3.0 AFFECTED ENVIRONMENT

3.1 SOILS, TOPOGRAPHY, AND GEOLOGY

Great Falls and its surrounding areas lie within the western edge of the northern Great Plains physiographic area, which in its entirety reaches from Mexico far north into Canada and spreads out east of the Rocky Mountains. Specifically, Great Falls is located within the Missouri Plateau region of the Great Plains, which is characterized by several levels of rolling upland surmounted by small mountainous masses and flat-topped buttes and entrenched by streams. The area has been greatly dissected by the Missouri River and its tributaries (Figure 3-1).

The rather limited variety of landforms found on the Missouri Plateau is testimony to their glacial origin and to the great advances of the continental ice sheets. This is a stream-carved terrain that has been modified by continental glaciers and almost completely covered by a thick blanket of glacially transported and deposited till and rock debris, locally hundreds of feet thick but generally less than 50 feet (15 m) thick. Soils surrounding the area have developed from the gently rolling glacial drift and rock debris and are characterized by poorly developed drainage (Trimble, 1980).

The regional topography in the Great Falls vicinity primarily consists of gently rolling northern Great Plains and prairie at relatively high altitudes, with little change in relief. Average elevations in the area range from 3,300 to 3,600 feet (1,000-1,100 m) above mean sea level (MSL). Nearby mountain ranges partially encircle the Great Falls portion of the Missouri River valley. These include the Highwood and Little Belt Mountains, which are about 30 miles (50 km) away to the east and south, respectively. The Big Belt Mountains are 40 miles (65 km) distant to the southwest and the Front Range of the Rocky Mountains varies between 60 and 100 miles (100-160 km) distance to the west and northwest.

Figure 3-1. Landscape of the Missouri River Canyon

A hydrogeologic report was completed for area in September, 2005 (PBSJ, 2005). The deepest rock of consequence identified in this study is the Madison limestone, a thick sequence of dark gray, hard limestone beds deposited during Mississippian Period or epoch, around 300 million years ago. The thickness of the Madison limestone is believed to be at least 1,000 feet (305 m) in this area.

Above the Madison limestone is the Morrison Formation of Jurassic age. Morrison sediments predominantly consist of intercalated sandstone and shale beds that are brown to dark gray, respectively. The Morrison Formation is about 100-200 feet (30-60 m) thick. Locally, below the Morrison Formation, is a separately recognized unit called the Swift Formation.

Overlying the Morrison Formation is the Cretaceous age Kootenai Formation. The upper portion of the Kootenai Formation consists dominantly of mudstone with some claystone and siltstone. This unit is chiefly grayish red to moderate red, with some greenish-gray and dark gray beds. The lower portion of the Kootenai is characterized by sandstone and siltstone. Sandstone color is light gray and weathers yellow-gray. The Kootenai Formation is roughly 200-250 feet (60-76 m) thick in this area (PBSJ, 2006a).

3.1.1 SALEM SITE

The preferred location, the Salem Site, is located approximately 3,354 feet (1,022 m) above sea level. This site lies approximately eight miles (13 km) to the east of Great Falls, Montana, and site topography is gently sloping and undulating, sloping downward to the west and north toward the Missouri River.

The geology of the area to the east of Great Falls is characterized by a thick sequence of sedimentary rocks overlain by a mantle of glacial and alluvial deposits. Glacial deposits beneath the Salem Site were identified during a geotechnical investigation that consisted of drilling 67 borings to depths ranging from 11.5 to 60 feet (3.5-18 m) (PBSJ, 2005). Site geology consists of eolian (wind-blown) deposits of Holocene age composed of silty sand, underlain by Pleistocene-age glacial lake bed deposits and glacial till layers. The glacial lake deposits are the end result of Glacial Lake Great Falls, a large lake that formed at the southern margin of the great ice sheets. Beneath the upper fine-grain layers, alluvial silt and sand and gravel deposits of the ancestral Missouri River were observed. The unconsolidated sediments extend 125 to 150 feet (38-46 m) below ground where the Kootenai Formation is found.

At the ground level, the Salem site is located entirely on Pendroy Clay soils, with 2-8 percent slopes. The Pendroy series consists of very deep, well-drained soils formed from clayey parent materials on alluvial fans, floodplains, stream terraces, and lake plains. These soils have a clay content of 60-75 percent through the surface and subsurface horizons

Soils Terminology

Parent Material: The unconsolidated mass from which soil forms. The characteristics of the parent material determine soil characteristics such as thickness and texture of the horizons, mineralogy, color, and reaction.

Soil Series: A group of soils formed from the same parent material under similar conditions and having the same kind and sequence of all major horizons and the same land use properties.

Soil Association: A landscape, named for its major soil series, which has a distinctive proportional pattern of soils, generally consisting of one or more major soils and at least one minor soil series.

(0-40" deep), below which the clay content decreases slightly to 50-65 percent (at 40-70" or 1.0-1.8 m of depth). As a result of these contents, Pendroy soils exhibit very slow permeability (NRCS, no date). Figure 3-2 is a soils map of the Salem site.

Pendroy Clay soils are in hydrologic group D, which consists of soils with high runoff potential. Hydrologic group D soils have very slow rates of water transmission and infiltration. Additionally, Pendroy soils are classified as CH soils according to the Unified system and A-7 soils according to the American Association of State Highway and Transportation Officials (AASHTO) system. The Unified system classifies soils according to properties that affect their use for engineering and construction purposes. The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance, including the particle-size distribution and Atterberg limits (the liquid limit and plasticity-index of the soil). CH soils are at the extreme end of the Unified classification system for fine-grained high content inorganic clay soils which exhibit high plasticity. Similarly, A-7 soils are at the extreme fine-grained particle end of the AASHTO measurement spectrum, and contain minimal to no coarse-grained particles.

3.1.2 Industrial Park Site

The alternate site location, the Industrial Park Site, is located approximately 3,530 feet (1,076 m) above sea level. Figure 3-3 is a soils map of the site.

The great majority of the facilities at the Industrial Park site (96.2 acres or 39 ha) would be located on Ethridge-Kobase (formerly known as Kobar) silty clay loams, with 0-2 percent slopes, and a smaller amount of facilities, including railbed and access roads, (8.1 acres or 3.3 ha) would be located on Linnet-Acel silty clay loams, also with 0-2 percent slopes. Additionally, some short sections of the transmission lines and railroad bed would be located on Kobase (Kobar) silty clay loam and Lothair silty clay loam.

Ethridge-Kobase (Kobar) silty clay loams are very deep, well-drained soils formed in alluvium and glaciofluvial deposits from mixed rock sources, or glaciofluvial or glaciolacustrine deposits. They are found on till and lake plains, stream terraces, alluvial fans, drainage ways, sedimentary plains, and hills. Slopes are 0 to 40 percent. These soils have a clay content of 27-35 percent in the surface horizons (0-20" deep), after which the clay content increases slightly to 35-45 percent (at 10-60" of depth). Ethridge-Kobase soils exhibit slow permeability (NRCS, no date).

Linnet-Acel silty clay loams are also very deep, well-drained soils formed in clayey alluvium, glaciolacustrine, or glaciofluvial deposits. They are located on lake plains, stream terraces, alluvial fans, drainage ways, and till plains. Slopes are 0 to 10 percent. These soils have a clay content of 30 to 40 percent in the surface horizons (0-6" deep), after which the clay content increases to 40-55 percent (at 6-60" of depth). The Linnet-Acel soils exhibit slow permeability (NRCS, unknown date).

Ethridge-Kobase (Kobar) and Linnet-Acel soils are all in hydrologic group C, which consists of soils that have a slow infiltration rate when thoroughly wetted. Hydrologic group C soils have moderately fine to fine texture and exhibit slow rates of water transmission. Additionally,

