4.0 ENVIRONMENTAL CONSEQUENCES

In response to public comments, RD and DEQ have made a number of edits to the text of Chapter 4. Other than updated maps to reflect the modified location of the HGS, there are no large changes. Any additions or changed text in the FEIS from the DEIS as a result of public comments are shown in double underlining. Deletions are not shown.

4.1 INTRODUCTION

Chapter 4 assesses the potential environmental consequences associated with the Proposed Action consisting of the construction and operation of the proposed HGS and four wind turbines at the Salem site) and secondary action(s) including the construction and operation of power transmission lines, a rail spur, and potable, raw water and wastewater lines. Hereafter, the term "Proposed Action" will include all related secondary actions as they are necessary for the operation of the HGS or to meet the purpose and need of the Proposed Action. Connected Actions are possible projects or activities that may be linked to the Proposed Action or secondary action(s). There are two connected actions associated with the proposed HGS at the Salem site. Both pertain to mining of minerals needed for the operation of the HGS. These connected actions are not considered this EIS.

The main connected action is the surface mining and transport of coal to supply fuel for the generating station. However, environmental impacts associated with the particular mine or mines (Spring Creek and/or Decker, in Montana's Powder River Basin) from which coal would be purchased to fuel the HGS are already addressed in previous EISs (USGS-MDSL, 1977; USGS-MDSL, 1979; MDSL, 1980). These EISs are incorporated by reference into the present EIS.

Another connected action is the mining and transport of limestone from the Graymont Indian Creek Lime Plant and quarry near Townsend. This limestone quarry/plant is an existing facility that has been evaluated with the appropriate level of MEPA analysis and has operating permit #00105 from DEQ.

Potential environmental consequences can be direct or indirect, on-site and/or off-site. Direct impacts are those that are directly caused by the Proposed Action, like an increase in air pollutants emitted. Indirect impacts are those that follow in turn from the primary or direct impact; increased air pollutants, for example, could lead to increased smog, visibility impairment in Class I areas like national parks and wilderness areas, or increased deposition of toxic substances and their uptake by living organisms.

Potential environmental consequences are discussed under each resource topic for three possible alternatives related to the Proposed Action: 1) No Action, in which no HGS would be built at the Salem or alternate (Industrial Park) site; 2) Proposed Action, or the construction and operation of the HGS at the preferred Salem site east of Great Falls; and 3) construction and operation of SME's proposed generating station at the alternate site, which is the Industrial Park location just north of the City of Great Falls. Consequences of mitigations are also discussed.

4.2 METHODOLOGY

MEPA and NEPA both require the disclosure of more than the direct and indirect effects. Rather than include the following three categories with each resource, they are combined at the end of the chapter so the reader can understand the overall effects of these categories of effects.

- Neither NEPA nor MEPA requires an agency to avoid adverse or even significant effects, but they must be disclosed. Typically, agencies attempt to avoid, minimize, reduce, or mitigate adverse affects. "*Unavoidable*" adverse effects are those that would occur regardless of the proposed mitigations or other actions that would eliminate adverse effects.

- The "*relationship between short-term uses and long-term productivity*" varies somewhat according to resource. Short-term uses of a resource could be for a couple of years or the life of the project. Long-term productivity may refer to productivity during the life of the project and beyond for some resources and for others long term would only apply when the project is completed. The key to this section is to look at the trade-offs between short-term uses and long-term productivity with and without the Proposed Action, Agency Alternative, and any mitigations. The gains and losses are described.

- An irreversible or irretrievable commitment of resources would occur when resources were either consumed, committed, or lost as a result of the project. The commitment of a resource would be "***irreversible"*** if the project started a "process" (chemical, biological, and/or physical) that could not be stopped. As a result, the resource, or its productivity, and/or its utility would be consumed, committed, or lost forever. Commitment of a resource would be considered "***irretrievable"*** when the project would directly eliminate the resource, its productivity, and/or its utility for the life of the project or some period of time, but the resources would recover.

The interdisciplinary study team (see Chapter 7, List of Preparers) followed a structured process to analyze the potential environmental impacts, or effects, resulting from the two alternatives for constructing and operating a coal-fired electricity generating station for SME. This procedure, called the cause-effects-questions process, is described the six steps outlined in the following text box.

Using this process, both direct and indirect effects that could potentially occur as a result of different management scenarios were identified. As mentioned above, direct effects are impacts that would be caused by the alternative(s) at the same time and in the same location as the action. Indirect effects are impacts that would be caused by the alternative(s) that occur later in time or farther removed in distance than the action, or, as described above, by means of a longer chain of cause-and-effect linkages.

Causes-Effects-Questions:
A Structured Analytic Process

Step 1: Identify the specific activities, tasks, and subtasks involved in the Proposed Action(s) and alternative(s) (Table 4-1).

Step 2: For each specific activity, task, and subtask, determine the full range of direct effects that each could have on any environmental resource. For example, removing vegetation could cause soil erosion. See Appendix K for more detail.

Step 3: For each conceivable direct effect, identify which further effects could be caused by the direct effects. For example, soil erosion could cause stream sedimentation, which could kill stream species, which could diminish the food supply for fish, leading to decreased fish populations. This inquiry can identify multi-stepped chains of potential causes-and-effects. See Appendix K for more detail.

Step 4: Starting at the beginning of each chain of causes-and-effects, work through a series of questions for each potential effect:

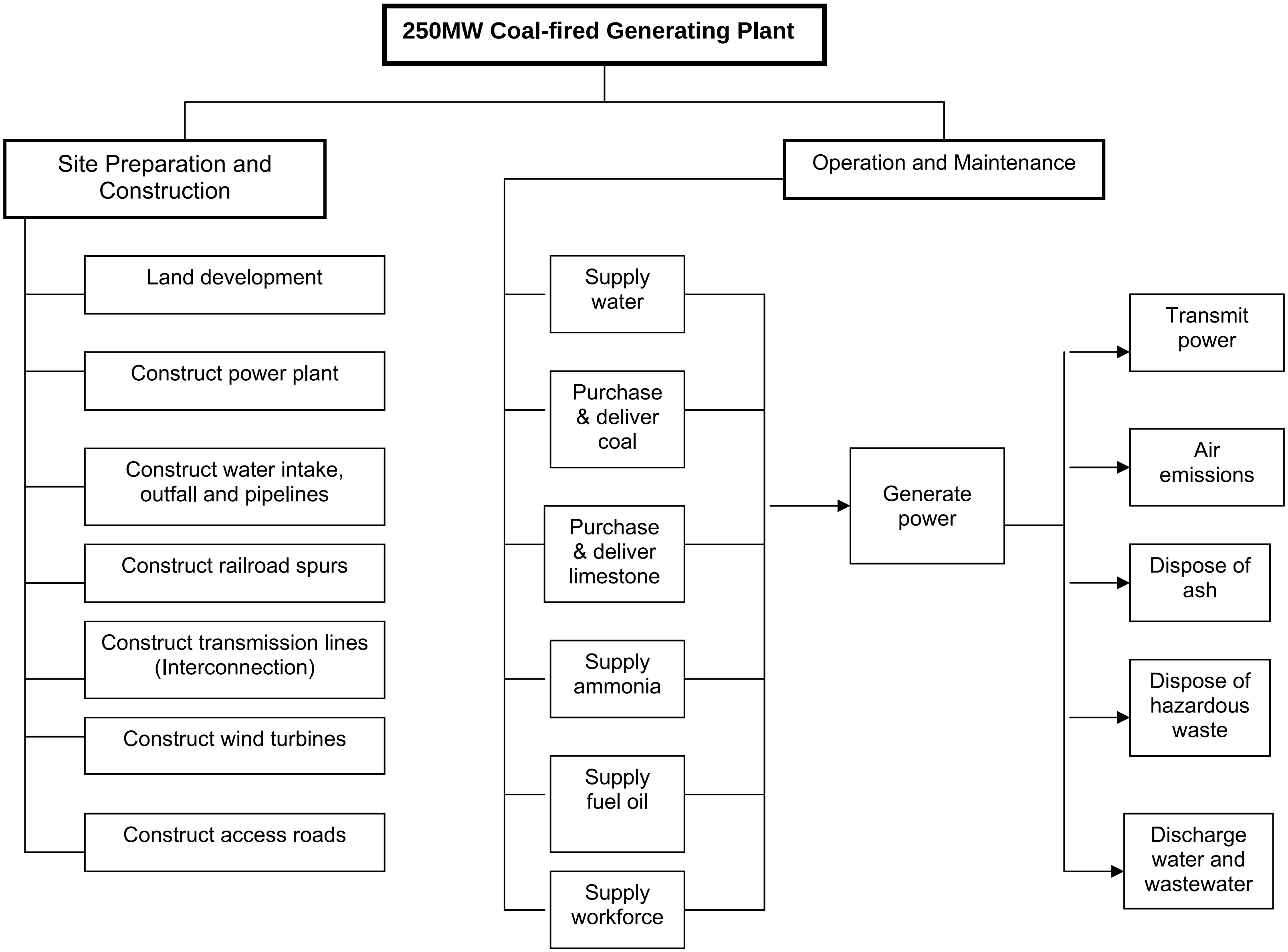
- Would this effect actually occur from this project?
  If not, why not? What would preclude it from happening?
- If the effect cannot be ruled out, characterize which types of data, other information, and analyses are needed to determine the parameters of the effect, including its extent, duration, and intensity. Identify the sources from which the data is to be obtained.

Step 5: Gather the data and conduct the analyses identified by the above steps, utilizing only relevant information.

Step 6: Document the results of this study process.

Figure 4-1 presents the preliminary cause-effects activities and tasks diagram for the proposed SME generating station. Appendix K presents the entire preliminary cause-effects-questions diagram that the study team prepared at the outset of the analysis. This visual aid helped organize the investigation and focus it on relevant issues.

Figure 4-1. Preliminary Cause-Effects Activities and Tasks Diagram for Proposed Southern Montana Electric Generating Station



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4.2.1 DEFINITIONS

Discussions of environmental consequences in the following sections will utilize a general vocabulary consisting of the following terms and definitions:

Types of Impact

Beneficial – A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
Adverse – A change that moves the resource away from a desired condition or detracts from its appearance or condition.
Direct – An effect that is caused by an action and occurs in the same time and place.
Indirect – An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

Duration of Impact:

Short-Term – Impact would occur during a transition phase only, or in the case of potential future developments, during the site preparation and construction phases only. Once these phases have ended, many resource conditions are likely to return to pre-transition/construction conditions.
Medium-term – Impact would extend past the transition, or construction phase for future developments; it could conceivably last 5-10 years, and depending on the resource, could persist for the life of a project.
Long-term – Impact would likely persist for 25-30 years or longer, often beyond the project life, depending on the specific resource and type of project.

Context of Impact:

Localized – Impacts would affect the resource area only on the project site or its immediate surroundings, and would not extend into the region.
Regional – Impacts would affect the resource area on a regional level, extending well past the immediate project site.
Worldwide – Impacts would affect the resource on a global level, extending well past the immediate project site and regional area.

Intensity of Impact:

Negligible – The impact is at the lowest levels of detection – barely measurable and with no perceptible consequences.
Minor – Change in a resource occurs, but no substantial resource impact results.
Moderate – Noticeable change in a resource occurs, but the integrity of the resource remains intact.
Major – Substantial impact to or change in a resource area that is easily defined, noticeable, and calculable but may not be measurable, or exceeds a trigger level.
Significant – The impact to or change in a resource is well defined, highly noticeable, measurable, and meets one or more of the significance criteria described in MEPA or NEPA summarized below, and/or violates an applicable state, federal or local statute or regulation.

4.2.2 EIS SIGNIFICANCE CRITERIA

The Highwood Coal-Fired Power Plant could have a wide variety of impacts on different components of the environment. The importance, or "significance," of each of these diverse impacts depends on several factors. For example, if a state or federal law clearly would be violated by any aspect of the Proposed Action, then that obviously would be a significant impact. Other factors affecting significance are matters of professional judgment, such as the importance of losing some wildlife habitat. The Council on Environmental Quality (CEQ) regulations implementing NEPA and DEQ's MEPA regulations provide a list of factors to be considered in determining impact significance. This EIS is based on an assessment method that combines these multiple factors into an overall assessment of significance. The following major factors influence the significance of most types of impacts:

- Magnitude of the impact (how much);
- Duration or frequency of the impact (how long or how often);
- Extent of the impact (how far);
- Likelihood of the impact occurring (probability).

Several levels were identified for each of these factors, as shown below.

Magnitude:
- major
- moderate
- minor

Duration:
- long term
- medium term (intermittent)
- short term

Frequency:
- often
- intermittent
- seldom

Extent:
- large
- medium (localized)
- small (limited)

Likelihood:
- probable
- possible
- unlikely (improbable)

Combinations of these factors would constitute various overall ratings of significance, as shown in Table 4-1. Given this general structure, specific definitions of these levels for each resource or impact topic were developed for this EIS.

Other factors affecting significance of impacts need to be taken into account during the impact analysis process. CEQ and MEPA regulations both contain the following similar requirements:

- The uniqueness and fragility of the resources or values; CEQ specifically defines different types of geologic features;
- The importance of the resource or value to the state and society, or conversely the degree to which impacts are likely to be highly controversial;
- The degree to which a precedence for future actions with significant impacts would be set as a result of the impact of the Proposed Action; and
- The potential for conflicts with local, state, or federal laws, requirements or plans.

CEQ regulations also include three additional factors that need to be considered:

- The degree to which the proposed action affects public health and safety;
- The degree to which the proposed action may adversely affect or cause the loss of significant scientific, cultural, or historic resources including sites on or eligible for the National Register of Historic Places; and
- The degree to which the proposed action may adversely affect endangered or threatened species or its habitat.

MEPA has one unique additional factor:

- The potential growth-inducing or growth-inhibiting aspects of the impact.

A Proposed Action also may generate impacts that are beneficial with regard to a given topic or resource area, in which case these impacts will be identified as "beneficial." By the same token, in some instances, impacts hypothetically may be neither beneficial nor adverse, or be negligibly beneficial or adverse, in which case they will be identified as such.

