008 |

Contributions to Kalk Campaign by South Heart Financially Interested Parties:

| Contributing Party | Nature of Interest | Contribution Amount | Date |
|---------------------------|---------------------------|----------------------------|-------------|
| Corbin Robertson | See above | \$500 | 5/1/2009 |
| Corbin Robertson | See above | \$5000 | 8/24/2008 |

We believe that these contributions by parties with direct financial interests in the South Heart development create conflicts of interest for Commissioners Cramer and Kalk. We therefore respectfully request that Commissioners Cramer and Kalk recuse themselves from any further deliberation on issues related to the proposed development at South Heart.

Conclusion

The draft permit plan for the Mine is deeply flawed and must not be accepted by the PSC. In its present form, the plan appears designed to maximize operational convenience to the corporate operators while forcing various public interests to bear environmental risks and costs of noxious externalities, including damage to the larger local tourism industry.

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For the reasons outlined in these comments, we believe that the proposed Mine will have a net negative impact on the South Heart community, that the many impacts have been inadequately analyzed, that proposed mitigations are inadequate, and that remediation will be inadequate to restore the land to its current use and value. We ask the PSC to require Applicants to submit the additional information required by applicable law and outlined in these comments, to provide further information requested of the PSC, to provide further public comment and hearing opportunities when requested information has been submitted, and ultimately to reject the Application, for the protection of North Dakotans' health, economic interests, and irreplaceable natural resources.

Sincerely yours,

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