Figure 3-2. Soils Map of the Salem Site

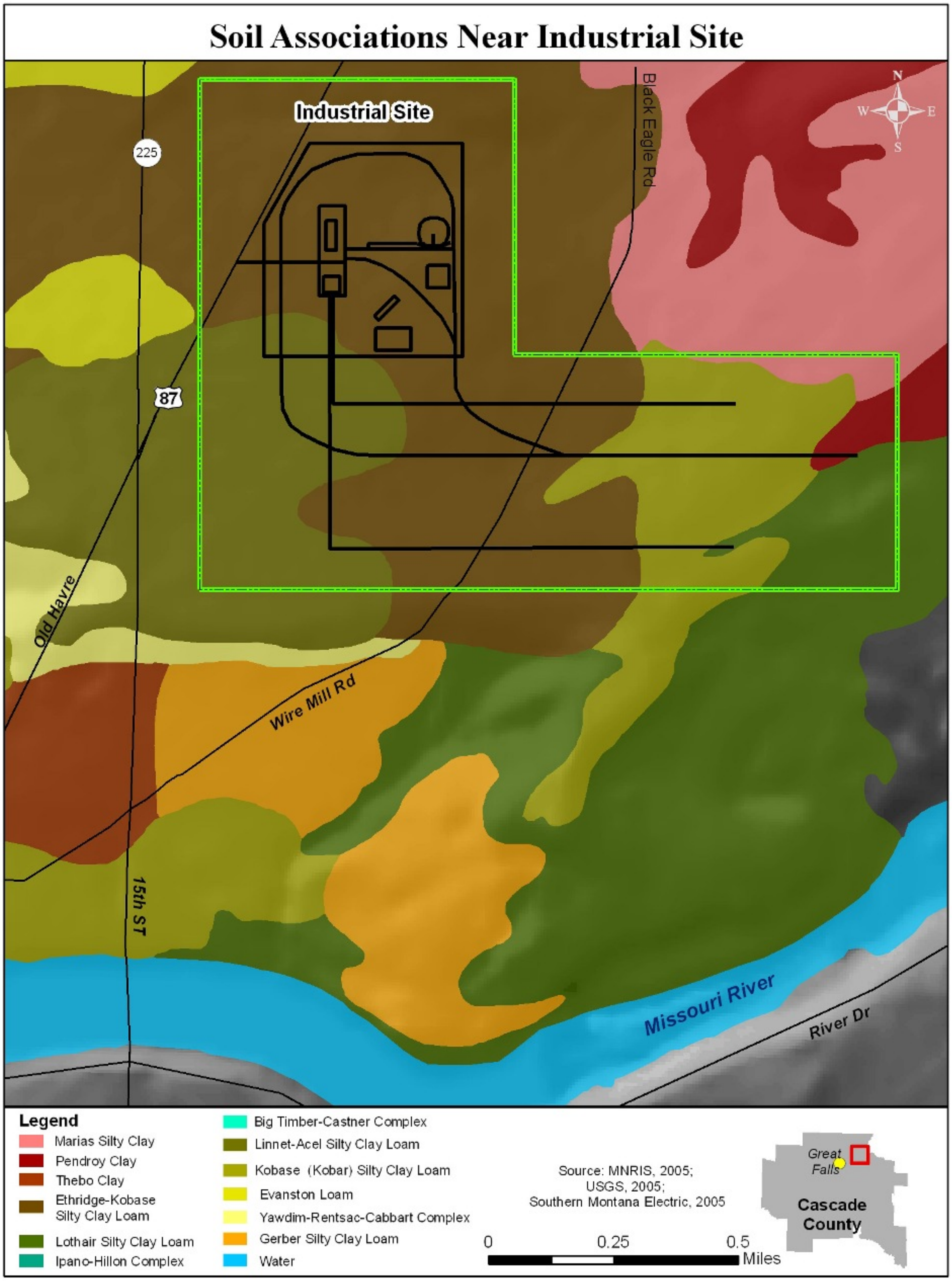


Figure 3-3. Soils Map of the Industrial Park Site

Ethridge-Kobase and Linnet-Acel soils are classified as CL soils according to the Unified system and A-6/A-7 soils according to the AASHTO system. Soils classified as CL by the Unified system are fine grained soils. Specifically, these soils are inorganic clay soils of low to medium plasticity. Similarly, soils classified as AAHSTO A-6/A-7 soils include plastic clay soils which usually have high volume changes between the wet and dry states, meaning that they will compress when wet and shrink and swell with changes in moisture content.

Lothair silty clay loams are located on the southeast edge of the proposed property, where some amount of transmission lines and railroad would potentially be located. Lothair soils consist of very deep, well-drained soils that formed in alluvium and lacustrine deposits. The soils are found on alluvial fans and stream terraces. The clay content throughout the Lothair soil horizons is between 35-45 percent.

3.2 WATER RESOURCES

3.2.1 MISSOURI RIVER

From the junction of the Jefferson, Madison and Gallatin Rivers near Three Forks, Montana, the Missouri River extends approximately 2,384 miles (3,837 km) in a northeasterly then southeasterly direction to its mouth just upstream of St. Louis, Missouri, where it joins the Mississippi River. The Missouri River is the longest river in the U.S., and the river basin has a total drainage area of 529,350 sq. miles (1,371,010 sq. km) (USACE, 2004). The river is considered a navigable U.S. water by both the Army Corps of Engineers and the State of Montana from Three Forks down to the Montana-North Dakota border. The City of Great Falls is located at river mile 2093, just under 300 miles (485 km) north of the river's beginning near Three Forks.

The Missouri River receives additional federal protection 50 miles (80 km) downstream from Great Falls near Fort Benton, where it is designated a Wild and Scenic River. Much further downstream, the river is nicknamed "Big Muddy" for its heavy load of silt and sediment. The Missouri River's brown waters do not readily mix with the gray waters of the Mississippi River until approximately 100 miles (160 km) downstream of their confluence (MRA, no date).

Figure 3-4. Missouri River Downstream of Great Falls

The Missouri's fluctuating flow is now regulated by seven large dams (Fort Peck, Garrison, Oahe, Big Bend, Fort Randall, Gavins Point, and Canyon Ferry) and more than 80 smaller dams on the river and tributary streams. Since the dams have no locks, Sioux City, Iowa, is the head of navigation for the river over the 760-mile (1,220-km) stretch downstream to the confluence with the Mississippi. Tugboats pushing strings of barges move freight along this route.

The major dams on the Missouri, along with their reservoirs, are part of the coordinated, basin-wide Missouri River basin project, authorized by the U.S. Congress in 1944, which envisioned a comprehensive system of flood control, navigation improvement, irrigation, municipal and industrial water supply, and hydroelectric generation facilities for the 10 states in the Missouri River basin. Though the project was only partially completed, it completely changed water resource development in the basin (USACE, 2004).

Figure 3-5. Black Eagle Falls Dam on the Missouri River in Great Falls
Source: bigskyfishing.com

In the Great Falls area, there are five major sets of waterfalls on the Missouri River. The falls are known as: the Great Falls of the Missouri, Crooked Falls, Rainbow Falls, Colter Falls, and Black Eagle Falls. Black Eagle Falls is the only set that is actually within the city limits of Great Falls. Rainbow Falls is on the eastern edge of town near Malmstrom Air Force Base. The Great Falls of the Missouri is several miles east of town.

There are five hydroelectric dams on the Missouri River in Cascade County: Black Eagle Dam, Cochran Dam, Morony Dam, Rainbow Dam, and Ryan Dam. None of these dams are considered major dams by the U.S. Army Corps of Engineers (USACE, 2004). The first dam was Black Eagle Dam, built at the top of Black Eagle Falls in 1891. The second dam built was Rainbow Dam in 1910. Rainbow Dam sits on top of Rainbow Falls, just up river from Crooked Falls. The next dam to be built was Volta Dam in 1915. The Volta Dam was renamed Ryan Dam in 1940. Ryan Dam sits on top of the actual Great Falls of the Missouri. Morony Dam was constructed in 1930, and the last dam, Cochran, was built in 1958.

Crooked Falls is the only visible falls in the Missouri/Mississippi River system that has not had a dam constructed on it.

The USGS maintains a gauging station on the Missouri River near Great Falls (gauging station 06090300). The station is located on the left bank of the River, 700 feet (210 m) downstream from Morony Dam, and 12.6 miles (20.3 km) northeast of Great Falls at river mile 2,105.4. The drainage area into the River at this station is 23,292 sq. miles (60,326 sq. km) of land. Measurements for Missouri River flows at this gauging station have been recorded consistently since 1957. As increased quantities of water have steadily been diverted from the river for agricultural, residential, and industrial uses since 1957, surface flows in the Missouri have accordingly decreased. Between 1957 and 2004, the annual mean river flow at the Great Falls gauging station was 7,435 cubic feet per second (cfs). In 2003, the annual mean river flow at the station was 5,376 cfs, and in 2004, the annual mean river flow was 4,601 cfs (USGS, 2005).

Overall, Missouri River Basin water projects and withdrawals have significantly reduced the annual flow and magnitude of peak flows of the Missouri at Great Falls, and areas downstream, from that of the predevelopment era. However, the seasonal timing of peak flows in Great Falls remains fairly consistent with the predevelopment era, as the area continues to experience annual peaks in river flow in late spring and early summer. Specifically, the spring rains and snowmelt that occur in the river basin which drains into the river near Great Falls swell the volume of the river in April, June, and early July, as seen below in the USGS average daily streamflow for 2002 and 2003.