Table 4-1. Criteria for Rating Impacts

Levels of Impact				**Impact Rating**
Magnitude	**Duration**	**Extent**	**Likelihood**	
Major	Any Level	Large or Medium	Probable	**Significant**
Major	Long Term	Large or Medium	Possible	
Major	Medium-term, inter-mittent, or short-term	Any Level	Probable	
Major	Medium-term, inter-mittent, or short-term	Any Level	Possible	**Potentially Significant or Potentially Non-Significant (to be determined on a case-by case basis)**
Moderate	Any Level	Large or Medium	Probable	
Major	Any Level	Small	Probable	
Major	Long-term	Small	Possible	
Moderate	Any Level	Large	Possible	
Moderate	Any Level	Medium or Small	Possible	
Moderate	Any Level	Small	Probable	
Major	Any Level	Large	Unlikely	
Major	Long-term	Medium or Small	Unlikely	
Minor	Any Level	Large	Probable	
Minor	Long-term	Medium or Small	Probable	
Major	Medium-term, inter-mittent, or short-term	Medium or Small	Unlikely	
Minor	Medium-term, intermittent	Medium	Probable	**Non-Significant**
Minor	Any Level	Large	Possible	
Minor	Long-term	Medium or Small	Possible	
Moderate or Minor	Any Level	Any Level	Unlikely	
Minor	Short-term	Medium	Probable	
Minor	Medium-term, inter-mittent, or short-term	Small	Probable	
Minor	Medium-term, inter-mittent, or short-term	Medium or Small	Possible	

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4.3 SOILS, TOPOGRAPHY, AND GEOLOGY

4.3.1 NO ACTION ALTERNATIVE

The No Action Alternative would not have any impacts on the topography or the geology of the Salem or Industrial sites. There would be no change to contours or elevations of the land.

There would be no significant adverse impacts on soils from the No Action Alternative, although negligible to minor, long-term adverse impacts would continue from existing land use practices. Even on lands with very little slope, long-term background rates of erosion would continue, particularly on cultivated areas, due to the exposure of soils to wind and water from grazing, tilling, disking, plowing, and movement of farm machinery. This erosion is exacerbated by the high clay content of the soils in the area. Overall, in this area, as throughout most of the High Plains area and the nation as a whole, soil loss rates exceed soil formation rates. In Montana, average erosion rates on crop and pastureland are estimated to be 5.5 tons of soil per acre (12.3 metric tons per hectare) per year (USDA, 2000). Soil formation rates are estimated to be only 10–25% of these erosion rates, leading to a net loss of topsoil over the long term.

Insofar as SME would need to purchase power from existing sources of wholesale supply to meet energy supply needs in the service area, SME would be contributing indirectly to ongoing soil resource impacts, and possibly impacts to geology and topography, at different generating stations in the region or at potentially new generating stations located outside of the region.

4.3.2 PROPOSED ACTION – HGS AT THE SALEM SITE

4.3.2.1 Construction

Under the Proposed Action, construction activities on the HGS are anticipated to occur for four years and three months. Two months or more are anticipated to be spent on site grading and site preparation activities. The total area of disturbance for these activities would include the total footprint of the power plant, approximately 545 acres (221 ha), and additional roadway, rail spur, and utility corridor zones. Installation of the proposed wind turbines and related facilities such as access roads and electrical and transmission cables would require several months.

All coal storage and processing facilities would be located within the 545-acre footprint of the power plant. Additionally, this area would include several storm water detention ponds and a waste monofill (Figure 4-2). The monofill would be constructed within the confines of the railroad loop for the disposal of ash and water treatment system byproducts. The monofill area within the rail loop would be laid out in a rectangular grid consisting of approximately 53 acres (21 ha). The monofill would be constructed as nine cells in a grid. Each cell would be an excavated pit approximately 36 feet (11 m) deep. Once filled and covered, the monofill grid would have a height of roughly 22 feet (7 m) above grade. Excavated material would be predominantly fine-grained, high content inorganic clay soils with high plasticity and low permeability, which would be used to construct a clay liner and perimeter containment berms with the balance stockpiled for use as final cover.

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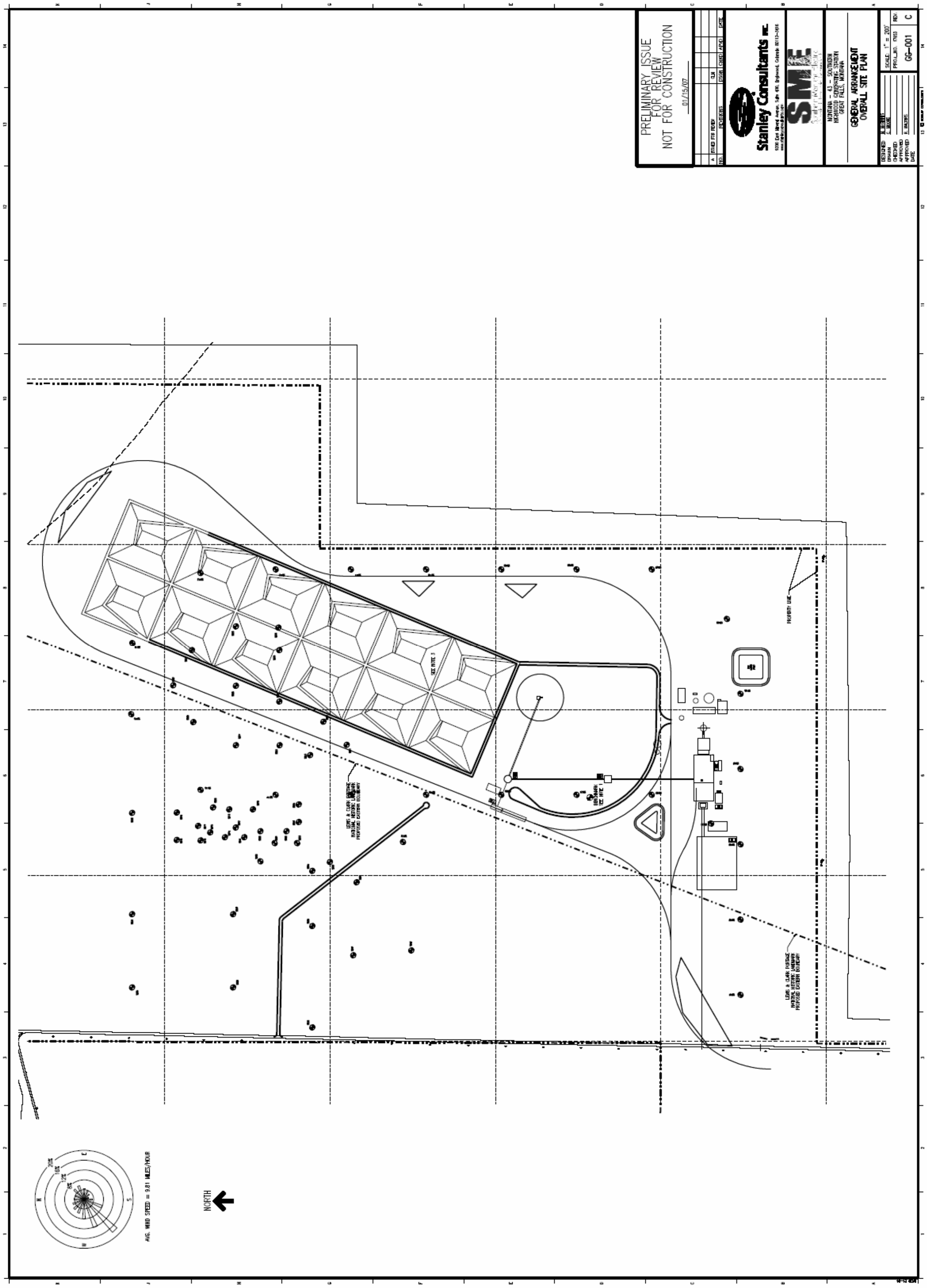

Figure 4-2. Construction Schematic of Ash Waste Monofill

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Each cell of the monofill would be designed as a self-contained unit. During initial construction, only one cell (with the associated containment berms) would be constructed. Every three years, a new disposal cell would be constructed, and the excavation materials from this construction would be used as the cover material and topsoil to close the filled cell. The Pendroy Clay soils found onsite are characterized by very slow water transmission rates and infiltration rates. This material would be recompacted at optimum moisture content to create an engineered clay liner for the cell. As each cell is filled, a final cover would be placed on the cell. The final cover is designed to retain the precipitation that falls on the final cover and maximize evaporation and transpiration by the plants grown on the cover. The cap would be constructed with a gravel layer immediately on top of the ash to serve as a capillary break. The gravel would be covered with 48 inches of native on-site materials that would function as subsoil. The capillary break prevents the subsoil from losing water into the waste. Six inches of topsoil would be applied and planted with suitable vegetation to minimize erosion and transpire the moisture retained in the cap. This type of cap, know as an evapotranspiration (ET) cap, is in common use at Class II landfills and other waste repositories in Montana. It is easier to construct and maintain than a compacted clay cap and mimics the natural soil conditions while preventing infiltration. The seeded areas would be maintained along with the balance of the site landscaping for the life of the plant.

With the exception of retention ponds and the monofill site, all areas within the footprint of the site would be contoured to an even grade according to design specifications, and the net balance between soil cut and fill is anticipated to be even (Walters, 2006). If, at any point, soil is stockpiled on site, the stockpile would be stabilized and/or covered, utilizing best management practices.

For access to the construction site, the existing aggregate roadways currently leading to the site would be maintained. At the end of the construction period, these existing roadways would be regraded and covered with additional aggregate. A 1,800-ft. (545 m) long paved access road into the site would be constructed and maintained from the existing Cascade County road, Salem Road.

Additionally, 6,600 feet (2,012 m) of paved internal roadways would be constructed to facilitate both the construction and operations phases of the plant. These on-site, paved roads would be aggregate-based during construction and would be paved upon completion of heavy construction. Internal road construction would take six months.

A 6.3-mile (10.1-km) railroad spur would be installed at the Salem site in order to transport and supply coal to the HGS. The spur would extend south from the plant and tie into existing main line track that is located three miles (five kilometers) south of the city of Great Falls. Although the railroad spur would not cross any waterways, it would cross agricultural lands and Montana State Highway SR 228, Highwood Road, which would require a raised highway (SME, 2005e). When railroad track is laid down, it would permanently remove or cover up arable soils on the agricultural lands to be crossed.

Additionally, two short segments of electrical transmission line would be constructed; the first line segment, approximately 4.1 miles (6.6 m) long, would extend from the plant site to a new switchyard site proposed for a location south and west of the Salem site; the second line segment, approximately 9.21 miles (14.82 km) in length, would extend south and west from the plant site, crossing the Missouri River north and east of Cochrane Dam. Both line segments would be constructed in new rights-of-way typically extending 50 feet (15 m) either side of centerline. All poles and structures associated with the transmission lines would be directly embedded utilizing native or engineered soils, in the event that additional soil is needed as backfill.

Construction of the raw water supply system would include a collector well which would use a passive intake screen installed on the end of a lateral pipe that extends into the Morony Reservoir. A reinforced, below-grade, concrete caisson (vertical cylinder used as a sump) would be constructed near the river and would serve as the intake's "wet well." A fully enclosed pump house would be located on the top of the caisson with a finish floor elevation at approximately grade.

Installation of the four wind turbine generators (WTGs) would involve temporary disturbance of soils from various activities. Excavation and grading would be required at each WTG location for foundation placement, as well as a temporary crane pad for tower erection. The total area of site disturbance for each tower is estimated at approximately 1.1 acres (0.4 ha), or 4.4 acres (1.6 ha) total. A portion of the excavated native soil materials would be used to establish natural drainage away from the turbine tower foundation. Additional soils disturbance would occur for installation of high voltage underground cable (collection system), communications cable and the electrical grounding system between the HGS Switchyard and WTG locations. A total of approximately 3,300 feet (1,000 m) of excavated trench, typically three feet wide by four feet deep (0.9 m by 1.2 m) would be required.

Ongoing operation and maintenance at WTGs would require construction of approximately 2200 lineal feet of access roads. Road construction impacts would be reasonably small considering the relatively minor change in elevation between WTG locations, the HGS plant site and existing county road. Access road construction would be limited to placement of pit run and final road base gradation materials to establish a 25-foot (8-m) wide drivable surface with elevations of 12 inches or more above natural grade, or as otherwise required to interface with an improved primary plant access road. Culverts to re-establish natural drainage would be utilized where required; in addition, riprap and flow diversion devices would be specified as required for erosion protection. Top soils removed at the start of construction would be spread adjacent to completed roadways and disturbed areas would be reseeded with natural vegetation. Impacts to topography and geology from erecting the WTGs would be negligible; impacts to soils would be negligible to minor, localized, and temporary to short-term.

Construction equipment to be used during the various facets of site development for both the power plant and WTGs would include bulldozers, backhoes, cranes, earth scrapers, motor graders, heavy haul trucks, large tractors, concrete trucks, asphalt pavers, concrete pavers, rollers, and compactors.

As with almost any construction project involving the use of heavy equipment, there is some risk of an accidental fuel or chemical spill, and the potential contamination of soils. Fuel products (petroleum, oils, lubricant) would be needed to operate and fuel excavation equipment. To reduce the potential for soil contamination, fuels would be stored and maintained in a designated equipment staging area. Oils and lubricants are usually stored in metal storage cabinets appropriately labeled, often inside a garage or maintenance shed. A person(s) designated as being responsible for equipment fueling would closely monitor the fueling operation, and an emergency spill kit containing absorption pads, absorbent material, a shovel or rake, and other cleanup items, would readily be available on site in the event of an accidental spill. Following these precautions, the potential for an accidental chemical or fuel spill to occur and result in adverse impacts on soils would be negligible.

Construction equipment also has the potential to compact soil, reducing the porosity and conductivity of the soil. Such compaction is likely to slightly increase the amount of surface runoff in the immediate area. The underlying soil in the area of the site, Pendroy Clay, is already characterized by high runoff potential and relatively high soil erosion potential. Stabilization of the soils would be vital to prevent sediment runoff impacts to off-site water sources, possibly degrading water quality.

Siltation, or sedimentation, is a leading cause of stream and river impairment in Montana and the U.S., as it can cause disturbances in aquatic ecosystems. The National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act prohibits the discharge of any pollutant, including sediments, to waters of the United States. The discharge of storm water runoff from construction sites is regulated under the NPDES program. Typically, sediment erosion rates from construction sites are 10 to 20 times greater than those from agricultural lands, and 1,000 to 2,000 times greater than those of forest lands (DEQ, 2003). Construction activities disturbing five acres or more of land are regulated by Phase I of the NPDES program. In Montana, DEQ is authorized to administer the NPDES Program through the Montana Pollutant Discharge Elimination System (MPDES) Program.

DEQ's Water Protection Bureau/Storm Water Program has issued general MPDES permits for construction sites, the chief requirement of which is the preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP). SWPPPs contain measures to reduce soil erosion and prevent pollution from petroleum, oil, and lubricants (POLs) and other chemicals or hazardous/toxic materials at construction sites. Specifically, SWPPP plans assess the characteristics of the site such as nearby surface waters, topography, and storm water runoff patterns; identify potential sources of pollutants such as sediment from disturbed areas, and stored wastes or fuels; and identify Best Management Practices (BMPs) which would be used to minimize or eliminate the potential for these pollutants to reach surface waters through storm water runoff.