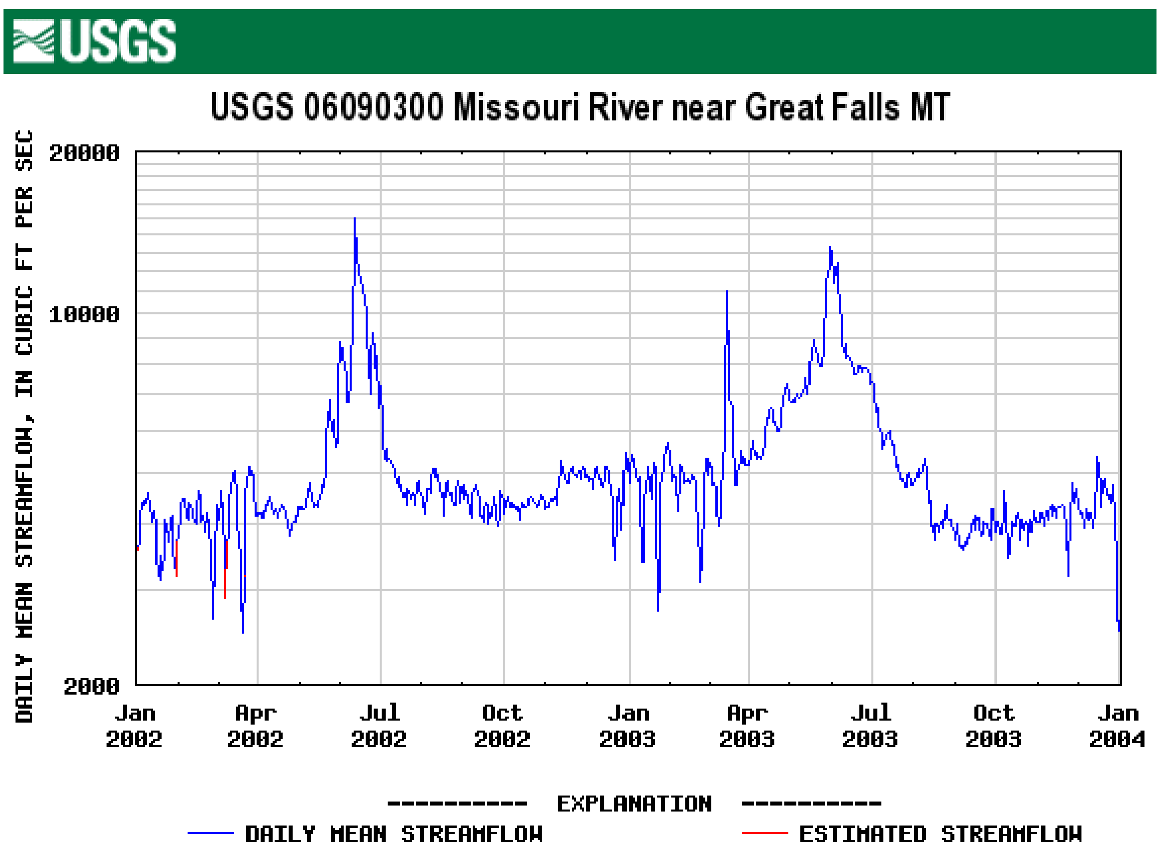


Figure 3-6. Missouri River Flow near Great Falls

3.2.2 WETLANDS AND FLOODPLAINS

The extensive use of dams along the Missouri River has provided substantial flood control for the river banks and farmlands along the Plains in Montana. However, as flood control has improved, floodplains and wetlands have been increasingly drained and developed. Both wetlands and floodplains have steadily declined with increased development in the Missouri River basin. In the last century, hundreds of thousands of acres of wetlands and nearly three million acres (1.2 million hectares) of riverine floodplain have been lost or substantially altered in the Upper Missouri River basin (USGS, 2004).

Wetlands within the project vicinity generally are limited to the incised drainage habitat and narrow fringes of the Missouri River and its tributaries (Westech, 2005). Though limited, these wetlands provide an invaluable resource for the filtration and adsorption of stream nutrients and contaminants, and for waterfowl and wildlife habitat. Five bird species on the State species of concern list have been documented in wetlands within ten miles (16 km) of Great Falls: white-faced ibis, black-crowned night heron, Franklin's gull, common tern, and black tern (Westech, 2005).

Wetlands

The regulatory definition of a Section 404 jurisdictional wetland, according to the Army Corps of Engineers, is "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (USACE, 1987).

Floodplains similarly follow the fringes of the perennial streams in the area. Along the Missouri River in the vicinity of the project areas, the floodplains do not extend over the river banks due to the fact that the river runs through a deeply incised channel with sides from sixty to over several hundred feet high (Nerud, 2006). The configuration and size of the channel, along with the area dams, prevent the project sites from receiving most flood waters.

Additional site specific information for the two sites under consideration is provided below, in their respective subsections.

Development in, and encroachment upon, floodplains and wetlands is regulated at the local, state, and federal level. Table 3-1 summarizes some of the key regulations governing the floodplains, wetlands, and waters within the project vicinity.

3.2.3 LISTED SPECIES ASSOCIATED WITH MISSOURI RIVER

Generally, reduced average and peak flows and altered sediment transport associated with river development have deepened and narrowed the Missouri River channel, with consequences for sensitive wildlife and fish populations described in Section 3.4.4.

Three federally threatened or endangered aquatic species, listed under the Endangered Species Act (ESA), are found within the Missouri River drainage in Montana: the pallid sturgeon, least tern, and piping plover.

Table 3-1. Water-Related Regulations

Regulation/Permit	Nature of Permit	Agency/Authority
Clean Water Act (404 Permit)	Controls discharge of dredged or fill materials in wetlands and other water of the U.S.	U.S. Army Corps of Engineers, Omaha District
Federal Rivers and Harbors Act (Section 10 Permit)	Regulates construction of any structure in or over any federally listed navigable waters of the United States, the excavation from or depositing of material in such waters, or the accomplishment of any other work affecting the course, location, condition, or capacity of such waters.	U.S. Army Corps of Engineers, Omaha District
Montana Land-Use License or Easement on Navigable Waters	Protects riparian areas and the navigable status of water bodies.	MT Dept. of Natural Resources and Conservation, Trust Land Division
Short-Term Water Quality Standard For Turbidity (318 Authorization)	Requires a permit for any activity in any state water that will cause unavoidable short-term violations of water quality standards	MT Dept. of Environmental Quality
Public Water Supply Watersheds	Requires the approval of detailed plans prior to the beginning of new electric plant construction in a public supply watershed.	MT Dept. of Environmental Quality
Clean Water Act (401 Certification)	Requires applicant for a federal permit or license that may result in a discharge to waters of the United States to first obtain certification from the state.	MT Dept. of Environmental Quality
Stormwater Discharge General Permits (MPDES permit)	Regulates stormwater discharges to surface water or groundwater during and following construction activities.	MT Dept. of Environmental Quality
Montana Stream Protection Act (SPA 124 Permit)	Regulates the construction of new facilities or the modification, operation, and maintenance of an existing facility that may affect the natural existing shape and form of any stream or its banks or tributaries.	MT Fish, Wildlife and Parks
Cascade County Floodplain Permit	Requires a permit to build permanent structures or to place fill in a designated flood plain.	Cascade County Planning Department
Montana Natural Streambed and Land Preservation Act (310 Permit)	Requires a permit to perform work in or near a stream and ensures that projects are not damaging to the stream or to adjoining landowners.	Cascade County Conservation District
Montana Water Quality Act (MPDES Permit)	Regulates the pollution of state waters and the placement of wastes in a location where they are likely to cause pollution of any state water.	MT Dept. of Environmental Quality

Each of these species is found in the river waters below Fort Peck Dam. Fort Peck Dam is the closest major dam to the river's headwaters and the closest major dam to Great Falls. It is located over 250 miles (400 km) downstream of Great Falls, and was built during the dust-bowl depression of the 1930s for flood control, irrigation and barge traffic. Below the dam, the flows of the Missouri go down abnormally in the spring and back up in the summer. The river that once occupied its floodplain, wide and slow with braided channels, is now narrow and fast. River biota has dwindled as it lost its natural connections to the floodplain. High summer flows wash away the nests of the least tern and cause the absence of plant-studded sandbars needed for breeding and raising young (MRA, no date).

Studies by the U.S. Fish and Wildlife Service and the National Academy of Sciences indicate that lower reaches of the Missouri River are in serious decline and that action must be taken to reverse the damage and restore some semblance of the river's natural flow out of Fort Peck Dam if the pallid sturgeon, least tern and piping plover are to be saved from extinction (MRA, no date).

3.2.4 SURFACE WATER QUALITY

Both the federal Clean Water Act (CWA) and the Montana Water Quality Act require an ongoing program of water quality assessments and reporting as part of the process intended to protect and improve the quality of rivers, streams, and lakes in the state. The EPA administers the provisions of the CWA while the Water Quality Planning Bureau of DEQ provides water quality assessment of waters within the state. The state 303(d) list contains specific information relating to waters assessed as having one or more of their beneficial uses impaired or threatened by human activities. A water quality management plan must be developed for any water found to have beneficial uses impaired or threatened, to correct the causes of the identified impairments. In those cases where the impairment involves the need to reduce the load of specific concentrations in the water, the water quality management planning process must include the identification of a total maximum daily load (TMDL) for each pollutant causing any standards exceedances.

Water bodies listed as impaired or threatened in Montana include all of the major drainages downstream of the proposed project sites, including each of the reaches of the Missouri River in the Upper Missouri-Dearborn watershed, and Belt Creek in the Belt watershed (DEQ, 2004c) (Figure 3-7).

The Missouri River is listed as not supporting the beneficial uses of aquatic life, coldwater fishery, warm water fishery, and drinking water. Probable causes of the river impairment include PCBs, metals, siltation, turbidity, and thermal modifications. Probable sources of the impairment are listed as being industrial point sources, dam construction, hydromodification, and agriculture.

Belt Creek is listed as not supporting the beneficial uses of aquatic life, coldwater fishery, and drinking water. Probable causes of the stream impairment include metals, siltation, bank erosion, fish habitat degradation, and other habitat alterations. Probable sources of the impairment are listed as being highway/road/bridge construction, resource extraction, acid mine drainage, channelization, construction, hydromodification, agriculture, and grazing-related sources.