BMPs at construction activity sites typically consist of various erosion and sediment control measures. At the Salem site, silt fences, straw bales, and other temporary measures would be placed in ditches and along portions of the site perimeter to control erosion during construction activities. At each outfall location, temporary sediment basins would be constructed and maintained until site vegetation is firmly established. These temporary sediment basins would be constructed before mass grading begins, so that they are in place and working for the entire construction period. Regular inspections of the erosion and sediment control measures would be

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performed after major storm or snowmelt events by qualified personnel, and as required in the MPDES General Permit.

In addition to preventing sediments from entering water bodies, erosion control methods would be in place to control the fugitive dust produced during construction activities. Dust control would be obtained through the use of water wagons on exposed earth or as required, the application of dust palliative on gravel surfaces. No human disturbances are anticipated, due to the lack of potential receptors in the immediate vicinity of the Salem site.

All disturbed areas (excluding those required for plant operations) would be stabilized and revegetated following completion of construction activities. Soils are likely to have been compacted during construction and would need to be ripped to reduce compaction prior to soil replacement. In addition, fertilizer and mulch may be needed to facilitate plant establishment. Proper seed selection would result in grasses with deep root systems and denser foliage, which would increase local retention times and reduce site outflows.

The construction activities would involve the conversion of existing agricultural lands into impervious areas. Increased urbanization and loss of pervious soils may result in increased surface runoff, perhaps contributing incrementally to localized drainage issues.

4.3.2.2 Operation

With the minor exception of the open monofill cell used in the disposal of ash, site soils would be stabilized once the proposed power plant is operational. Dust abatement would continue to occur on an as-needed basis on gravel surfaces.

The operation of the proposed power plant could hypothetically result in localized contaminant loading into the soil due to percolation of precipitation through coal stockpiles or leachate from the ash infiltrating into the soil from the monofill cells. The water would run off these piles or through the ash waste and could flush heavy metals such as arsenic and lead, which are inherently present in coal in trace amounts, into nearby soils where they could be adsorbed as the water slowly infiltrates down through the soil column. Leaching tests on the ash from proposed coal sources show no to very low concentration of specific metals will leach and that if any leachate was produced, it would be magnitudes lower than the standards for drinking water. Additionally, given the great depth to groundwater and the impermeability and thickness of clayey soils on site, the potential for extensive contamination problems is regarded as very low. Go to Section 4.13.2.2 for more information on ash disposal.

To further minimize any soil contamination, runoff within the power plant would be carefully managed. The ash monofill would be lined with compacted clay and groundwater in the vicinity of the monofill cells would be monitored. If contamination of soils is detected, SME would be required to follow the steps outlined in the site's Spill Prevention Control and Countermeasures Plan (SPCCP), or equivalent contingency and emergency plan, and the DEQ-approved solid waste management plan.

4.3.3 ALTERNATIVE SITE – INDUSTRIAL PARK SITE

4.3.3.1 Construction

Construction activities at the alternative site would be very similar to those described for the Proposed Action, the Salem site, except that they would not include the wind turbines. Construction timing would be anticipated to be the same, though the total area of disturbance would be only about half that of the Salem site. At the Industrial Site, the total area of disturbance for construction activities would include the total footprint of the power plant, which is several hundred square feet less than at the Salem site, and additional roadway, rail spur, and utility (pipeline and transmission line) corridor zones.

An ash disposal monofill would not be constructed at the site due to space constraints. For access to the construction site, SME and its contractors would maintain existing aggregate roadways to be used for construction access across the Industrial Park. They would regrade and place additional aggregate on these existing roadways at the end of the construction period. SME and its contractors would also construct and maintain all paved internal roadways to facilitate plant construction and operations. These on-site, paved roads would be aggregate-based during construction and would be paved upon completion of heavy construction.

Eight miles (13 km) of new track and railroad bed would be needed, slightly more than the distance for the Salem site. The rail spur would start north of the Missouri River and travel north and west to the plant site. A 4.5-mile (7.2-km) long pipeline (compared to less than three miles for the Salem site) would be needed to transport make-up water from an intake structure on the Missouri River to the plant. Precise locations of transmission line corridors have not yet been determined, though it is likely that one transmission line would go to the Great Falls Switchyard, which is about 5.5 miles east of the Industrial Park site. A second line of 18 miles in length would likely be built to a switchyard installed on the Great Falls to Ovando line. The specific rights-of-way for potable water and wastewater lines have been selected, and are 1.5 and two miles in length, respectively, which are shorter than for the Salem site.

Construction equipment used during site development would be the same as the Proposed Action, and would include bulldozers, backhoes, cranes, earth scrapers, motor graders, heavy haul trucks, large tractors, concrete trucks, asphalt pavers, concrete pavers, rollers, and compactors. Impacts from the use of this equipment are described under the Salem site section.

A storm water MPDES permit for construction sites would be required for the Industrial Park site. BMPs employed at this site would be expected to mirror those described for the Salem site. The construction activities would involve the conversion of existing agricultural lands into impervious areas. Increased urbanization and loss of pervious soils might result in increased surface runoff, perhaps contributing incrementally to localized drainage and flooding issues.

4.3.3.2 Operation

Site soils would be stabilized once the proposed power plant is operational at the Industrial Park site. Dust abatement would continue to occur on an as-needed basis on gravel surfaces.

As discussed under the Salem site, the operation of the potential power plant may result in contaminant loading into the soil due to percolation of precipitation through coal stockpiles. Any runoff within the power plant would be carefully regulated and managed. If contamination of soils is detected, SME would be required to follow the steps outlined in the site's SPCCP, or equivalent contingency and emergency plan, and the DEQ-approved solid waste management plan.

Since the on-site ash monofill would not be constructed at the Industrial Park site, an alternative disposal location for the ash would have to be found. Either an off-site landfill of the same size as the Salem site would have to be licensed, constructed and operated, or the ash would have to be placed in another existing licensed solid waste management facility. The same volume of ash, 228 tpd, would have to be managed. Disposal at a new landfill would possibly require more road construction than at the Salem site, but the total amount of disturbance would not be known until the site was actually selected. The road construction standards might change because the haul to the new landfill would have to be done in smaller, road-worthy trucks. The use of an existing landfill would prematurely fill the landfill and would require that the solid waste facility be replaced earlier than it otherwise would be without the additional material from the power plant. Road-worthy trucks might also be needed to haul ash to an existing facility.

4.3.4 CONCLUSION

The No Action Alternative would not have any impacts on the topography or the geology of the Salem or Industrial sites. There would be no change to contours or elevations of the land. There would be no significant adverse impacts on soils from the No Action Alternative, although negligible to minor, long-term, possibly adverse impacts would continue from existing agricultural land use practices. Insofar as SME would need to purchase power from other generation sources of wholesale supply to meet energy its supply needs, it would be contributing indirectly to ongoing soil resource impacts, and possibly impacts to geology and topography, at different generating stations in the region or at potentially new generating stations located outside of the region.

The construction of a power plant and related facilities at the Salem and Industrial Park sites would involve extensive site grading and excavation activities that would disturb a considerable amount of soil and alter the topographic contours of the respective sites. Because the sites are relatively flat, the impacts associated with topography are considered negligible. Impacts to soil resources from construction activities at the Salem site would be slightly larger than those at Industrial Park site, due to the ash disposal monofill construction at the Salem site. At the Salem site, soil resource impacts from construction activities would have a moderate magnitude, medium-term duration, medium extent, and probable likelihood. The soil resource impacts from construction at the Industrial Park site would be of minor magnitude, medium-term duration, and medium extent, and have a probable likelihood of occurring. The overall rating for impacts on soil from the construction phase of the power plant would be adverse and non-significant for both the sites.

Due to the operation of the waste monofill for the duration of the plant's life, operation-related impacts on soil resources for the Salem site would be of minor magnitude, long-term duration, and small extent, and have a probable likelihood of occurring. Soil that is stockpiled while a monofill cell is being filled would have to be stabilized and monitored on a consistent basis. The impacts of plant operation on soil at the Salem site would be adverse and most likely non-significant.

Operation-related impacts on soil resources for the Industrial Park site would be of minor magnitude, short-term duration, and small extent, and have a possible likelihood of occurring. Soils are anticipated to be completely stabilized upon commencement of plant operations, and the only outstanding impacts to soil remain the permanent increase in impermeable surface area and the risk associated with soil contamination from site runoff or leachate. The impacts of plant operation on soil at the Industrial Park site would be adverse and non-significant. Nevertheless, since the amount of ash waste would not change, an alternative disposal site would have to be located. Impacts to soils at a new location are unknown and site-dependent.

4.3.5 MITIGATION

The compliance with the terms and conditions of the MPDES permit and the extensive use of best management practices (BMPs) during all construction activities would minimize the loss of soil due to erosion. Additionally, the regulation of all runoff within the power plant grounds, groundwater quality monitoring in the vicinity of the monofill cells, and adherence to a site-specific SPCCP, equivalent contingency and emergency plan, or DEQ-approved solid waste management plan would reduce the risk of a major adverse impact on soil resources to below the level of significance.

Oils, lubricants, and other chemicals would be stored inside a garage or maintenance shed within metal storage cabinets appropriately labeled. A person(s) designated as being responsible for equipment fueling would closely monitor the fueling operation, and an emergency spill kit containing absorption pads, absorbent material, a shovel or rake, and other cleanup items, would readily be available on site in the event of an accidental spill.

To minimize erosion and stabilize soils, all areas disturbed during construction would be stabilized, graded, and revegetated with appropriate grasses and forbs (using seeds) as soon as possible afterwards. Compacted soils may require ripping to mitigate the effects of compaction and allow roots to properly penetrate, develop, and obtain oxygen, moisture and nutrients; in addition, mulching and/or fertilizer may be needed to encourage initial plant growth.

4.4 WATER RESOURCES

4.4.1 NO ACTION ALTERNATIVE

The No Action Alternative would not significantly, adversely affect water resources at or near the Salem site or the Industrial Park. However, negligible to minor, long-term adverse impacts would continue from existing land uses.

Runoff from the agricultural lands on the sites can carry sediments, and possibly nutrients and other pollutants, to surface waters where they can potentially degrade water quality. Sedimentation is a leading cause of stream and river impairment in Montana and the U.S, and it can cause disturbances in aquatic ecosystems such as the degradation of fish spawning grounds, the potential reduction of recreational activities, increased cost of domestic water purification and decreased life span of dams and levies. Continuing agricultural practices such as grazing, plowing, disking, harvesting, fertilizing, and using pesticides (e.g. herbicides, fungicides, insecticides) on the Salem or Industrial Park sites would contribute incrementally (albeit to a minute extent) to this distant, regional water quality problem.

Insofar as SME would need to meet its energy supply needs by purchasing power from generation sources located elsewhere, SME could potentially be contributing indirectly to ongoing water resource impacts at different generating stations in the region or at potentially new generating stations located outside of the region.

4.4.2 PROPOSED ACTION – HGS AT THE SALEM SITE

4.4.2.1 Construction

Under the Proposed Action, construction activities would last approximately four years and three months. The maximum area of disturbance for these activities would include the total footprint of the power plant, approximately 545 acres (221 ha) (though not all of this would be disturbed), a water intake structure and associated pipelines, and additional roadway, rail spur, transmission lines, and utility corridor zones. Installation of the proposed wind turbines and related facilities such as access roads and electrical and transmission cables would require several months.

General construction impacts associated with the upland sites (the plant footprint and transportation corridors) could indirectly affect water resources by increased storm water runoff from the sites carrying sediment and contamination loads into surface water, and by contamination from construction equipment and activities infiltrating area soils and percolating down into the groundwater. Direct impacts to water resources from construction activities include the construction of the water intake structure in the Morony Reservoir, the installation of a transmission line and pipeline within the watershed of the Missouri River, and excavation and soil disturbance from installing four proposed wind turbines on site.

Under existing conditions, the main footprint of the Salem site drains to four distinct outfall locations. Drainage areas vary in size from 26 to 94 acres (11-38 ha). Along the western boundary of the site, storm flows are routed through in-place culverts under Salem Road. To the north and east, flows are to local coulees.

Under the Proposed Action, the Salem site would remain gravity drained. Disturbed areas would be revegetated. Proper seed selection would result in grasses with deep root systems and denser foliage, which would increase local retention times and reduce site outflows.

Internal site drainage would be accomplished through the use of open ditches and culverts. Most ditches would have a nominal slope of 0.5 percent and a width of six feet (two meters). This wide, flat shape would encourage infiltration of storm flows and would further reduce site outflows. Where concentrated flows intersect undisturbed ground, or where existing soils are erosive, riprap would be placed to reduce flow velocities. While the four outfalls would be maintained, the majority of them would have a reduced drainage area. One area would remain the same size and three areas would have an increase in drainage area (8.8 to 9.0 acres, 207 to 224 acres, and 58 to 105 acres). Detention storage of seven acre-feet and four acre-feet would be provided at the two larger areas; these detention areas are labeled as North Pond and South Pond in Figure 4-3 below. This detention storage would reduce peak outflows during future storm events such that they would not exceed peak outflows experienced under existing conditions.

During site preparation and grading activities, soils in the construction areas may become exposed, rutted, and compacted. Soil exposure, rutting, and compaction have the potential to increase water yields from sites, concentrate and channelize sheet flow, increase erosion rates, and increase sediment delivery to nearby waterbodies. These effects, if unmitigated, could deliver small quantities of sediment and nutrient loadings to the Missouri River or its tributaries, which as already noted, are currently impaired by excess silt and nutrient concentrations.

Best Management Practices (BMPs), such as silt fences, straw bales, and other temporary measures, would be placed in ditches and along portions of the site perimeter to control erosion during all construction activities. At each outfall location, temporary sediment basins would be constructed and maintained until site vegetation is firmly established. These temporary sediment basins would be constructed before mass grading begins, so that they are in place and working for the entire construction period.

As with almost any construction project involving the use of heavy equipment, there is some risk of an accidental fuel or chemical spill, which could adversely affect water quality if the spilled chemical were to percolate into groundwater or directly enter and adjacent surface water body. Fuel products (petroleum, oils, lubricant) would be needed to operate and fuel both construction and water pumping equipment. Fueling activities would be restricted to the equipment staging area, away from drainages. To reduce the potential for water resource contamination, fuels would be stored and maintained in a designated equipment staging area, away from water bodies.