TMDL development has not yet begun for the impaired stream segments within the project area.

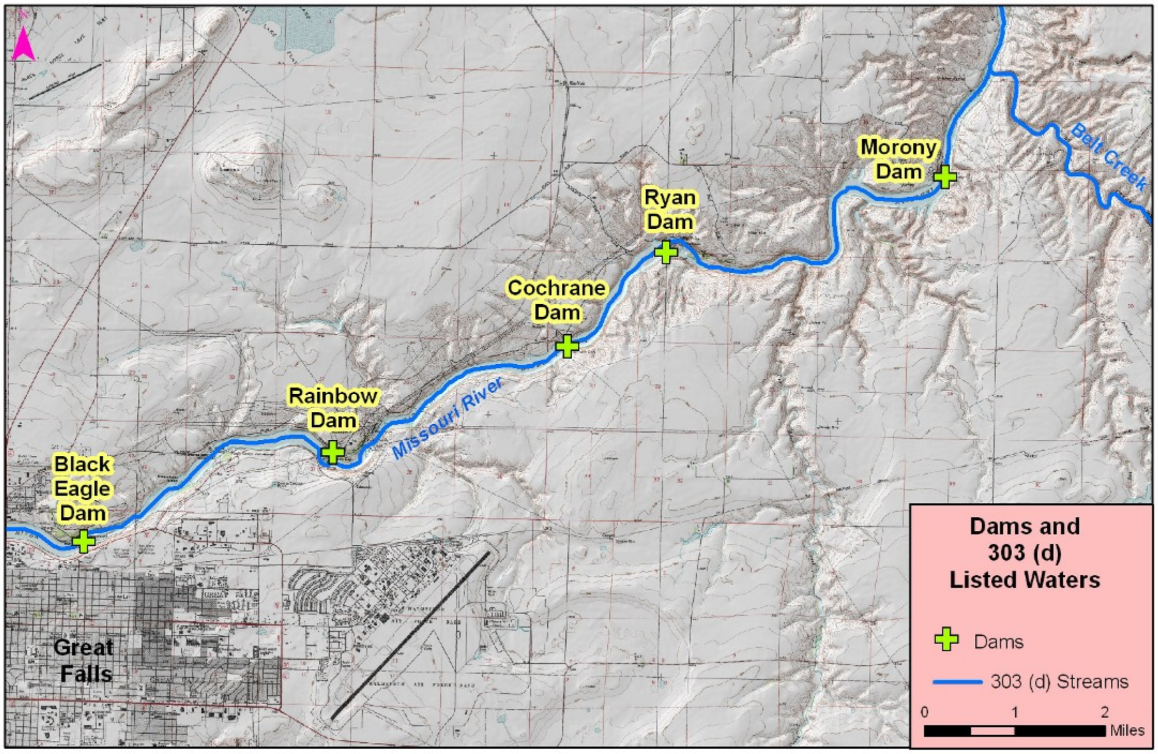


Figure 3-7. DEQ-Designated Impaired and Threatened Waters near Great Falls

3.2.5 WATER RIGHTS

Like most of the Western states, Montana is a Prior Appropriation state. Under the Prior Appropriation Doctrine, a party must have a water right to appropriate water from a river, stream, or other source. Users of municipal water supplies and other water users who buy their water from a water supply system do not need to have a water right. However, the municipality or water supply system owner must have a water right in order to divert water.

Water rights in Montana are regulated by the Montana Water Use Act of 1973 (Mont. Code Ann. §85-2-101 et seq.). A party may appropriate water by applying for a "Permit to Appropriate Water" from the Department of Natural Resources and Conservation (DNRC). In order to appropriate water, the party must prove by a preponderance of evidence that: 1) there is water physically available at the proposed point of diversion; 2) water is legally available during the period of appropriation, in the amount requested; 3) the water rights and/or water quality of a prior appropriator will not be adversely affected; 4) the water will be put to beneficial use on property in which the party has a possessory interest; and 5) the proposed means of diversion, construction, and operation of the diversion works is adequate. For appropriations meeting or exceeding 5.5 cubic feet per second or 3000 acre-feet per year, a higher evidenciary standard of "clear and convincing" applies, as well as additional information showing that the proposed use is reasonable (Mont. Code Ann. §85-2-311).

The priority of a water right in a Prior Appropriation state is probably the most important part of the right. Water rights are exercised in accordance with their order of priority, starting with the earliest (senior) rights and progressing to the later (junior) rights, until the water is all appropriated.

Generally, water rights automatically transfer with the land when the land is conveyed to someone else, unless specifically withheld through the appropriate legal documentation. However, in order use these water rights on another location, DNRC approval is required. Changes in a water right subject to DNRC jurisdiction include a change in the point of diversion, the place of use, the purpose of use, or the place of storage. A change in a water right can be made so long as there is no "adverse effect" to other appropriators, both junior and senior. Before any change can be initiated, approval from the DNRC must be obtained.

Water rights in Montana can be divided into two categories: those that pre-date the 1973 Water Use Act, and Post-1973 developments. Water rights acquired prior to July 1, 1973, with the exception of exempt rights, are Statements of Claim, and subject to adjudication by the Water Court. Statements of Claim include many types of water rights in Montana, acquired in accordance with the particular rules that applied at that time. Specific types of Statements of Claim include:

Use water rights: water rights that were acquired by merely appropriating and beneficially using the water. No recording, approval from a government agency, or other written record of the right was required. Approximately 67 percent of the water rights filed in Montana's statewide adjudication are use rights. The priority date of use rights is generally the date the water was first put to beneficial use.

Filed rights: water rights that were filed with the local county Clerk and Recorder's Office under a system that was first statutorily recognized in 1885 and which continued until the July 1, 1973, effective date of the Water Use Act of 1973.

Decreed rights: water rights that were initially use or filed rights that have been adjudicated (decreed) by a district court. These rights are more certain in their existence, because a district court previously reviewed the evidence and decided, at least at the time of the decree that a water right existed.

Court Approved Rights on Adjudicated Streams: water rights that have been approved by a district court after 1921 on an adjudicated stream. The 1921 legislature required water users on adjudicated streams to petition the district court for new appropriations.

Murphy Rights: In 1969, the Montana Legislature enacted legislation granting the Montana Fish and Game Commission authority to appropriate waters on twelve streams to maintain instream flows for the preservation of fish and wildlife habitat. The Legislature established specific reaches to appropriate on these streams, including the Missouri River in Broadwater, Lewis and Clark and Cascade counties, and the Smith River in Cascade and Meagher counties (Doney, 1990).

As mentioned previously, certain water rights were exempted from the adjudication filing statutes. These included groundwater developments used for stock or domestic (one household) put to use prior to 1962, or put to use prior to July 1, 1973 and filed with the county under the groundwater codes. Stock drinking directly from surface water streams prior to July 1, 1973 was also exempted from the filing requirements.

Appropriations occurring after the passage of the Water Use Act are under the jurisdiction of the DNRC:

Provisional Permits: All appropriations of surface water and groundwater dirversions exceeding 35 gallons per minute or 10 acre-feet require permits from the DNRC before water can be put to beneficial use. The application process and criteria are as previously discussed.

Groundwater Certificates: Except in controlled groundwater areas, a party does not need to apply for a permit to develop a well with an anticipated use of the 35 gallons per minute or less (not to exceed 10 acre-feet per year). The party must only file a Notice of Completion for well drilling with the DNRC. For groundwater appropriations over 35 gallons per minute, or exceeding 10 acre-feet per year, a party must submit an application to DNRC for a "Permit to Appropriate Water" before developing the well. There are no controlled groundwater areas within Cascade County (MDNRC, 2004).

State Water Reservations: The Water Use Act of 1973 authorized state and federal agencies to apply to the DNRC to acquire a state water reservation for existing or future beneficial uses. With regard to the study area, water reservations were granted on the Missouri River above Fort Peck Dam on July 1, 1992, and have a priority date of July 1, 1985.

Water Leases: The Department of Fish, Wildlife & Parks is authorized to lease water on a temporary basis for the purpose of maintaining or enhancing streamflows.

Montana has closed some of its river basins to certain types of new water appropriations because of water availability problems, water quality issues, and a concern for protecting existing water rights. There are several types of basin closures, including: controlled groundwater areas, petitioned surface water basins closed by administrative rule, DNRC ordered closures (Milk River), Compact closures, and Legislative closures. Included in the legislative closures is the drainage area of the Missouri River and its tributaries above Morony Dam in the Upper Missouri River Basin, which the Great Falls area is located within. Since April 16, 1993, this basin is closed to certain new appropriations of water until final decrees have been issued for all of the sub-basins of the Upper Missouri River basin (MDNRC, 2004).

3.2.6 GROUNDWATER

The Great Falls area has ample groundwater resources, and the depth to water varies depending on the aquifer used as a source of water (Figure 3-8). The shallow alluvial aquifer contains water that is generally is less than 100 feet (30 m). This aquifer does not appear to be present beneath the Salem site based on geotechnical soil borings and local well logs.

The Kootenai Formation is the most commonly used aquifer in the area. The aquifer is used mostly for domestic purposes and public water supply, and is recharged by snow pack and runoff

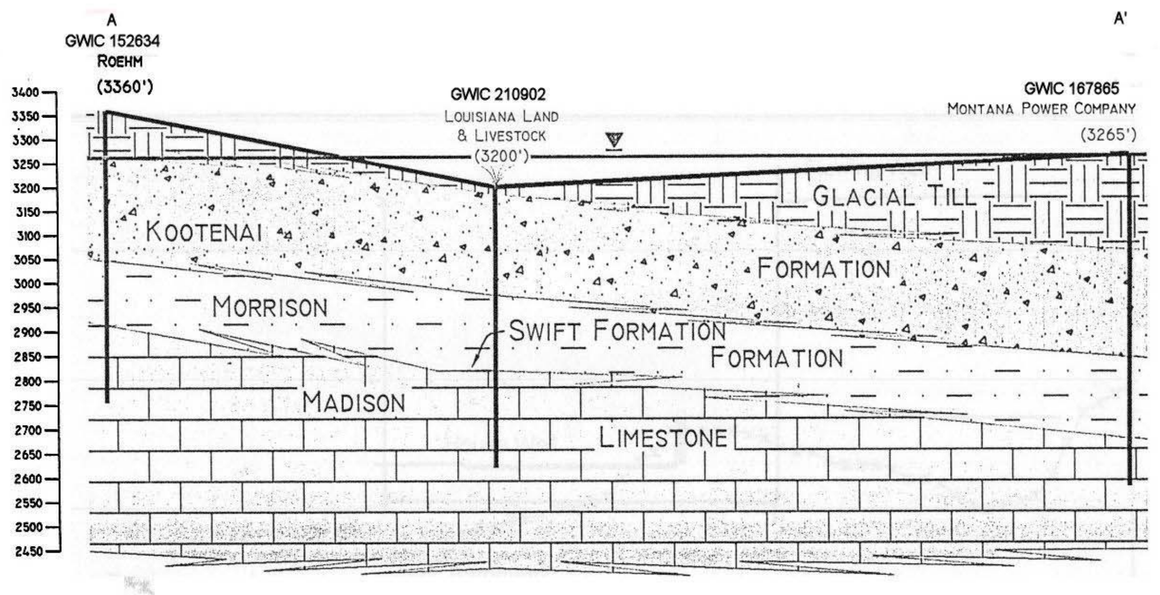


Figure 3-8. Geologic Cross-Section in Vicinity of the Salem Site
Source: PSBJ, 2006a

in streams. The thickness of the Kootenai Formation averages 200-250 feet (60-76 m). The upper portion of the Kootenai Formation consists primarily of mudstone with some claystone and siltstone. The lower portion of the Kootenai is characterized by sandstone and siltstone. The productive portion of the formation is normally found in these rocks. Estimated average hydraulic conductivity of this aquifer is 182 ft/day. The predominant groundwater flow within the aquifer is towards the Missouri River (Figure 3-9) (PBSJ, 2006a).

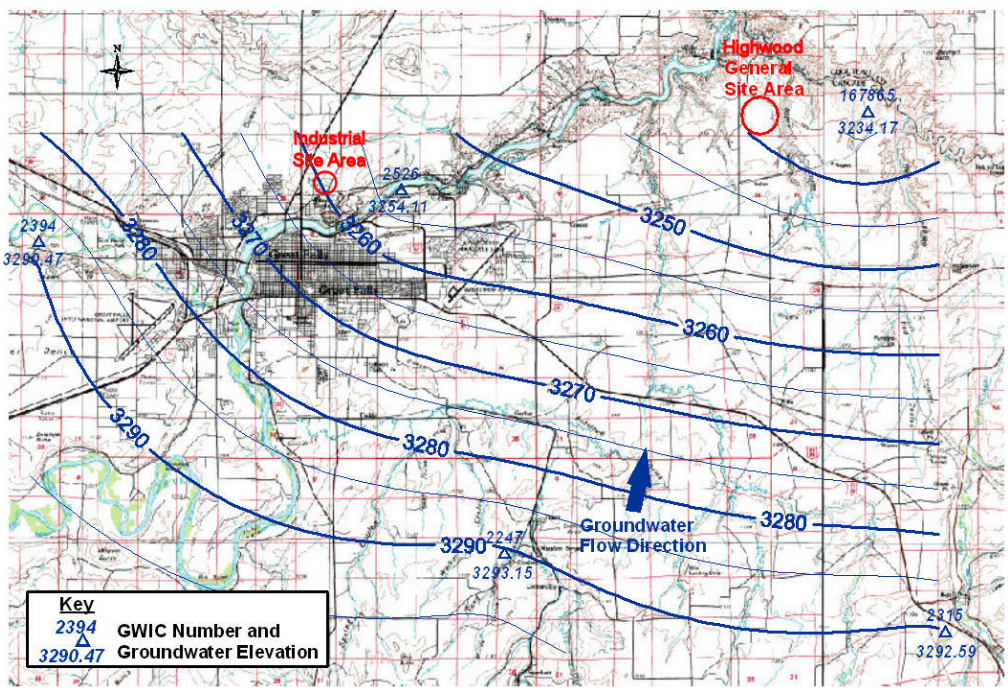


Figure 3-9. Kootenai Formation Groundwater Elevation Contours

Below the Kootenai Formation is the Morrison Formation of Jurassic Age. It is about 100-200 feet thick (30-60 m). The Morrison sediments consist of intercalated sandstone and shale beds. It is the confining unit for the underlying Madison Formation. The Morrison is not a water producing formation in the Great Falls area (PBSJ, 2006a).

The second most commonly used aquifer in the area is the Madison limestone aquifer. This aquifer is used mostly for domestic purposes and public water supply, and, like the Kootenai Formation aquifer, is recharged by snow pack and runoff in streams. The Little Belt Mountains are the recharge area for the Madison limestone aquifer. The thickness of the Madison aquifer averages 500 feet (150 m). The Madison aquifer is a confined aquifer in the vicinity of Great Falls. Estimated average hydraulic conductivity of this aquifer is 321 ft/day. The predominant groundwater flow direction within the water table aquifer is towards the Missouri River; specifically, in the areas south of the river the direction of groundwater flow is to the north-northeast (Figure 3-10) (PBSJ, 2006a).

The quality of the groundwater is generally good in the Great Falls vicinity, with the exception of a few water quality parameters. Elevated concentrations of sulfate, manganese, and cadmium, were measured in the alluvium, Kootenai, and Morrison formations. If the alluvial samples are ignored, then the data seem to indicate a logical progression and evolution of water quality with residence time and with depth/source rock type. Total dissolved solids (TDS), sulfate, hardness and bicarbonate/alkalinity increase from the shallow noncarbonate rocks (Kootenai) to the Morrison and then to the deeper carbonate rocks in the Madison. All of these waters are moderately to extremely hard (PBSJ, 2006a).