A person(s) designated as being responsible for equipment fueling would closely monitor the fueling operation, and an emergency spill kit containing absorption pads, absorbent material, a shovel or rake, and other cleanup items, would readily be available on site in the event of an accidental spill. Following these precautions, the potential for an accidental chemical or fuel spill to occur and result in adverse impacts on water resources would be negligible.

Direct impacts to water resources from construction activities would occur from the construction of the water intake structure in the Morony Reservoir and the installation of transmission lines and water and wastewater pipeline within watersheds of the Missouri River and tributaries.

As part of the construction of the intake structure, a concrete caisson (vertical, cylindrical water-tight structure in which construction work is carried out) would be constructed several hundred feet landward from the edge of water. The pipeline would be jacked or drilled horizontally through the riverbank and extended out into the Morony Reservoir. The pipeline would emerge

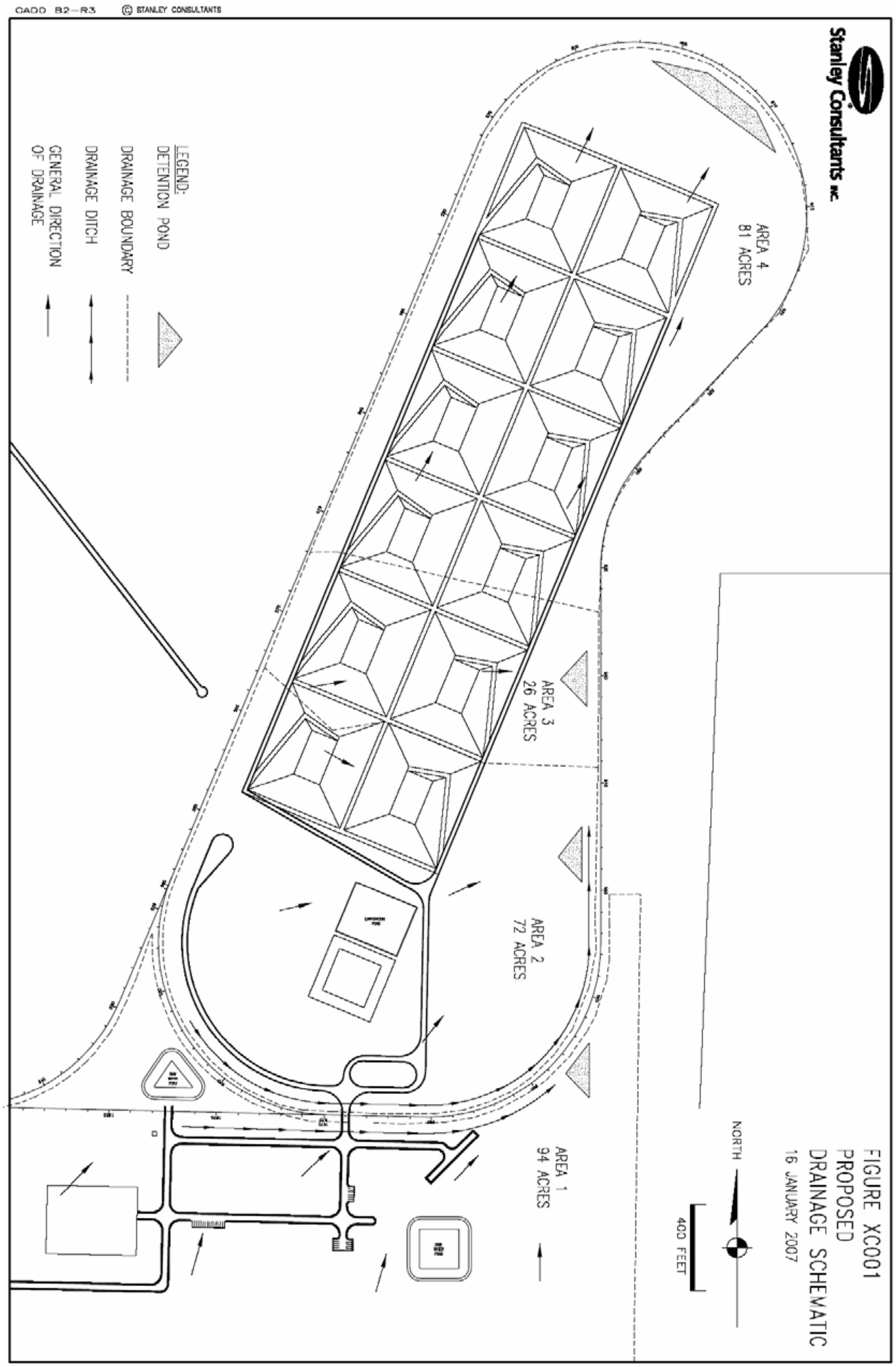

Figure 4-3. Proposed Drainage Schematic for Salem Site

from the ground, well below the water surface, and there would be no anticipated impact to the riverbank or to riverbank vegetation due to construction access or pipe placement. The pipeline would extend approximately 400 feet underwater to access the deeper portion of the reservoir.

Approximately eight vertical H-pile supports would be driven into the channel bottom as supports for the proposed pipeline. The supports would be driven to a depth to be determined during construction. The pipeline would be 20” welded steel pipe approximately 400 feet (120 m) long. A stainless steel passive intake screen would be installed on the end of the pipe. The diameter of the intake screen to be installed on the pipe extending into the river would be sized to meet the impingement velocity requirement and address Clean Water Act requirements. No measurable effects on fish, other aquatic life, or aquatic habitat are anticipated. Intake velocity of water through the intake screen would be below impingement velocity as required by 40 CFR Part 125 Subpart I (0.5 ft/sec).

The raw water supply system would consist of a collector well which would use a passive intake screen installed on the end of a lateral pipe that extends into the Morony Reservoir. The intake screen would be located and designed to prevent sediment and debris from entering the system while also providing protection to aquatic life. The passive intake would be designed according to Section 316(b) of the Clean Water Act which applies to new cooling water facilities that withdraw between two and 10 million gallons per day (mgd). The rule states that the maximum through screen intake velocity must be less than 0.5 feet per second (fps).

A reinforced, below-grade, concrete caisson (a vertical cylinder serving as a waterproof chamber or sump) would be constructed near the river and would serve as the intake’s “wet well.” The caisson would be located outside of the floodplain. A fully enclosed pump house would be located on the top of the caisson with a finish floor elevation at approximately grade. The pump house would contain two pumps designed to deliver a maximum of 3,200 gallons per minute (gpm) to the plant site. The pumps would deliver the water to the HGS plant site through a buried pipe approximately 2.3 miles (12,200 ft or 3,720 m) in length. The pipe would be buried at a minimum of 6.5 feet (2 m) below the ground surface.

HGS would discharge wastewater back to the City of Great Falls for disposal at its existing wastewater treatment facility via approximately 55,000 feet (16,800 m) of newly constructed 12”sanitary force main that would run from the project site to a point near Malmstrom Air Force Base where the line would intersect an existing wastewater line owned by the City of Great Falls. A third pipeline would be constructed to supply potable water to the site from the City of Great Falls. This pipeline, constructed of 6” ductile iron or HDPE, would follow the same routing as the discharge pipe, but would be located a minimum of 10 feet (3 m) to the side. This water supply pipeline would be buried at a depth of 7 feet (2.1 m).

An additional construction activity that could directly affect water resources by nature of its location includes the installation of a transmission line. The transmission line would extend south and west from the plant site, across the Missouri River north and east of Cochrane Dam and terminate at NorthWest Energy’s existing Great Falls Switchyard, located north and west of Rainbow Dam. Multiple-pole or H-frame structures would probably be required at the Missouri River crossing point to maintain proper phase-to-phase and phase-to-ground clearances.

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In order to protect the water quality of the Missouri River during construction activities taking place in or adjacent to the River, any and all BMPs required by the appropriate authority would be implemented and maintained. These BMPs could include such measures as the installation of double-walled silt curtain in the river surrounding construction activities and installation of silt fencing and other erosion and sediment control measures when working in the floodplain to protect all adjacent wetlands and drainage ways. Permits and authorizations that would likely be required for all construction activities in or adjacent to water bodies include: Corps 404 and Section 10 Permits; Montana DEQ 401 Certification and 318 Authorization; MFWP SPA 124 Permit; and Cascade County 310 and Floodplain permits. On March 21, 2006 SME submitted a Joint Application to county, state and federal authorities, including DEQ and the Army Corps of Engineers. On November 20, 2006 the Helena Regulatory Office of the Army Corps of Engineers' Omaha District advised SME that the proposed activity (intake structure and overhead power line crossing of the Missouri River) was authorized by Nationwide Permit 12 (Utility Line Activities).

Because construction activities in or near water bodies are so heavily regulated in Montana, the temporary impacts from construction, such as increased erosion on the river banks and increased turbidity in the water column, are anticipated to be reduced below the threshold of significance. Construction is not anticipated to significantly affect floodplains or wetlands, as in the area of impact both floodplains and wetlands are generally limited to the incised drainage habitat and narrow fringes of the river. In order to minimize impacts on waterfowl and wildlife habitat, it is likely that required permits for construction in or adjacent to the Missouri River would be limited to times when spawning, nesting, or breeding of aquatic and/or wetland species is not occurring. That would probably limit construction to late summer, fall, and winter months.

4.4.2.2 Operation

The operation of the power plant would require a large amount of water, with implications for both water supply and wastewater treatment and disposal. In the U.S., water withdrawals for thermo-electric power plants are the leading use of water and accounts for approximately 48 percent of all water withdrawals in the United States. Water withdrawals for irrigation are the second largest water user and account for approximately 34 percent of all water withdrawals (USGS, 2005).

In 2000, a total of 110 million gallons per day (123 thousand acre-feet per year) of water was withdrawn in Montana for use in thermoelectric power generation. All water used in the state for thermoelectric power is surface water. Comparatively, in the same year a total of 7,950 million gallons per day (8,920 thousand acre-feet per year) of water was withdrawn for irrigation uses in Montana, over 70 times the amount used for thermoelectric power. The amount of water withdrawn for thermoelectric uses in Montana represents 0.056 percent of the total water withdrawn in the entire nation (195,000 million gallons per day) for thermoelectric uses (USGS, 2005).

The proposed power plant would withdraw surface water required for its operation from Morony Reservoir, approximately 0.4 mile (0.6 km) upstream of Morony Dam on the Missouri River. Morony Dam is owned and operated by Pennsylvania Power & Light (PPL) Montana (Figure 2-

26). The land directly adjacent to the reservoir is also owned by PPL Montana. Morony Dam is operated as a run-of-the-river generation facility. Therefore, the outflow is maintained essentially equal to the inflow. The Morony Reservoir has a capacity of approximately 13,889 acre-feet and covers an area of approximately 304 acres (123 ha). Presently there is no public access to the Morony Reservoir for recreational purposes.

The plant would require a maximum of 3,200 gpm (7.13 cubic feet per second or 5,161 acre-feet per year) of "make-up water" to be pumped from the Morony Reservoir. The majority of this water (80 to 85 percent) would be a consumptive water use. This would represent almost five percent of all water withdrawn in the state for electrical power generation. The majority of make-up water would be used for cooling tower make-up due to the large evaporation, drift, and blowdown losses. A raw water tank would provide an on-site storage for service water and cooling tower make-up usage. A coal burning power plant is a thermoelectric plant which works by heating water in a boiler until it turns into steam. After the steam is used to spin the turbine-generator that produces electricity, it is sent to the condenser to be cooled back into water. Most of the water used in thermoelectric power generation is used in the condenser to cool the steam back into water. Then the condensed water is pumped back to the steam generator to become steam again while the cooling water is discharged as return flow or is recycled through cooling ponds or towers.

The annual mean flow of the Missouri River immediately downstream of the Morony Dam varies substantially, but is generally above 4,000 cfs. During extreme dry months, the monthly flow can drop down to 3,000 cfs. Assuming an extreme dry spell flow of 2,500 cfs for flows of the Missouri downstream of Morony Dam, the amount of withdrawal for the power plant (a maximum of 7.13 cfs) would reduce the river's flow by 0.29 percent.

This withdrawal would not in of itself significantly reduce flows in the Missouri River downstream of the site, though it would represent a small additional increment of consumptive use within the Missouri River Basin. This consumptive use of water has important implications for aquatic life, including threatened and endangered species, but is not cited by the state as the priority threat facing aquatic species in the Missouri River.

The water rights for supplying the water would be from an existing water reservation that is owned by the City of Great Falls. The city would continue to own the water reservation and would sell the water to the HGS through an agreement between the city and SME. The point of diversion for the existing water reservation is within city limits.

Consumptive Water Use

Much of the water that is withdrawn from rivers and aquifers for use by irrigated agriculture, industry and municipalities is actually returned to a watershed after being used. Often it is returned in altered form, carrying impurities like nutrients and suspended solids that can impair receiving water quality. Wastewater treatment plants endeavor to improve the quality of effluent prior to discharge so as to reduce the impact on receiving water.

In contrast, **consumptive use** is that portion of withdrawn water that is used or "locked up" and effectively removed from a watershed, like that incorporated into the tissues of growing crops. This water is sequestered, and no longer available for other uses. Consumptive use also includes water lost to a basin through diversion and evaporation, plant evapotranspiration, or conversion, or to the ground.

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The point of diversion for the preferred HGS plant site is located downstream of the city in the Morony Reservoir. The city has prepared and submitted an application to the Montana Department of Natural Resources and Conservation to add a point of diversion and place of use to the existing water reservation (SME, 2005f).

The power plant would generate a maximum of 811 gpm of wastewater that must be discharged and would consist of concentrated river water and trace amounts of cooling tower water and boiler water treatment chemicals (DEQ, 2005). Best available pollution control technologies (BACT, or Best Available Control Technology) could reduce but not eliminate the chemical loading in the discharge water.

SME proposes to discharge wastewater back to the City of Great Falls for disposal and treatment at its existing wastewater treatment facility via a 12" newly constructed sanitary force main. The City of Great Falls wastewater treatment facility is licensed and permitted to treat and discharge up to 21 million gpd into the Missouri River (MPDES MT 0021920). The facility's discharge point is 1.5 miles (2.4 km) upstream of Black Eagle Falls Dam or approximately 12 river miles upstream from the proposed water intake pipe in Morony Dam Reservoir. The facility currently discharges between 9 and 10.5 million gpd. The facility thus has sufficient capacity to treat and discharge HGS' proposed 1,168,000 gpd maximum industrial and sanitary wastewater discharge. The environmental impacts from the discharge of the facility's treated wastewater were addressed during its MPDES permitting and 5-year review processes (Jacobson, 2006b).