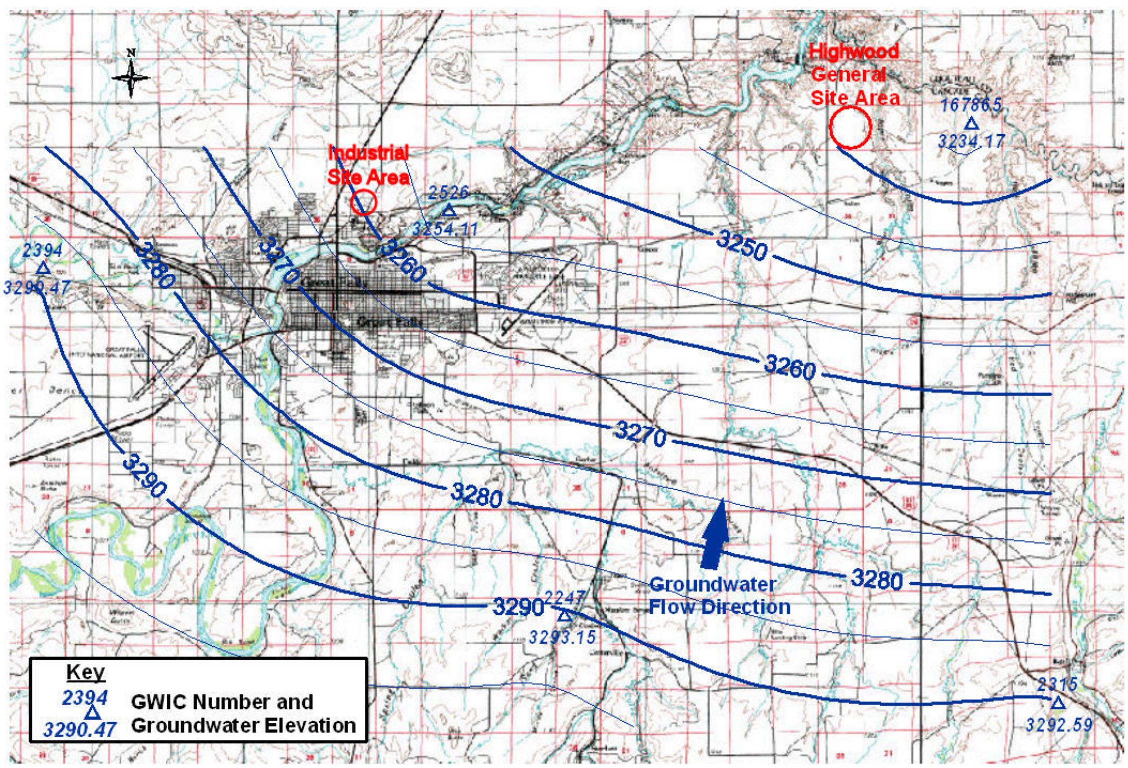


Figure 3-10. Madison Limestone Groundwater Elevation Contours

3.2.7 WATER UTILITIES

Incorporated areas of the City of Great Falls, including residents of Great Falls, Malmstrom Air Force Base and Black Eagle, are serviced by the City's Public Works Utility Branch, which operates water and wastewater treatment plants. Great Falls is classified as a medium (between 50,000 and 100,000 people served) surface water community public supply. Public drinking (potable) water is treated surface water from the Missouri River. The water treatment facility providing potable water to the city is located on the east bank of the Missouri just upstream from its confluence with the Sun River in Great Falls (GFWU, 2005). The public drinking water supply treated at the Great Falls plant meets all federal and state requirements and reported no violations, exemptions, or variations in water quality in 2004 (GFWU, 2005).

Wastewater generated within Great Falls is treated at the city's wastewater treatment facility, located on the north, or west, bank of the Missouri River. Powerful pump stations are located on the south side of the river and pump sewage from the city and other areas across the river to the facility. Veolia Water of North America is contracted by the city to manage and operate the treatment facility. The facility has a capacity to treat up to 21 million gallons per day (mgd) of wastewater, though it currently receives approximately 9 mgd (Jacobson, 2006a).

It is the policy of the City of Great Falls that city services, including water and sewer, are not available to non-annexed/non-incorporated land. Unincorporated areas of Cascade County, including both residences and industries located outside of the city, are thus not eligible to hook up to city lines and generally have wells or cisterns for potable water and septic or lagoon treatment systems for the disposal of wastewater (Walters, 2006).

3.2.8 SALEM SITE – SURFACE WATERSHEDS/AQUATIC FEATURES

The Salem site is located within the Upper Missouri River Basin and the Missouri-Sun-Smith River Sub-Basin. The Missouri-Sun-Smith River Sub-Basin consists of five watersheds that all drain into the Missouri River. The Salem site is located in two of these watersheds. The western majority of the site is located within the Upper Missouri-Dearborn watershed while the eastern portion of the site is located within the northwestern most tip of the Belt watershed (Figure 3-8).

Belt Creek is the primary drainage stream located within the Belt watershed, and it is a direct tributary to the Missouri. It joins the Missouri just downstream of the Salem site, approximately 15 river miles (24 km) northeast of Great Falls.

There are several intermittent streams in the vicinity of the Salem site. To the east, drainage from the site would flow into Rogers Coulee, a drainage channel which connects with Belt Creek just northeast of the site. To the west of the site, and located immediately west of Salem Road, there are several unnamed drainage channels with intermittent flows to the Missouri River. Both Rogers Coulee and the drainages discussed above are dry the majority of the year and contain flowing water only during major overland runoff events. Box Elder Creek is the first named tributary of the river located on the west side of the site. Surface water flows in a north to northeast direction throughout this area, into the Missouri River.

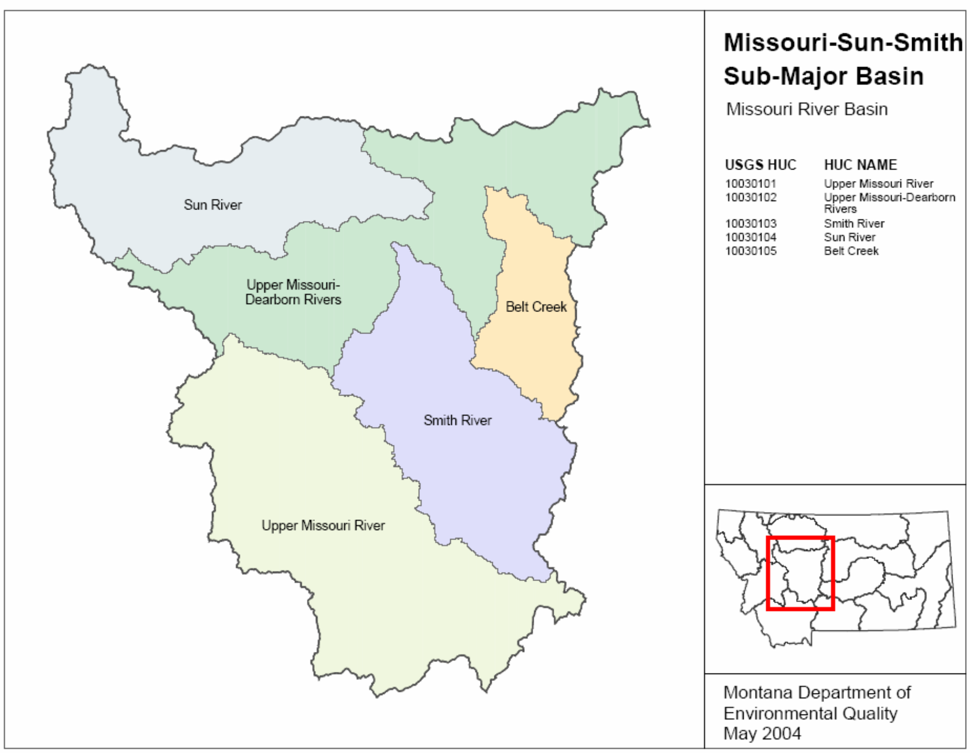
Lacustrine limnetic wetlands are associated with the unnamed tributaries and the Missouri River northwest of the site, where the raw water intake corridor would be located in the Morony pool, immediately upstream from the Morony dam.

Lacustrine limnetic wetlands have the following characteristics: they are (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30 percent areal coverage; and (3) total area exceeds 20 acres (8 ha). Similar wetland and deepwater habitats totaling less than 8 ha are also included in the lacustrine system if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 6.6 feet (2 m) at low water.

Lacustrine system wetlands are bounded by upland or by wetland dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. Lacustrine systems formed by damming a river channel are bounded by a contour approximating the normal spillway elevation or normal pool elevation. Where a river enters a lake, the extension of the lacustrine shoreline forms the riverine-lacustrine boundary (USGS, 1998).

Figure 3-12, on the page following Figure 3-11, depicts the principal aquatic and hydrologic features in the vicinity of the proposed Salem site. As discussed above, the only flowing streams in the vicinity of the site are Belt and Box Elder Creeks. The remaining drainages are intermittent, that is, dry during most of the year and containing flowing water only during overland runoff events. According to the reconnaissance-level USFWS National Wetlands Inventory, five small, isolated palustrine emergent wetlands occur on the site. These are not "jurisdictional wetlands" under current interpretation of Section 404 of the Clean Water Act.

Figure 3-11. Watersheds in the Project Area



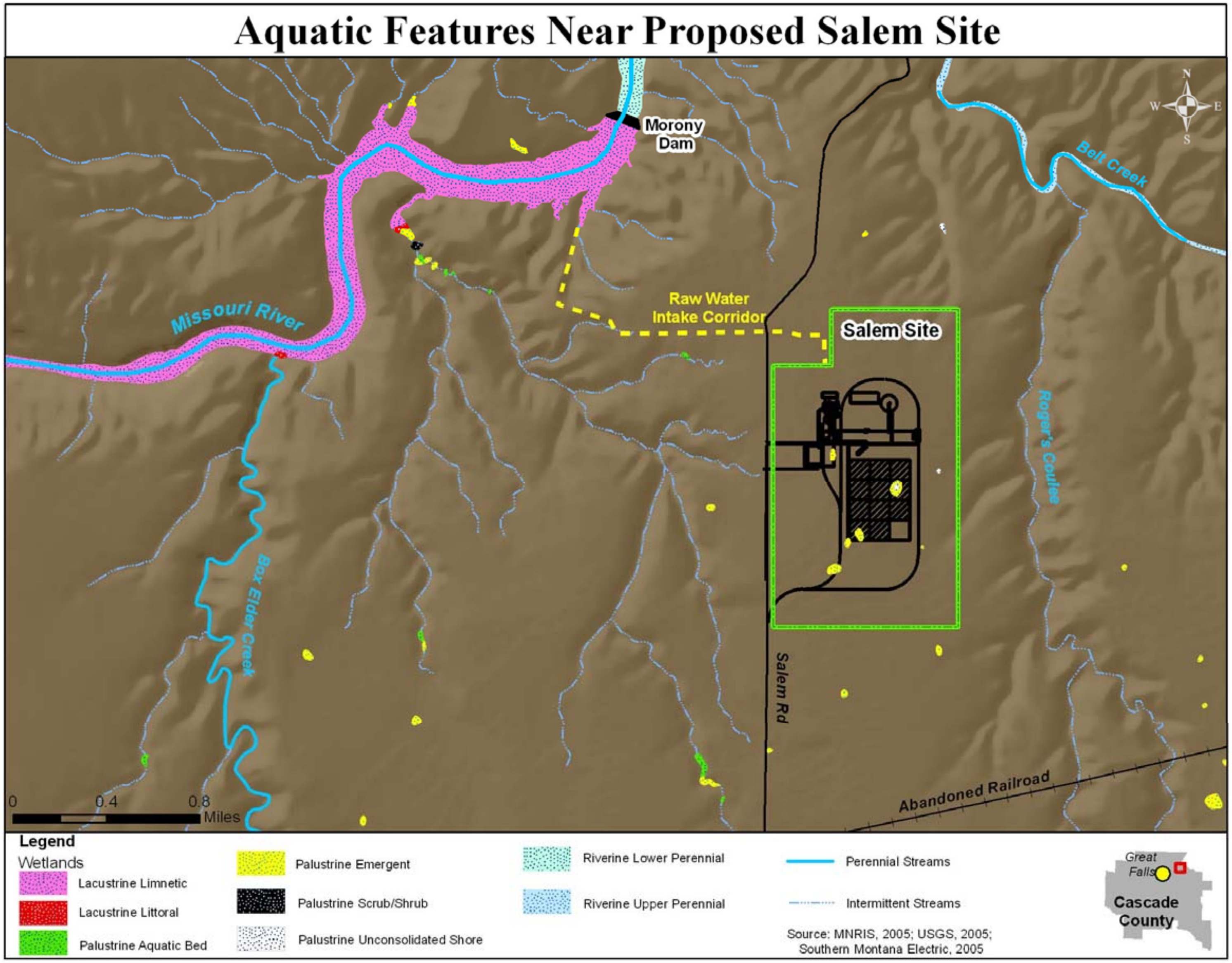


Figure 3-12. Aquatic Features of the Salem Site and Environs

3.2.9 INDUSTRIAL PARK SITE – SURFACE WATERSHEDS/AQUATIC FEATURES

The Industrial Park site also is located within the Upper Missouri River Basin and the Missouri-Sun-Smith River Sub-Basin. The site is located entirely within the Upper Missouri-Dearborn watershed.

Several unnamed drainages to the Missouri River are located immediately south and east of the site, and surface water flows in a south to southeast direction throughout this area, into the Missouri River. Lacustrine limnetic, lacustrine littoral, and riverine upper perennial wetlands are associated with the Missouri River, south and southeast of the site. A palustrine emergent wetland is located north-northwest of the site.

Lacustrine limnetic wetlands are associated with deep water while lacustrine litoral wetlands are shallow, extending from the shoreward boundary of the system to a maximum depth of 6.6 feet (2 m) below low water or to the maximum extent of nonpersistent emergents, if these grow at depths greater than 6.6 feet (2 m) (USGS, 1998).

Riverine perennial wetlands include all wetlands and deepwater habitats contained within a channel, provided they are not dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. Riverine wetlands often are immediately bounded on the landward side by upland or by the channel bank. Water flows consistently in these wetlands, and the water gradient is high and velocity of the water fast. The natural dissolved oxygen concentration is normally near saturation. The fauna is characteristic of running water, and there are few or no planktonic forms. The gradient is high compared with that of the lower perennial subsystem, and there is very little floodplain development.

Finally, palustrine emergent wetlands are nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens. It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 ha (20 acres); (2) active wave-formed or bedrock shoreline features lacking; (3) water depth in the deepest part of basin less than 2 m at low water; and (4) salinity due to ocean-derived salts less than 0.5 percent. Palustrine wetlands often are bounded by uplands, and their system of classification was developed to group the vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen, and wet prairie, which are found throughout the United States. It also includes the small, shallow, permanent or intermittent water bodies often called ponds.

Figure 3-13 on the next page shows the primary aquatic and hydrological features of the landscape in the vicinity of the Industrial Park site. While the alternate power plant site is comprised almost entirely of upland habitats, it is within one mile (1.6 km) of the Missouri River itself; other hydrological features are still closer.

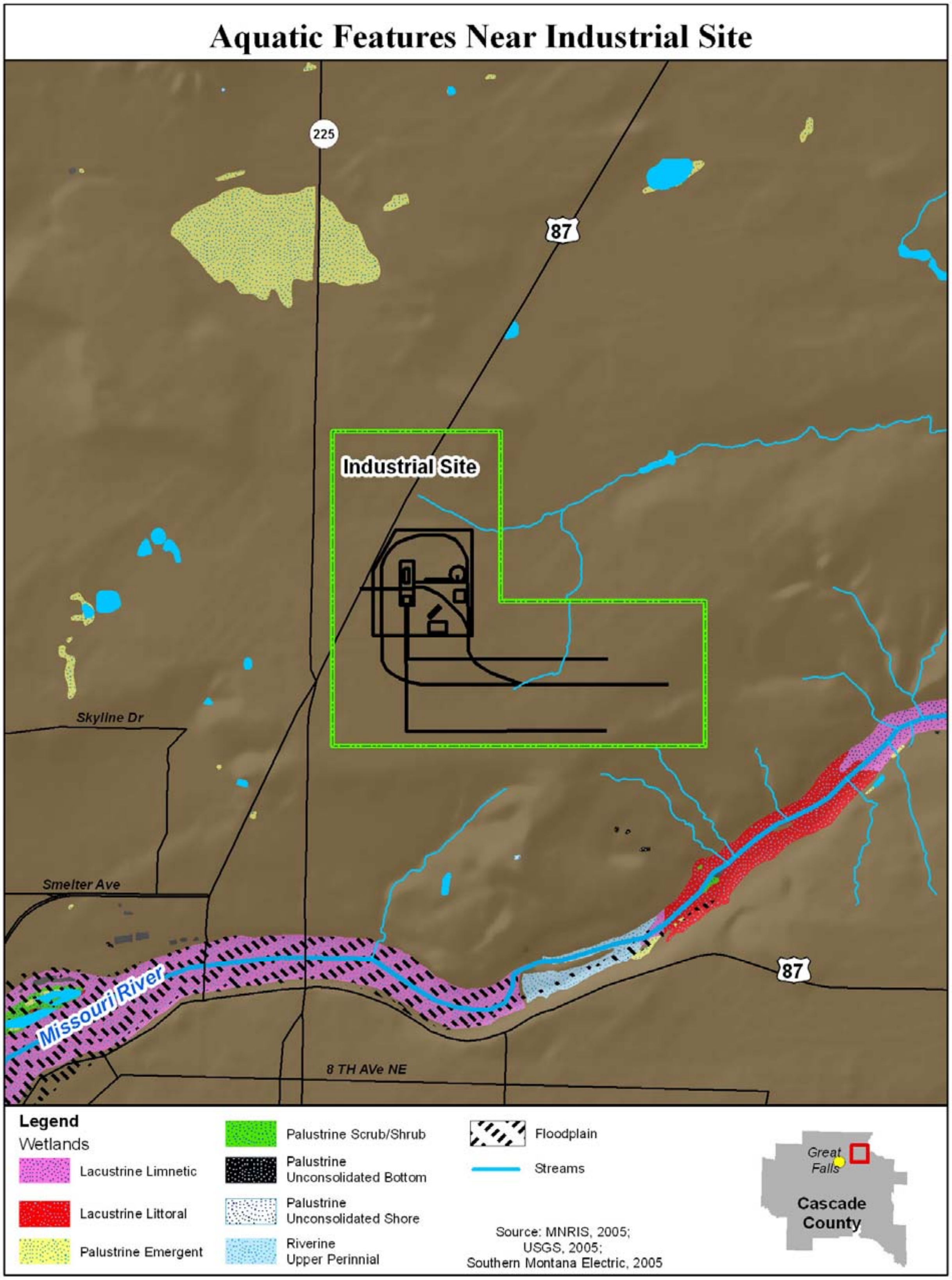


Figure 3-13. Aquatic Features of the Industrial Park Site and Environs

3.3 AIR QUALITY

3.3.1 LOCAL METEOROLOGY

Temperature and precipitation data for the project area were obtained from the Western Regional Climate Center (WRCC, 2006). These data include mean temperature and precipitation levels by month from 1971 through 2000. This 30-year period is the current standard for identifying long-term average temperature and precipitation levels in the United States.

Temperature and precipitation data were collected at the National Weather Service (NWS) station at the Great Falls airport. Precipitation data were also collected by the National Oceanic Atmospheric Administration (NOAA) Cooperative Observer Network at Highwood. The NOAA observers collect daily precipitation data, which are used to develop monthly normals. Temperature and precipitation data for Great Falls and Highwood are shown in Table 3-2.