The city's wastewater treatment facility has pretreatment requirements that must be met before it would accept any water from the power plant. Some of these requirements are summarized in the textbox below. Additionally, the city has set maximum allowable industrial loading (MAIL) numbers for heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, zinc). The loading numbers represent the total mass of each pollutant that the wastewater treatment plant can accept from all industrial sources combined. Wastewater discharged to the treatment facility from HGS would need to meet city-determined loading levels set below the MAIL values.

An Industrial Wastewater Application for Permit was submitted to the City of Great Falls on February 15, 2006 in order to allow the proposed power plant to discharge industrial wastewater as a Steam Electric Power Generating (40CFR Part 423) category of industry. A 12" forced main piping system would extend from the proposed plant and connect to the existing municipal sanitary sewer at the junction of the Highway 87 bypass and North 10th Avenue. Discharge from the plant would average 0.734 mgd (734,400 gpd) and have a maximum peak of 1.168 mgd (1,168,000 gpd). This wastewater would be generated from various plant operation sources, including boiler blowdown; cooling tower blowdown; turbine, boiler, and transformer sumps; and raw water treatment (softener, RO backwash).

A 5.8-million gallon basin would be constructed onsite in order to provide surge control and a limited amount of primary sedimentation for boiler blowdown, cooling tower blowdown, and sump discharges from turbine, boiler and transformer areas. The sump discharges would undergo treatment prior to entering the basin in a standard oil/water separator unit. No toxic organic compounds would be present in the discharged wastewater. SME would install wastewater sampling and monitoring equipment as per the requirements of the city. Among several compounds, trace amounts of the heavy metals arsenic, copper, zinc are expected to be present in the wastewater discharged from the plant. There is a possibility that extremely low concentrations of lead and mercury may also be present in the discharged wastewater. However, the concentration of all regulated compounds in the power plant waste stream would be well below (typically between 1 and 10 percent of) the maximum allowable discharge concentrations.

Highwood Generating Station Requirements under the Industrial Pretreatment Program:

- At least 180 days prior to discharging industrial wastes, submittal of a Disclosure Form and Permit Application. Process schematics and site plans shall be included in the application.
- Process water and domestic wastewater must be separated. Domestic wastewater shall not be discharged though the monitoring facilities.
- Highwood Station would need to install sampling facilities for process wastewater discharge. The sampling facilities must include:
    - An automatic sampler capable of collecting flow-proportioned composite samples.
    - A flow meter with totalizer that would enable daily and monthly flow totals to be determined.
    - The sample point must be such that the sample gathered by the automatic sampler is representative of the discharge of process wastewater being regulated.
    - The ability to collect grab samples of process wastewater representative of the flow at the time of sampling.
    - Reasonable access to the sampling facilities by the City of Great Falls personnel or representatives.
    - A properly calibrated open-channel type flow meter.
- A Spill Prevention Control and Countermeasure Plan.
- Secondary Containment must be provided for hazardous chemicals. Chemicals stored in containers larger than 55 gallons would probably require secondary containment depending on the degree of hazard. Storage of low-hazard chemicals in 55 gallon and smaller containers (not in use) should be in an area with no floor drain. 55 gallon and smaller containers of non-hazardous chemicals that are in use may be located at the point of application.
- Storm drainage and roof drains must not discharge into the sanitary sewer.
- Highwood Station must obtain a storm water discharge permit from the Montana Department of Environmental Quality if so required by that agency.
- Highwood Station would meet all requirements of OCCGF, particularly 13.14 and 13.20.
- Highwood Station would meet all requirements of 40CFR Part 423 as it applies to Pretreatment Standards for New Sources.
- Highwood Station would be responsible for sampling, analyzing and reporting results of sampling activity to the city. The city would also collect samples of process wastewater discharge.
- Dilution of process wastewater for the purpose of lowering pollutant concentrations would not be allowed.

Source: City of Great Falls, Water/Wastewater Treatment Plant

Other important sources of impacts associated with operations of the plant include site runoff and leaching. Runoff specifically from the coal piles on site would be directed to a dedicated, zero outflow evaporation pond. This pond would have a footprint of 3.5 acres (1.4 ha) and capacity of 12 acre-feet and is labeled Loop Pond in the proposed drainage schematic above (Figure 4-3). The ash disposal areas and the waste monofill would be located inside the southern area of the rail road loop. The ash disposal area would be constructed to include ponding areas to collect runoff from precipitation events. These containment areas would serve as evaporation ponds and would have zero discharge.

While leaching of coal and other site runoff, and the percolation of wastes into the groundwater, is an inherent concern to water resources, the clays found onsite are characterized by very slow water transmission rates and infiltration rates. These soils should serve as efficient cell and detention pond basin liners, and groundwater below the site would be monitored on a regular basis to ensure no contamination is occurring. If any contamination is detected by means of groundwater wells or other methods, SME would be required to conduct cleanup procedures in accordance with a DEQ-approved Solid Waste Management Plan and a site-specific SPCCP.

4.4.3 ALTERNATIVE SITE – INDUSTRIAL PARK

4.4.3.1 Construction

Construction activities at the Industrial Park Site and Best Management Practices (BMPs) employed to reduce the impacts associated with construction activities, would be very similar to the Salem site. The total area of disturbance for these activities at the Industrial Park Site would include the total footprint of the power plant, approximately 300 acres (121 ha), a water intake structure and associated pipelines, and additional roadway, rail spur, transmission lines, and utility corridor zones.

Though a storm water management plan has not been developed for the Industrial Park Site, the facility would be required to completely manage all storm water, to ensure that runoff from the construction areas would be minimized. Direct impacts to water resources from construction activities include the construction of the water intake structure in the Morony Pool and the installation of transmission line and pipeline within floodplain and wetland areas of the Missouri River.

A 4.5-mile (7.2-km) pipeline (compared to less than two miles (3.2 km) for the Salem site) would be needed to transport make-up water from an intake structure on the Missouri River downstream of the City of Great Falls to the plant. Insofar as this pipeline would be installed in an area of wetland, waters of the U.S., and/or floodplain, the temporary, minor impacts associated with riparian habitat disturbance would be commensurate with those at the Salem site.

If the Industrial Park site were to be chosen as the location of the power plant, it could be annexed into the city (please see relevant discussion under the Farmland/Land Use, Section 4.12). Both industrial and municipal wastewater generated from the plant would then be discharged back to the City of Great Falls for disposal at its existing wastewater treatment facility. Potable water would be supplied to the plant from the city's water treatment plant. The city municipal sewer and water lines currently run to the IMC plant, located approximately one half-mile (0.8 km) southwest of the site and SME would tap into those lines.

In order to protect the water quality of the Missouri River during construction activities taking place in or adjacent to the river, SME would be required to implement and maintain any and all BMPs required by the appropriate authority would be implemented and maintained. These BMPs would be similar to the ones required for the Salem site, and could include such measures as the installation of double-walled silt curtain in the river surrounding construction activities

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and installation of silt fencing and other erosion and sediment control measures when working in the floodplain to protect all adjacent wetlands and drainage ways.

Because construction activities in or near water bodies are so heavily regulated in Montana, the temporary impacts from construction, such as increased erosion on the river banks and increased turbidity in the water column, are anticipated to be reduced to below the threshold of significance. The construction is not anticipated to significantly affect floodplains or wetlands, as in the area of impact both floodplains and wetlands are generally limited to the incised drainage habitat and narrow fringes of the river. In order to minimize impacts on waterfowl and wildlife habitat, permitting would likely limit construction in or adjacent to the river to times when spawning, nesting, or breeding of aquatic and/or wetland species is not occurring.

4.4.3.2 Operation

The operation of the power plant at the Industrial Park site would be almost identical to the operation of the plant at the Salem site, with similar implications for water resources. The site would have the same requirements for water withdrawals from the Missouri River, and would also withdraw water from the Morony Reservoir. However, since the Salem site is located south of the river and the Industrial Park site north of it, the water intake structure would be placed on the opposite side.

The withdrawal of Missouri River water for plant operations would not significantly reduce flows in the Missouri River downstream of the site, though it would represent an additional increment of consumptive use within the Missouri River Basin. The water rights for supplying the water would be from an existing water reservation that is owned by the City of Great Falls.

The power plant would generate industrial wastewater that would not be consumptively used and would instead require discharge. A maximum of 811 gallons per minute of wastewater would be discharged to the City of Great Falls wastewater treatment plant. The discharged water would consist of concentrated river water and trace amounts of cooling tower water and boiler water treatment chemicals (DEQ, 2005). The city's wastewater treatment facility would require pretreatment standards to be met before it would accept any water from the power plant, as described under the Proposed Action.

Other important sources of impacts associated with operations of the plant include site runoff and leaching. Runoff from the site would be contained in zero outflow evaporation ponds. Ash generated from the burning of coal would be disposed of off site, eliminating the risk of leaching from an onsite waste monofill. The risks of leaching at any off-site disposal facility are unknown and site-dependent. Use of the High Plains Landfill would result in impacts similar to that of the Salem site given the similarities in bedrock (WMA, 1995). Although the leaching of coal and other site runoff could be a concern to water resources, the clays found onsite are characterized by very slow water transmission rates and infiltration rates. These soils should serve as effective detention pond basin liners, and groundwater in the vicinity of the site would be monitored on a regular basis to ensure no contamination is occurring. If any contamination is detected, SME would be required to follow cleanup procedures in accordance with a DEQ-approved Solid Waste Management Plan and a site-specific SPCCP.

4.4.4 CONCLUSION

The No Action Alternative would not significantly, adversely affect water resources at or near the Salem site or the Industrial Park. However, negligible to minor, long-term adverse impacts would continue from existing agricultural land uses. Continuing agricultural practices such as grazing, plowing, disking, harvesting, fertilizing, and using pesticides on the Salem or Industrial Park sites would contribute incrementally to a minute extent to sedimentation and nutrient loadings of the Missouri River.

Because SME would need to meet its energy supply needs by purchasing power from generation sources located elsewhere, SME could potentially contribute indirectly to ongoing water resource impacts at different generating stations in the region or at potentially new generating stations located outside of the region.

The proposed construction and operation of the power plant and wind turbines at the Salem site would create several potential impacts to water resources. The construction of the site could involve general impacts such as increased storm water runoff carrying sediment and contamination loads into surface water, and contamination from construction equipment and activities infiltrating area soils and potentially percolating down into the groundwater.

Potential direct impacts to water resources from construction activities would include the construction of the water intake structure in the Morony Reservoir and the installation of transmission lines and pipelines within the watershed of the Missouri River and tributaries.

There would be a minimal loss of non-jurisdictional wetlands from these actions, and water quality of the Missouri River would be protected by any and all BMPs required by the appropriate authority and permitting agency. Because construction activities in or near water bodies are so heavily regulated in Montana, the impacts from construction would be substantially reduced from what they otherwise could be in the absence of regulation. Required authorizations and permits reduce water resource impacts from the construction of the power plant to be of moderate magnitude, medium term duration, and medium extent, and have a probable likelihood of occurring. The overall rating for impacts on water resources from the construction phase of the power plant would be adverse and non-significant.

Operation of the power plant at the Salem site would involve water withdrawals from the Missouri River, which would reduce the river by 0.31 percent in a "worse-case scenario". Though it would represent an additional increment of consumptive use within the Missouri River Basin, it is not in of itself a significant reduction in the Missouri River flows downstream of the site. The power plant would discharge a maximum of 811 gal/minute of wastewater. The operation of the power plant would result in impacts that would be of minor magnitude, long term duration, and medium extent, and have a probable likelihood of occurring. The overall rating for impacts on water resources from the operation phase of the power plant would be adverse and non-significant.

The construction and operation of the power plant at the Industrial Park site would involve similar activities and create many of the same impacts to water resources as the Proposed Action.

Impacts associated with the installation of the longer water intake pipeline would be comparable to those of the Proposed Action: temporary disturbance of non-jurisdictional wetland, and no direct effluent discharges to the Missouri River. At the Industrial Park site, SME would also hook up to city sewer and water lines. While this likelihood would make it easier for SME to manage its water resources, it does not change the impact of net water consumption amounts or water quality parameters that would be regulated and required at the plant. In other words, regardless of the alternative, the power plant operators would have to obtain and adhere to all local, state, and federal regulations, which would prevent any significant impacts from occurring to water resources.

The construction and operation of the power plant at the Industrial site, then, would have similar impacts as at the Salem site. The associated activities would result in impacts that would be of minor magnitude, long term duration, and medium extent, and have a probable likelihood of occurring. Overall, the rating for impacts at the Industrial Park would also be adverse and non-significant.

4.4.5 MITIGATION

The implementation of any and all BMPs required by appropriate permitting authorities would reduce the impacts to water resources associated with both the construction and operation of a coal-burning power plant. These BMPs could include such measures as the installation of double-walled silt curtain in the river surrounding construction activities and installation of silt fencing and other erosion and sediment control measures when working in the floodplain to protect all adjacent wetlands and drainage ways. Permits and authorizations that would likely be required for construction and operation activities include: Corps 404 and Section 10 Permits; Montana DEQ 401 Certification and 318 Authorization; Montana FWP SPA 124 Permit; and Cascade County 310 and Floodplain permits.

Depending on permitting requirements, construction activities in or adjacent to the Missouri River may be limited to times when spawning, nesting, or breeding of aquatic and/or wetland species is not occurring. Additionally, during plant operations at the Salem site, groundwater would be voluntarily monitored in the vicinity of the waste monofill in order to detect any possible contamination.

4.5 AIR QUALITY

4.5.1 NO ACTION ALTERNATIVE

The No Action Alternative would not contribute directly to air emissions or air pollution at either the Salem or Industrial Park sites. However, it would require that other power generation facilities increase, or expand production, to meet SME's demand for power. The impact of the consequent changes on air quality cannot be determined, because this would depend on the mix of energy sources used to generate SME's power, which is unknown. The discussions in Chapter 2 of this EIS describe the wide ranges in air emissions from various energy sources.

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Under the No Action Alternative, air pollutant emissions and impacts to ambient air quality from meeting SME's projected electricity load would not simply "go away," but would be located in different places and occur to different degrees, depending on the energy source or mix of energy sources used to generate the electricity sold to SME. This uncertainty makes it impossible to predict, for example, whether emissions of mercury and greenhouse gases would be equal to, lower, or higher than those expected from the HGS.

4.5.2 PROPOSED ACTION – HGS AT THE SALEM SITE

4.5.2.1 Construction

Heavy equipment needed to build the power plant or any other heavy industrial facility would likely include, at a minimum, graders, bulldozers, backhoes, dump trucks, cement trucks, cranes and other diesel and gasoline-fueled heavy and light equipment. Intermittently, over a period of several years, this equipment would emit quantities of five criteria air pollutants: carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter (PM_{10}), and volatile organic compounds (VOCs). In addition to tailpipe emissions from heavy equipment, the temporary disturbance of several hundred acres of ground surface during excavation and grading activities to prepare the site for construction potentially could generate fugitive dust.

Construction personnel would be required to implement reasonable measures, such as applying surfactant chemicals or water to exposed surfaces or stockpiles of dirt, when windy and/or dry conditions promote problematic fugitive dust emissions. However, mines in windy areas have found that chemical surfactants do not work well. The area around Great Falls is fairly windy. High winds would peel off the treated layer, exposing dry soil or gravel beneath. Some form of soil pavement treatment might be a better solution in a windy area where equipment is in use. Adhering to these would minimize any fugitive dust emissions. Use of one or more of these mitigation measures, in addition to the fact that there are few nearby residents, would reduce the possibility of adverse impacts from fugitive dust emissions to below the level of significance.

Exhaust emissions from equipment used in construction, coupled with likely fugitive dust emissions, could cause minor to moderate, short-term degradation of local air quality, but would not be high enough to result in significant deterioration.

4.5.2.2 Operation

4.5.2.2.1 Emissions and Compliance with Regulatory Standards

The primary source of emissions from the plant would be the combustion byproducts of the CFB boiler. The combustion of coal in the boiler generates hot gases, which, in turn, generate steam. The steam powers a steam turbine that turns a generator to produce electricity. In addition to the CFB boiler, air pollutants would be emitted from the following equipment:

- Auxiliary boiler
- Coal thawing shed heater
- Building heaters
- Emergency generator and fire water pump
- Refractory brick curing heaters
- Material handling equipment and storage areas
- Cooling tower
- Fuel storage tank
- General vehicle travel

As described in Section 3.3.1, under the federal Clean Air Act (CAA), states are given the primary authority to manage their air quality resources. Compliance with applicable air regulatory programs would serve to mitigate impacts of HGS air emissions sources as described in the following sections.

Regulatory Programs

As described in Section 3.3.1, under the federal Clean Air Act (CAA), states are given the primary authority to manage their air quality resources. EPA requires air pollution control agencies such as DEQ to develop State Implementation Plans (SIPs), which are control plans based on federal statutes and regulations. The Montana SIP generally establishes limits or work practice standards to minimize emissions of the criteria air pollutants or their precursors. Among other requirements, air quality management in Montana's SIP includes general state emission standards, federal New Source Performance Standards (NSPS), hazardous air pollutant (HAP) regulations, federal Acid Rain Program requirements, the federal Title V operating permit program, and the Prevention of Significant Deterioration (PSD) permitting program. The proposed generating station would be required to comply with the requirements of each of these air quality programs.

The general state standards set the most basic level of air quality control for criteria pollutants, and cover all regulated sources in the state of Montana. These standards include a solid fuel sulfur content limitation, particulate limits for fuel burning sources based on the heat input of the source, particulate emission limits for other sources based on the weight of material processed, and limits on the opacity of visible emissions. Montana also has liquid and gaseous fuel sulfur content limits which would apply to the use of fuel oil for startup of the CFB and the fuel/gas firing of the auxiliary boiler and building heaters.

The NSPS set more stringent requirements for equipment that has been newly constructed, reconstructed, or modified since the standards were put into effect. While NSPS have historically applied only to newly constructed, reconstructed, or modified equipment, the recently promulgated NSPS, 40 CFR 60, Subpart HHHH, "Emission Guidelines and Compliance Times for Coal-Fired Electric Steam Generating Units," is applicable to certain existing emission units. The primary purpose of the NSPS program is to achieve long-term emissions reductions by assuring that the best demonstrated emission control technologies are installed as the industrial infrastructure is modernized. The specific applicability of the NSPS program upon the generating station equipment is discussed further below.

The National Emission Standards for Hazardous Air Pollutants (NESHAP) program establishes standards for certain industrial source categories for the emission of HAPs, otherwise known as the Maximum Achievable Control Technology (MACT) standards. The MACT standards can apply to existing and newly constructed or reconstructed source categories. The specific applicability of the NESHAP program upon the generating station equipment is discussed further below.

The federal Acid Rain Program is a national regulatory program applicable to certain emission units that burn fossil fuels and produce and sell electricity. The program is focused on the

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reduction of NO_x and SO_2 emissions from these sources. The emissions of SO_2 are regulated and reduced through a national cap-and-trade program where SO_2 "allowances" are bought and sold on a market. The NO_x emission reductions are achieved through specific NO_x emission limits placed upon certain coal-fired utility boilers that are subject to the program. The specific applicability of the Acid Rain program upon the proposed generating station is discussed further below.

The Title V Air Operating Permit program is administered by DEQ and requires "major sources" of regulated air pollutants to obtain an operating permit that provides the required monitoring, record keeping, reporting, and compliance certification requirements necessary for the on-going operation of the plant. An operating permit application has already been submitted for the proposed project and an operating permit is expected to be issued for the plant prior to operation.

Pursuant to DEQ rules (ARM 17.8.1211(4)), sources that are required to develop and submit a Risk Management Plan (RMP) pursuant to section 112(r) of the federal Clean Air Act, are required to register such a plan. The only expected equipment to be installed that may be subject to RMP requirements is the ammonia storage tank associated with the selective non-catalytic reduction (SNCR) control system to be installed on the CFB boiler. However, this program is not triggered for aqueous ammonia storage if the quantity stored is less than 20,000 lbs at a concentration of 20 percent or greater. If the concentration of aqueous ammonia is less than 20 percent, regardless of quantity, the storage of the ammonia would not be subject to RMP (40 CFR §68.130(a) and 40 CFR §68.115(b)(1)). Before the ammonia could be brought on-site, either the inapplicability of the RMP program would need to be documented or an RMP would need to be developed and submitted.

The PSD permitting program is a federally required permitting program administered by DEQ that involves the review of proposed new and modified major air pollution sources. This review is comprised of two main parts –

- A review of ambient air impacts upon the immediately surrounding area (referred to as a Class II area) and on more distant areas in the region that are designated as environmentally sensitive Class I areas;

- An assessment of the air pollution control technologies proposed by the source to ensure that the Best Available Control Technology (BACT) is installed for each criteria pollutant.

Appendix I contains the DEQ's supplemental preliminary determination on the PSD air quality permit for SME-HGS (DEQ, 2006a), which was subject to public comment along with the DEIS. The ambient air quality review is discussed in detail later in this section.

In addition to BACT for criteria pollutants required under PSD, the DEQ requires a BACT review for all pollutants of concern, including HAPs, as part of the pre-construction permitting.

The following subsections discuss how the requirements of these air quality programs would be addressed for the HGS.

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CFB Boiler

The CFB boiler would be subject to the NSPS standard for electric utility steam generating units (Subpart Da), and would be capable of meeting the limits provided in this subpart for visible emissions (opacity), PM, SO_2, NOx, and Hg. EPA updated the current NSPS Subpart Da requirements on February 27, 2006. This updated NSPS Subpart Da applies to any electric utility steam generating unit (>250 MMBtu/hr heat input) that is newly constructed, modified, or reconstructed after the proposal date of the updated NSPS (February 28, 2005). The NSPS Da update sets new emission limitations on PM, SO_2, and NOx. The CFB boiler is required to meet these updated NSPS Da emissions limits.

The CFB boiler would be subject to the promulgated Clean Air Mercury Rule (NSPS Subpart HHHH – Emission Guidelines and Compliance Times for Coal-Fired Electric Steam Generating Units), which allocates mercury budgets to every state. Under the federal mercury program (known as the "model rule"), mercury emission allowances are then distributed to coal-fired electric utility units. Under the model rule, these allowances may be bought and sold through a trading program administered by the EPA. The federal mercury reduction program will go into effect in 2010. It is important to note that NSPS Subpart HHHH requires states to update their SIPs to reflect how the mercury rule would be implemented. The individual states have the flexibility to develop their own mercury reduction program that is different from the EPA's "model rule." However, regardless of what type of program is used, the state is required to meet the EPA determined state mercury budget.

The state of Montana has adopted its final rules on mercury emissions from coal-fired electrical generating units and the rules became effective on October 27, 2006. The Montana mercury standard is more stringent than the federal rule and is on a pound per trillion Btu (lb/TBtu) basis. The CFB boiler of the HGS would be subject to the requirements of the final mercury rule adopted in Montana.

The Acid Rain Program also would be applicable to the proposed CFB boiler. In order to comply with the program, the following steps would be required –

- Necessary SO_2 allowances would need to be obtained
- Applicable NO_x limitations would need to be complied with
- Required continuous monitoring, record keeping, and reporting would need to be followed

As part of the air quality permit application for HGS, a BACT review has been conducted by DEQ for the CFB boiler for the following pollutants: SO_2, NO_x, PM/PM_{10}, VOC, CO, sulfuric acid mist, lead, mercury, acid gasses (HCl and HF), and radionuclides. The conclusions of the BACT analysis were that the following control technologies would need to be implemented (Table 4-2). Each chosen technology would reduce emissions to levels that would meet or exceed the level of control required by all general state standards and NSPS requirements.

Table 4-2. BACT Summary for CFB Boiler

Pollutant	Selected BACT Control Technology
Filterable PM/PM_{10}	Fabric Filter Baghouse
SO_2	CFB Design, Low-Sulfur Coal, and Hydrated Ash Reinjection
NO_x	CFB Design with Selective Non-Catalytic Reduction
VOC	Proper Design and Combustion
CO	Proper Design and Combustion
Sulfuric Acid Mist, Acid Gases, Trace Metals, and Condensable PM/PM_{10}	CFB Design, Low-Sulfur Coal, Hydrated Ash Reinjection, and Fabric Filter Baghouse
Mercury (Hg)	IECS and, if necessary, ACI or equivalent
Radionuclides	Fabric Filter Baghouse

Control of filterable particulate (PM/PM_{10}) emissions from the CFB boiler would be accomplished through the use of a fabric filter baghouse. In this device, exhaust from the boiler would pass through rows of fabric filter bags. The exhaust gases pass through the bags, while the filterable particulate remains on the upstream face of the bags.

SO_2 emissions in the boiler result from the sulfur present as an impurity in the coal that is fired. The CFB boiler primarily would fire low-sulfur, sub-bituminous coal from the Powder River Basin. This coal varies in sulfur content, but is expected to typically have sulfur contents below one percent by weight. The design of the CFB boiler employs the firing of crushed coal mixed with limestone injected into the combustor. The use of limestone provides control of SO_2 by reacting with SO_2 to form calcium sulfate ($CaSO_4$), which can be removed from the exhaust in the fabric filter baghouse. In addition to this boiler design, the boiler would be equipped with a hydrated ash reinjection system that would take a portion of the limestone and ash collected in the fabric filter baghouse, hydrate it, and re-introduce it into the exhaust in a reaction vessel upstream of the fabric filter baghouse. Hydrated ash reinjection is a type of dry flue gas desulfurization (FGD) system that allows for additional conversion of SO_2 to $CaSO_4$. Overall, the use of limestone injection with hydrated ash reinjection would control 97 percent of the SO_2 emissions that would result from an uncontrolled boiler firing low-sulfur coal.

Emissions of NO_x from the boiler would be formed in two ways: thermal NO_x would be formed from the oxidation of nitrogen gas (present in the air fed to the boiler) at very high temperatures, and fuel NO_x would be formed from the oxidation of nitrogen that is bound in the coal fired in the boiler. The CFB boiler design has approximately 80 percent lower NO_x emissions than a comparably sized traditional pulverized coal boiler design. The lower emissions are due to the inherently lower flame temperature of the CFB boiler design, which helps minimize formation of thermal NO_x. The CFB NO_x emissions would be controlled through the use of a selective non-catalytic reduction (SNCR) system. This technology involves the decomposition of NO_x to nitrogen (N_2) and water. This is accomplished by injecting ammonia (NH_4) or urea ($CO(NH_2)_2$) into a high-temperature area of the furnace. The ammonia or urea reacts with the nitric oxide (NO) in the exhaust gas and reduces it to nitrogen and water. A byproduct of this technology is an increase in ammonia emissions (sometimes referred to as "ammonia slip"), resulting from a portion of the injected ammonia that does not react with the NO_x. Applying SNCR technology to the exhaust reduces NO_x emissions by an additional 50 percent beyond the control already provided by the CFB boiler design, for an overall reduction of 90 percent of NO_x emissions.

CO and VOC emissions from the CFB boiler would be controlled through proper design and combustion in the boiler. Add-on controls such as catalytic and thermal oxidation systems have been evaluated by DEQ as part of the proposed generating station's PSD permit application, but were determined to be infeasible due to the high expense and impracticality of reheating the exhaust gas to a temperature where those controls could be effective.

Though a BACT review for HAPs is not required under the federal CAA provisions, SME has conducted a BACT evaluation of HAPs from the CFB boiler per the request of DEQ pursuant to Montana's general air quality permit rules in 17.8.740 *et seq*. Sulfuric acid (H_2SO_4) mist, acid gases (primarily hydrofluoric acid (HF) and hydrochloric acid (HCl)), trace metals (including lead), and condensable PM_{10} would be emitted from the boiler. These pollutants form as a result of combustion conditions of the boiler and impurities in the coal. Emissions of these pollutants would be minimized through the use of the CFB boiler design, the hydrated ash reinjection system, and the fabric filter baghouse. Mercury emissions result from mercury present in the coal fired in the boiler. Control of mercury emissions is addressed under Section 4.5.2.2.4. Radionuclide emissions result from trace amounts of radioactive material that is present in coal and nearly all natural materials. The use of the fabric filter baghouse for particulate control represents BACT for radionuclides, as it would reduce radionuclide emissions from the CFB boiler by more than 90 percent.

Auxiliary Combustion Devices (Auxiliary Boiler, Emergency Generator, Emergency Fire Water Pump, Coal Thawing Shed Heater, Refractory Brick Curing Heaters, and Building Heaters)

The auxiliary boiler would be subject to the NSPS for industrial, institutional, and commercial steam generating units (Subpart Db), which establishes emission limits for visible emissions (opacity), PM, SO_2, and NO_x. Given that the auxiliary boiler would operate for a limited amount of time and would fire fuel oil, the applicability of NSPS emission limits is limited. EPA has updated NSPS Subpart Db on February 27, 2006. The updated NSPS Subpart Db applies to any steam generating unit (>100 MMBtu/hr heat input) that is newly constructed, modified, or reconstructed after the proposal date of the updated NSPS (February 28, 2005). The NSPS Db update sets more stringent emission limitations on PM than exist under the current rules. This updated PM limit would not be applicable to the auxiliary boiler given that no solid fuels (e.g. coal) would be fired.

The propane-fired building heaters would not be subject to a NSPS given that each unit is less than 10 MMBtu/hr. The only potentially applicable NSPS (NSPS Subpart Dc) applies to any steam generating unit >10 MMBtu/hr and < 100 MMBtu/hr heat input.

The EPA has proposed NSPS Subpart IIII (Standards of Performance for Stationary Compression Ignition Internal Combustion Engines) that applies to all owners or operators of stationary compression ignition (CI) internal combustion engines (ICE) for which construction, modification or reconstruction commences after July 11, 2005. This NSPS may be applicable to

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either the emergency fire water pump or emergency generator. Any applicable requirement of this NSPS, if promulgated as a final rule, would need to be met for these engines.

Two potentially applicable MACT standards that have been promulgated for these types of combustion emission units include the following:

- 40 CFR 63, Subpart ZZZZ (National Emissions Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE)) (Emergency Generator)

- 40 CFR 63, Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters) (Auxiliary Boiler)

Even though the emergency fire water pump would be operated with a RICE, the engine would be exempt from 40 CFR 63, Subpart ZZZZ given that the engine is less than 500 horsepower. The emergency generator would be operated with a RICE, but would be classified as an "emergency stationary RICE" and, therefore, subject only to the initial notification requirements of the standard.

The auxiliary boiler would fire only liquid or gaseous fuels and operate less than 10 percent of the year. Therefore, the boiler would be considered in the "limited use liquid fuel subcategory" of 40 CFR 63, Subpart DDDDD. New "limited use liquid fuel subcategory" boilers are subject to certain emission limits and other requirements of this standard including a particulate matter, HCl, and CO limit.

The building heaters would fire only gaseous fuels and the heat input of each heater would be less than 10 MMBtu/hr. Therefore, these heaters would be considered to be in the "small gaseous fuel subcategory" of 40 CFR 63 Subpart DDDDD. New "small gaseous fuel subcategory" boilers are subject only to the initial notification requirements of the standard.

A BACT review has been conducted by DEQ for each of the auxiliary combustion devices for the following pollutants: SO_2, NO_x, PM/PM_{10}, VOC, and CO. Each of these devices would be subject to annual limits on operation that would result in reduced annual emissions.

- The auxiliary boiler would operate only during startup, shutdown, and commissioning of the CFB boiler, and to keep the CFB boiler warm during shutdown, for a maximum of 850 hours of operation per year.

- The emergency generator and emergency fire pump would operate only in emergencies and for required maintenance, for a maximum of 500 hours of operation per year each. The coal thawing shed heater would operate only when coal needs to be thawed, for a maximum of 240 hours of operation per year.

- Because the auxiliary combustion devices would have limited hours of operation (and therefore, have low annual emissions), many add-on controls would not be cost effective.

The conclusions of the BACT analysis were that the following control technologies would be implemented (Table 4-3). Each chosen technology would reduce emissions to levels that would meet or exceed the level of control required by all general state standards and NSPS requirements.

Table 4-3. BACT Summary for Auxiliary Combustion Devices

Pollutant	Selected BACT Control Technology
PM/PM_{10}	Process Limitations Including Limited Hours of Operation
SO_2	Low Sulfur Fuels and Process Limitations Including Limited Hours of Operation
NO_x	Auxiliary Boiler: Dry Low-NO_x Burner Technology with Process Limitations Including Limited Hours of Operation Others: Process Limitations Including Limited Hours of Operation
VOC	Proper Combustion Design with Process Limitations Including Limited Hours of Operation
CO	Proper Combustion Design with Process Limitations Including Limited Hours of Operation

The dry low-NO_x burner (DLN) technology that would be used on the auxiliary boiler would reduce NO_x emissions from the boiler by 40 to 60 percent compared with conventional burners.

Material Handling and Storage

The coal, limestone, and ash material handling sources would consist of material transfer points, and would be located at conveyor transfer points, railcar and truck unloading sites, storage silos, the coal crusher, and material storage piles and bunkers.

Coal drying, cleaning, conveying, processing, storage, and transfer equipment at the site would be subject to the NSPS standard for Coal Preparation Plants, Subpart Y. This regulation sets a visible emission limit of less than 20 percent opacity for subject equipment. Equipment subject to this regulation would comply through the use of water spray and enclosures (emergency coal pile, with associated reclaim hoppers and belt feeder), and with baghouse controls (remaining subject equipment).

Limestone crushing, conveying, and transfer equipment at the site would be subject to the NSPS standard for Nonmetallic Mineral Processing, Subpart OOO. This regulation sets a visible emission limit of seven percent opacity, and a particulate emission limitation of 0.022 grains per dry standard cubic feet (a grain is 1/7000 of a pound) for subject equipment. Limestone processing equipment subject to this regulation would comply through the use of an enclosure with a baghouse.

A BACT review for particulate emissions was conducted by DEQ for each of the material handling sources. The resulting controls for all coal, limestone and ash conveyors would be partial or full enclosures. Coal and limestone belt conveyors would be partially enclosed with a cover that extends past the conveyor belt, or is fully contained within a building. The limestone bucket elevator conveyors and ash handling pneumatic conveyors would be fully enclosed. On almost all material transfer emission points, SME would use enclosures with a baghouse or bin vent controls, which would reduce particulate emissions by 99.5 percent. Transfer points at the emergency coal pile, reclaim hoppers, belt feeder, and associated conveyor would be controlled with complete enclosure. The fly ash and bed ash conveyor and transfer emission points would be controlled with a wet dust suppression system.

The material storage areas were also evaluated by DEQ for BACT. The material to be stored on-site includes coal, limestone, fly ash, and bed ash. The proposed BACT controls for these storage areas were determined to be the use of a combination of enclosures (e.g. silos) with bin vent or baghouse control (for the active storage of coal, limestone, and ash) and reasonable precautions (for the emergency coal and ash storage areas). Reasonable precautions include compaction of storage piles and application of dust suppressants as necessary.

Cooling Tower

A wet cooling tower, with a design circulating water rate of 2,250 gallons per minute, would be used to dissipate heat from the power plant system. The proposed cooling tower would be an induced draft, counter-flow design. Cooling towers are a source of PM emissions given that a certain amount of cooling water becomes entrained in the air stream and is emitted from the tower as water droplets (known as "drift"). When the droplets evaporate, dissolved solids in the water crystallize and become PM emissions.

The most common method of reducing PM emissions from a cooling tower is with the use of a drift eliminator that removes water droplets prior to being emitted from the tower. Different types of drift eliminators have different associated control efficiencies. The cooling tower was evaluated for BACT and DEQ determined that a high efficiency drift eliminator (0.002% of the circulating water flow) constitutes BACT.

4.5.2.2.2 Impacts on Air Quality in Class II Areas

SME has submitted a PSD permit application to DEQ for the construction of a coal-fired, steam-electric generating station located near Great Falls, Montana, the aforementioned Highwood Generating Station (HGS). The proposed site is approximately eight miles (13 kilometers) east of Great Falls, Montana and approximately two miles (3.2 km) southeast of the Morony Dam, which is located on the Missouri River. The Universal Transverse Mercator (UTM) coordinates of the CFB stack are X-UTM - 497,297 m and Y-UTM - 5,266,363 m. The site elevation is approximately 3,310 feet (1,009 m) above mean sea level.

Prevention of Significant Deterioration Review

Part C of Title I of the federal CAA and ARM 17.8.801 *et seq* include preconstruction permitting requirements for new and modified major sources under the PSD program. The PSD regulations apply to new major stationary sources and modifications at existing major sources undergoing construction in areas designated as attainment or unclassifiable, under Section 107 of the 1990 Clean Air Act Amendments (CAAA), for any criteria pollutant (42 USC 7407).

An electric generating unit is one of the 28 listed source categories (fossil fuel-fired steam electric plants of more than 250 million Btu/hr heat input) that are considered major sources under the PSD program if they have the potential to emit 100 tons per year (tpy) or more of at least one criteria pollutant. Since HGS would be a new plant, a PSD permit is required for the plant if the potential to emit for at least one criteria pollutant is 100 tpy or more. The PSD application must include review each pollutant with potential emissions above the PSD significant emission rates (SERs). The potential emissions for each criteria pollutant expected to be emitted from the operation of the HGS plant were estimated in Section 3 of the PSD Application (Table 3.1-1: Facility-Wide Potential Annual Emissions Summary of Criteria Pollutants). The PSD SERs and a summary of the proposed plant PTEs are listed in Table 4-4. The plant requires PSD review for NOx, SO_2, CO, PM and PM_{10}. There are no longer any applicable air quality standards for PM so the analyses conducted for PM_{10} address PM.

Table 4-4. PSD Significant Emission Rates

	NO_x (tpy)	SO_2 (tpy)	CO (tpy)	VOC (tpy)	PM (tpy)	PM_{10} (tpy)	Pb (tpy)
PSD Significant Emission Rate	40.0	40.0	100.0	40.0	25.0	15.0	0.6
HGS Potential to Emit	944	443	1177	38.0	376	366	0.28
PSD Review Required	Yes	Yes	Yes	No	Yes	Yes	No

Criteria Pollutant Emissions

HGS would include the operation of the following types of emission sources:

- Circulating Fluidized Bed (CFB) Boiler
- Auxiliary Boiler
- Emergency Generator
- Emergency Fire Pump
- Coal Thawing Shed Heater
- Coal Railcar Unloading
- Coal Silos
- Coal Crusher
- Silos
- Bin Vents
- Storage Piles
- Cooling Towers
- Refractory Brick Curing Heaters

The specific emission calculation methodologies for these source types are described in Section 3 of the PSD Application, which is on file with DEQ and available to the public upon request.

Class II Area Modeling Analyses

Pursuant to ARM 17.8.820 and 40 CFR 52.21(k), SME must demonstrate that emissions from the proposed project would comply with the NAAQS, MAAQS, and Class II PSD Increments. DEQ reviewed all monitoring and modeling submitted by SME and found it to conform to all requirements.

Model Selection
At the time of submittal of the Application, EPA's modeling guidance (40 CFR Part 51, Appendix W) indicated that the Industrial Source Complex Short Term (ISCST3) dispersion model was the approved model for stationary source modeling for analyses including both simple and complex terrain types. The area surrounding the site is a combination of simple and complex terrain. Simple terrain has an elevation between ground level and stack release height. Complex terrain has an elevation that is at, or greater than, the height of the stack being modeled.

Further, the impacts of structures on plume travel (downwash, which can lead to elevated ground level concentrations) can be evaluated using the EPA's Building Profile Input Program (BPIP) or BPIP with plume rise enhancements (BPIP-PRIME) (EPA, 1985). Their use requires the use of ISC-PRIME. ISC-PRIME was proposed for approval by EPA in 65 FR 21506 (April 21, 2000).

Since the date of submittal of the PSD application, 40 CFR Part 51, Appendix W was revised on November 9, 2005, with an effective date of December 9, 2005. This current version of Appendix W indicates that AERMOD should be used for appropriate applications as a replacement for ISCST3. On December 15, 2006 DEQ received revised modeling of the HGS facility (Bison, 2006b). New modeling was conducted based on the footprint of the facility at the alternative location described in Section 2.2.2 of this EIS. The revised modeling followed the November 9, 2005 version of Appendix W, with the primary change being the use of the AERMOD model instead of the older ISC-PRIME model. The change in location and change in dispersion model made little difference in the modeled Class II impacts. Impacts at Class I receptors were not remodeled because only minor changes in results would be expected due to long distance to the receptors.

Meteorological Data
A PSD Class II dispersion modeling analysis requires the use of either one year of onsite meteorological data or five years of representative data. In this case, onsite data were not available. The Great Falls International Airport is relatively close to the proposed plant location, and has similar topography. Consequently, the National Weather Service (NWS) data from the Great Falls International Airport was an acceptable alternative. ISC-PRIME met data requires both surface data (wind speed, wind direction, temperature, and cloud cover) and upper air data (mixing heights) to be processed in a single model-ready input file. The most recent readily-available five years of data from the airport were processed with AERMET and used (1999-2003) in the AERMOD model. Concurrent upper air data from the Great Falls airport was used in the data processing.

Receptor Grids
The AERMOD model calculates ground level concentrations at specific locations referred to as receptors. A gridded network of receptors is referred to as a Cartesian receptor grid. Receptors

placed at increasing spacing with distance, extended to 28 km (17 miles) in all directions as well as along the HGS property boundary for the initial modeling analysis, are referred to as the significant impact area analysis. For refined modeling at locations where impacts were above the significance levels, receptor grids extended to a distance necessary to ensure that the overall high concentration in the impact area was located.

Terrain
The terrain elevation for each receptor was determined using United States Geological Survey (USGS) 7.5-minute Digital Elevation Model (DEM) data in the UTM NAD27 datum coordinate system. The UTM grid system divides the world into coordinates that are measured in East meters (measured from the central meridian of a particular zone, which is set at 500,000 m) and North meters (measured from the equator).

The DEM files obtained from the USGS have terrain elevations at 30-m intervals. The terrain height for each receptor was calculated by interpolating the terrain height from the digital terrain elevations surrounding the receptor. This methodology ensures a consistent and accurate determination of elevation for each of the individual receptors. AERMAP was used to process the receptor elevation data for use in the AERMOD model.

Emission Rates
EPA's modeling guidance requires that modeled emission rates match the averaging period being modeled. That is, to demonstrate compliance with a 1-hour standard, the maximum 1-hour emission rate is used in the model. When demonstrating compliance with a standard based on annual average data, the annual average emission rate on an hourly basis is used. Table 6.1-1 of the PSD Application provides the specific emission rates per pollutant and averaging period that were used in the dispersion modeling analysis.

Source Types
AERMOD allows emission sources to be modeled as point sources (stacks), volume sources (material handling activities), and area sources (haul roads and storage piles). Tables 2 and 3 of SME's December 2006 Air Dispersion Modeling Report (Bison, 2006b) provide the specific parameters utilized for these source types in the model.

Class II Area Significant Impact

In accordance with EPA guidelines, modeled concentrations resulting from the proposed project are compared to applicable Class II significant impact levels (SIL's) . If a significant impact (i.e., an ambient impact above the SIL for a given pollutant and averaging period) is not observed, no further modeling analysis (i.e., NAAQS, MAAQS, or Class II PSD Increment modeling) is required for that pollutant. If a significant impact is shown, NAAQS, MAAQS, and PSD Increment modeling are required. A Radius of Impact (ROI) is determined for each pollutant that would exceed the SIL. The ROI encompasses a circle centered on the HGS plant with a radius extending out to the farthest location where the emissions increase of a pollutant from the project would be above the SIL. All sources within the ROI are assumed to potentially contribute to ground-level concentrations and are evaluated for possible inclusion in the NAAQS, MAAQS, and PSD Increment analyses. Table 4-5 provides the results of the MSL and ROI analyses.

Table 4-5. Class II Significant Impact Modeling Results

Pollutant	Averaging Period	HGS Concentration (μg/m³)		Significant Impact?	ROI (km)
		Significance Level	Peak Model Predicted		
PM_{10}	24-hr	5	11.0	Yes	1.1
	Annual	1	2.2	Yes	1.8
SO_2	3-hr	25	15.9	No	N/A
	24-hr	5	7.2	Yes	0.6
	Annual	1	0.24	No	N/A
NO_X	Annual	1	1.1	Yes	0.6
CO	1-hr	2,000	90.3	No	N/A
	8-hr	500	26.3	No	N/A

The maximum-modeled impacts of the project exceed the SILs for PM_{10}, SO_2 (24-hr averaging period), and NO_X. The modeled impacts are below the SILs for CO for both averaging periods. Consequently, CO is considered to have an insignificant impact and is not required to be evaluated further.

Class II Pre-Construction Monitoring Analysis

The modeled concentrations resulting from the plant must also be compared to the monitoring *de minimis* levels to determine if pre-construction monitoring is required. The results of the monitoring *de minimis* evaluation are provided in Table 4-6.

The maximum-modeled concentrations of PM_{10} were above the monitoring *de minimis* level for PM_{10}. Consequently, one year of PM_{10} monitoring data was required. Data were collected at a location near the proposed HGS plant. The results demonstrated that ambient concentrations of PM_{10} in the area are very low. The highest 24-hr concentration was 23 μg/m³ (the 24-hr standard is 150μg/m³) and the annual concentration was 7 μg/m³ (the annual standard is 50 μg/m³).

Table 4-6. Maximum Modeled Impacts Compared to Monitoring *de minimis* Levels

Pollutant	Averaging Period	Concentration (μg/m³)		Monitoring Required?
		Monitoring *de minimis* Level	Peak Model Predicted	
PM_{10}	24-hr	10	11.0	Yes
SO_2	24-hr	13	7.2	No
NO_X	Annual	14	1.1	No
CO	8-hr	575	26.3	No
Lead	Calendar Quarter	0.1	0.0005	No
Fluorides	24-hr	0.25	0.12	No

Class II Area NAAQS and MAAQS Analysis

Since HGS has impacts above the SILs, all non-HGS sources that have the potential to impact the HGS significant impact area were included in the Class II NAAQS and MAAQS analyses. The non-HGS sources include: Montana Megawatts I, LLC (proposed gas-fired power plant), Montana Ethanol Project (proposed ethanol plant), International Malting Company (malting plant), Malmstrom Air Force Base (boilers), and Montana Refining Company (petroleum refinery).

The ambient concentrations from other activities, such as agricultural activities, highways, and naturally occurring levels of pollutants, are accounted for by adding a background concentration to the modeled concentrations prior to comparing the results to the NAAQS or MAAQS. The gaseous pollutant background concentrations used in the analysis are the typical values provided by DEQ for modeling analyses in Montana. SME's on-site PM_{10} monitoring data results were used for PM_{10} background values.

The modeling results in Table 4-7 demonstrate that the high modeled concentrations from HGS sources, non-HGS sources, and background concentrations combined are less than 25 percent of the respective NAAQS or MAAQS in all cases except 1-hr NO_X which is approximately 56 percent of the MAAQS. Consequently, it is not anticipated that the proposed plant would cause or contribute to an exceedance of a NAAQS or MAAQS. Further, although the magnitude of the NO_X impacts would be moderate, these impacts would occur at specific receptors and decrease rapidly with distance from the location of the high impact.

Table 4-7. SME NAAQS/MAAQS Compliance Demonstration

Pollutant	Avg. Period	Modeled Conc.[a] ($\mu g/m^3$)	Backgrnd Conc. ($\mu g/m^3$)	Ambient Conc. ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	% of NAAQS	MAAQS ($\mu g/m^3$)	% of MAAQS
PM_{10}	24-hr	10.3	23	33.3	150	22	150	22
	Annual	2.31	7	9.31	------	------	50	19
$PM_{2.5}$[b]	24-hr	10.3	23	33.3	35	95	------	------
	Annual	2.31	7	9.31	15.0	62	------	------
NO_2	1-hr	240[c]	75	315	------	------	564	56
	Annual	1.4[d]	6	7.4	100	7.4	94	7.9
SO_2	1-hr	72.0	35	122	------	------	1,300	9.4
	3-hr	44.3	26	70.3	1,300	5.4	------	-----
	24-hr	7.8	11	18.8	365	5.2	262	7.2
	Annual	0.7	3	3.7	80	4.6	52	7.1
Pb	Quarterly[e]	0.0005	Not. Avail.	0.0005	1.5	0.03		
	90-day[e]	0.0005	Not. Avail.	0.0005	-----	-----	1.5	0.03

[a] Concentrations are high-second high values except annual averages and SO_2 1-hr, which is high-6th-high.
[b] The $PM_{2.5}$ compliance demonstration assumes all PM_{10} is $PM_{2.5}$.
[c] One-hour NOx impact is converted to NO_2 by applying the ozone limiting method, as per DEQ guidance.
[d] Annual NOx is converted to NO_2 by applying the ambient ratio method, as per DEQ guidance.
[e] SME reported the 24-hour average impact for compliance demonstration.

Class II Area PSD Increment Analysis

The determination of the emissions that consume PSD Increment is based on the current level of actual emissions in relation to actual emissions at the baseline date. The major source baseline date is the date after which actual emissions associated with construction (i.e., physical changes or changes in the method of operation) at a major stationary source affect the available PSD Increment. The trigger date is the date after which the minor source baseline date may be established. The minor source baseline date is the earliest date after the trigger date on which a complete PSD application is received by the regulatory agency. The date marks the point in time after which actual emission changes from all sources affect the available PSD Increment.

The minor source baseline dates for NO_X, SO_2, and PM_{10} all have been triggered in the Great Falls area. The non-HGS emission sources used in the PSD modeling are the same as for the NAAQS and MAAQS modeling. However, the emission rate for non-HGS sources are the two-year average actual emission rate if the source has been in operation for more than two years (otherwise, the maximum is used).

The PSD modeling results in Table 4-8 show that the high modeled concentrations from PSD increment consuming sources (HGS sources and non-HGS sources combined) are 35 percent or less of the respective PSD Increments for all pollutants and averaging periods.

Table 4-8. Class II PSD Increment Compliance Demonstration

Pollutant	Avg. Period	Met Data Set	Modeled Conc. (µg/m^3)	Class II Increment (µg/m^3)	% Class II Increment Consumed	Peak Impact Location (UTM Zone 12)
PM_{10}	24-hr	Great Falls 2003	10.3	30	34%	(497227, 5266071)
	Annual	Great Falls 2003	2.31	17	14%	(497901, 5266560)
SO_2	3-hr	Great Falls 2003	12.6	512	2.5%	(497069, 5266071)
	24-hr	Great Falls 2003	6.33	91	7.0%	(497713, 5266416)
	Annual	Great Falls 1999	0.311	20	1.6%	(498700, 5267500)
NO_2	Annual[b]	Great Falls 2003	1.18	25	4.7%	(497701, 5266703)

a – Compliance with short-term standards is based on high-second-high impact.
b – Annual NO_x impacts are compared to the NO_2 standards.

CFB Startup Analysis

EPA's modeling guidance recommends that, for applications where the source can operate at substantially less than design capacity, and the changes in stack parameters could lead to higher ground level concentrations, the load or operating condition that causes maximum ground-level concentrations should be determined. SME's boiler startup procedures fall into this category of analyses.

Three boiler startup scenarios were evaluated. For CFB boiler startup, SME would use both fuel oil and coal to initiate boiler operations, with the switch from fuel oil to coal firing occurring at approximately 30 percent of maximum boiler load. Firing at approximately 70 percent of maximum boiler load, all emission controls are expected to be operating. Consequently, the CFB at 30 percent of maximum load with oil only, the CFB at 30 percent of maximum load with coal only, and the CFB at 70 percent of maximum load with coal only were evaluated.

Modeling results provided in Tables 7 and 8 of the December 2006 modeling report demonstrate that the high-modeled concentrations resulting from the startup scenarios are less than the NAAQS, MAAQS, and PSD Increments for all pollutants and averaging periods.

Class II Soil and Vegetation Impacts Analysis

Montana's PSD permitting regulations require that the impacts of a proposed plant's projected emissions on soil and vegetation be evaluated. The primary NAAQS for criteria pollutants were developed to provide adequate protection of human health, while the secondary standards were designed to protect the general welfare, i.e., manmade and natural materials including soils and vegetation. EPA guidance on new source review supports this by stating:

> *For most types of soils and vegetation, ambient concentrations of criteria pollutants below the secondary national ambient air quality standards (NAAQS) will not result in harmful effects (EPA, 1990).*

The results of the air quality analysis demonstrate that the impacts of the HGS plant are insignificant (i.e. less than the PSD modeling significance levels, which are more conservative than the NAAQS) for CO. The modeled concentrations of NO_2, SO_2, and PM_{10} for the plant and other interactive sources surrounding the plant were less than the NAAQS and MAAQS. Since the air quality analysis shows that emission impacts are either insignificant or below the NAAQS and MAAQS, the plant is predicted to have a minor impact on the soil and vegetation in the area surrounding the plant.

Effects of Criteria Pollutant Concentrations on Sensitive Plant Species

The EPA also provides a screening document as a guide for determining the impacts of the projected emissions on plants, soils, and animals (EPA, 1981). The December 2006 modeling report, Table 9, provides a comparison of modeled (predicted) concentrations to sensitive species concentrations by pollutant and averaging period. The predicted impacts are below the identified sensitive species concentrations and are considered to be minor.

Effects of Trace Element Deposition on Soils, Plants, and Animals

The EPA screening document also suggests an analysis of trace elements that could be deposited and contaminate soil and plant tissue. Predicted deposition levels were estimated by calculating the ratio of total HGS annual trace element emissions to total HGS annual NO_X emissions and multiplying the highest NO_X modeled concentration by this ratio. The resulting calculated trace element concentration was then multiplied by a deposition factor to calculate trace element deposition impacts.

The deposition analysis was performed for each of the trace elements for which screening concentrations were provided in EPA's screening document. The results of the analysis were provided in Table 10 of the December 2006 modeling report.

The calculated deposition levels were below all of the screening values for the forty-year life of the facility. Consequently, trace compound and elements deposition from the proposed plant is predicted to have a minor impact on soil, plants, or animals.

Minor Source Growth Analysis

Minor source growth is expected to occur in the surrounding area due to the construction and operation of the facility. Emissions of criteria pollutants and HAPS associated with this growth are expected to be minor.

Summary of Class II Area Impact Analysis

The Proposed Action would cause a number of on-site and off-site impacts on air quality, ranging from negligible to moderate in intensity. More specifically, the Proposed Action would result in:

- Short-term, minor to moderate degradation of local air quality from construction activities
- Long-term minor to moderate degradation of local air quality from operations
- Long-term minor impacts on sensitive species from criteria pollutant emissions and/or trace element deposition.

4.5.2.2.3 Impacts on Air Quality in Class I Areas

SME submitted modeling to analyze impacts on air quality and air quality related values (AQRV's) in Class I areas. AQRV analysis included ambient concentrations, visual plume analysis, acid deposition and regional haze. The modeling was based on the permitted emission rates for the Proposed Action.

The regional haze analysis for the Proposed Action considered visibility-affecting air pollutants, including the following –

- NOx
- SO_2
- Sulfate (SO_4)
- Elemental carbon (EC)
- Secondary organic aerosols (SOA)
- Coarse particulate matter (with aerodynamic diameter greater than 2.5 microns but not exceeding 10 microns)
- Fine particulate matter (with aerodynamic diameter not exceeding 2.5 microns)

The emission sources for the regional haze analysis included the CFB boiler and the material handling baghouses. Fugitive emissions were not included in the analysis since it is expected that these emissions would not be significant to the long-range transport (over 50 km) of emissions to the Class I areas that potentially could be affected. The same emissions were also used for the PSD Class I increment impact analysis and acid deposition analysis by considering the contributions from the appropriate air pollutants.

PSD Class I Increment Impacts from the Proposed Action

Analysis results indicate that the maximum predicted Class I increment impacts due to NOx and PM_{10} emissions from the Proposed Action would be below the applicable EPA-proposed Class I increment significance levels as shown in Table 4-9. Because the impacts are less than 50 percent of the Class I increments, the adverse impacts for both NOx and PM_{10} emissions would be minor for all applicable long-term/short-term averaging periods. The predicted annual SO_2 impacts from the Proposed Action would be less than 50 percent of the Class I increment for all Class I areas and thus would be considered minor.

The predicted 3-hour and 24-hour SO_2 impacts exceed the EPA-proposed PSD Class I significance levels in some Class I areas (i.e., Scapegoat Wilderness Area for the 24-hour period and the Gates of the Mountains Wilderness Area for the 3-hour and 24-hour periods), triggering the requirement for cumulative impact modeling. Cumulative impacts analysis including the HGS emissions and other PSD increment-consuming sources in the nearby area indicates that the total impact would be less than 50% of the 3-hour and 24-hour SO_2 Class I increments. As such, the predicted 3-hour and 24-hour SO_2 impacts would be minor. Table 4-9 summarizes the predicted impacts on the Class I increments from the Proposed Action.

Table 4-9. Class I PSD Increment Compliance Demonstration

Pollutant	Avg. Period	Class I SIL (μg/m^3)	Peak Modeled Conc. (μg/m^3)	Class I Increment (μg/m^3)	% Class I Increment Consumed	Class I Area of Peak Impact Location
PM_{10}	24-hr	0.3	0.197	8	2.5%	Scapegoat Wilderness Area
	Annual	0.2	0.0070	4	0.18%	UL Bend Wilderness Area
SO_2	3-hr	1.0	1.08 (HGS only) 2.34 (cumulative)	25	4.3% 9.4%	Gates of the Mountains Wilderness
	24-hr	0.2	0.25 (HGS only) 0.57 (cumulative)	5	5.0% 11%	Gates of the Mnt.and Scapegoat Wilderness
	Annual	0.1	0.0060	2	0.30%	UL Bend Wilderness Area
NO_2	Annual[b]	0.1	0.0061	2.5	0.24%	UL Bend Wilderness Area

a – Compliance with short-term standards is based on high-second-high impact.
b – Annual NO_x impacts are compared to the NO_2 standards.

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