Table 3-2. Great Falls and Highwood Temperature and Precipitation Summary/ Period of Record: 1971-2000

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Ann.
Great Falls Airport Temperature (degrees F)													
Max	32.1	37.7	45.3	55.6	64.7	77.5	82.0	81.2	69.6	58.0	42.1	34.2	56.4
Min	11.3	15.1	21.5	29.7	38.3	46.0	50.4	49.9	41.2	33.0	22.5	14.4	31.1
Mean	21.7	26.4	33.4	42.6	51.5	60.0	66.2	65.6	55.4	45.5	32.3	24.3	43.7
Great Falls Airport Precipitation (inches)													
Max	1.68	1.21	2.09	4.63	5.20	5.18	4.68	4.90	3.23	3.43	1.44	1.92	5.20
Min	0.05	0.15	0.10	0.05	0.69	0.54	0.05	0.12	0.09	0.02	0.18	0.03	0.02
Mean	0.68	0.51	1.01	1.40	2.53	2.24	1.45	1.65	1.23	0.93	0.59	0.67	14.89*
Highwood 7NE Precipitation (inches)													
Mean	0.62	0.46	1.10	1.69	3.09	3.27	2.01	1.61	1.58	1.16	0.69	0.70	17.97*

Note: Total Annual Precipitation*
Source: WRCC, 2004

Wind conditions in the project area were determined from data collected by the National Weather Service (NWS) at the Great Falls airport. Figure 3-14 shows a wind rose depicting the wind patterns at the Great Falls airport for the years 1987-1991, the data period used for air dispersion modeling. The Great Falls wind rose shows dominant winds from the southwest with the highest wind velocities from that direction as well. The site only reported 1.21 percent calm winds.

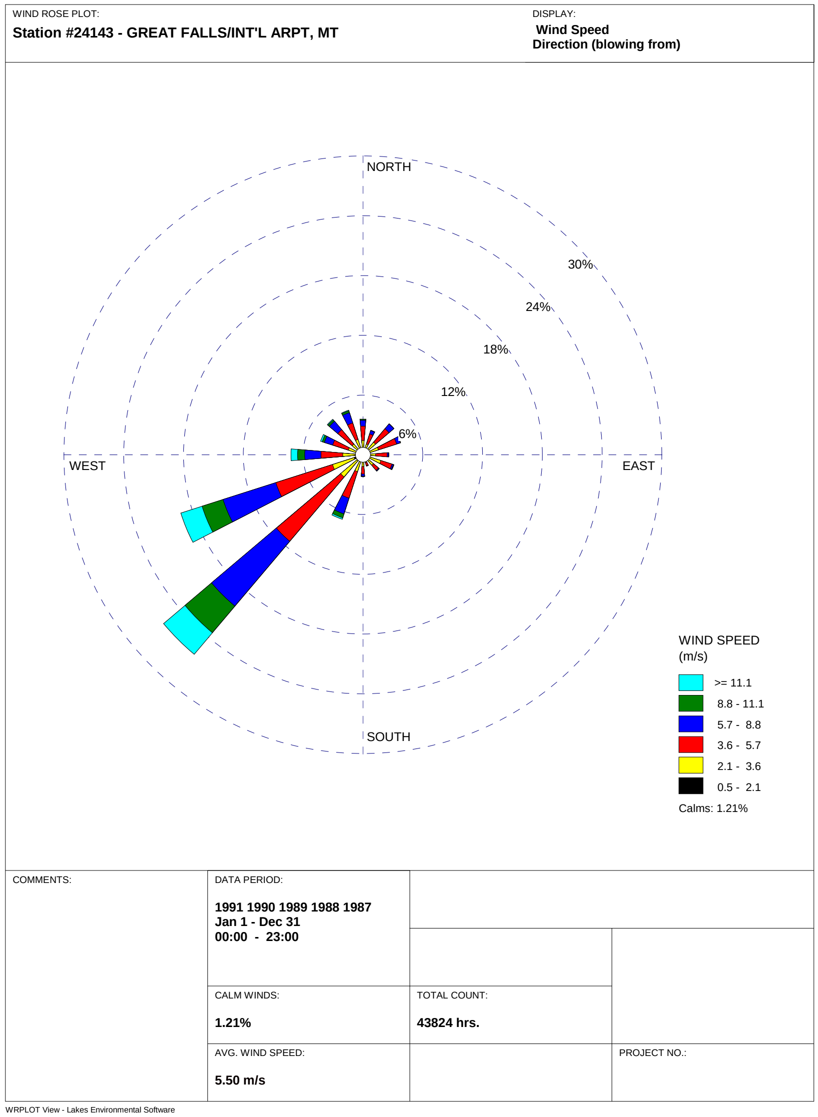


Figure 3-14. Great Falls NWS Station Wind Rose

3.3.2 TERMINOLOGY AND FEDERAL/STATE REGULATION OF AIR POLLUTANTS

Under the Federal Clean Air Act (CAA), as amended in 1970, 1977, and 1990, the United States Environmental Protection Agency (EPA) established primary standards to protect human health with an adequate margin of safety by setting maximum ambient air concentrations for seven threshold-value pollutants, or criteria pollutants (de Nevers, 2000). The six criteria pollutants, described below, are carbon monoxide (CO), ozone (O_3), nitrogen oxides (NOx), sulfur dioxide (SO_2), lead (Pb) and particulate matter (PM). NOx is composed primarily of nitric oxide (NO) and nitrogen dioxide (NO_2) with lesser amounts of NO_3, N_2O, N_2O_3, N_2O_4 and N_2O_5. PM is regulated as PM_{10} (particulate matter less than 10 microns in equivalent aerodynamic diameter [diameter]) and $PM_{2.5}$ (particulate matter less than 2.5 microns in diameter).

Micron or Micrometer

The micron or micrometer is a unit of length in the metric system equal to one-thousandth (10^{-3}) of a millimeter or one-millionth (10^{-6}) of a meter. The abbreviation of the micron is µm.

PM is a mixture of small solid and liquid particles that are suspended in the atmosphere. Smoke and fly ash contain PM in a wide range of sizes, from 0.05 to 200 µm in diameter. As a basis of comparison, the width of a human hair ranges between 20 and 100 µm. PM is released through factory and utility smokestacks, vehicle exhaust, wood burning, construction activity, agriculture, and natural sources like volcanoes. PM also can form in the atmosphere when oxidized sulfur or nitrogen reacts to form aerosol particles. Such aerosols are called secondary fine particles, adding to PM levels in the atmosphere (DOE, 2003b). PM is regulated based on its size, with $PM_{2.5}$ regulated separately from PM_{10}. $PM_{2.5}$ particles, which can be carried much farther and higher than larger particles (like PM_{10}), are more likely to carry heavy metals and cancer-causing organic compounds into the alveoli, the deepest and most susceptible part of the lungs, and thus are more stringently regulated (Davis and Cornwell, 1998).

CO is a colorless, odorless gas formed during combustion. CO is a product of incomplete combustion of carbon and is emitted during nearly all combustion activities. CO reacts with hemoglobin in the blood to form carboxyhemoglobin, effectively depriving the body of oxygen. Oxygen deprivation impairs perception and thinking, slows reflexes and causes drowsiness. Prolonged exposure to high levels of CO, particularly in those who have heart and circulatory ailments, can cause unconsciousness or even death.

Nitrogen oxides are formed during combustion, either by the oxidation of nitrogen in fuel or by the reaction of atmospheric nitrogen (typical air content is about 80 percent nitrogen or N_2) and oxygen (O_2) in the high temperatures of combustion. A small portion of NOx from combustion is emitted as NO_2. Most NOx emissions from combustion are NO, some of which eventually oxides to NO_2 in the ambient air. State and federal ambient air quality standards for NOx are based on NO_2.

Nitrogen oxides are one of the precursors to acid rain. Over time, NO in the atmosphere can react with water (H_2O) to form nitric acid (HNO_3). Nitric acid can form fine particles that remain suspended in the air or fall to the earth in the form of rain, snow, or fog. Acid rain (sometimes called acid precipitation or deposition) can cause soils, lakes and streams to become acidic, adversely affecting the ecosystem. Additionally, acid rain causes deterioration of cars, buildings, and irreplaceable historic monuments.

Nitrogen oxides also contribute to PM concentrations in the atmosphere, as NO_x particles react with ammonia, moisture, and related particles. Exposure to nitrogen oxides also can result in coughing and irritation of the respiratory tract, or in more severe cases, in difficulty breathing, damage to lung tissue, or premature death (EPA, 2003a). Nitrous oxide (N_2O) is also a potent greenhouse gas. Greenhouse gases are discussed further in Section 3.3.6.

SO_2 is formed through the oxidation of bound sulfur found in all organic fuels used by humans, including oil, coal, natural gas, peat, and wood. Sulfur dioxide also is released from volcanoes and decaying plants. As with nitrogen oxides, sulfur dioxide is a precursor to acid rain. Oxidized sulfur reacts with H_2O to form sulfuric acid (H_2SO_4). Sulfuric acid then falls to the earth in the form of rain, snow, or fog. SO_2 also reacts with other atmospheric chemicals to form tiny sulfate particles, which contribute to PM concentrations. Such particles can gather in the lungs and cause respiratory symptoms and disease, difficulty in breathing, and premature death (EPA, 2003b). Furthermore, these aerosols are a major cause of the visibility impairment that interferes with views of scenery in national parks and mountain ranges like the Appalachians.

O_3 is a strong photochemical oxidant that is formed when NO reacts with volatile organic compounds (VOC's, also referred to as hydrocarbons (HC)) and oxygen in the presence of sunlight. Ozone is considered a secondary pollutant because it is not directly emitted from pollution sources but is formed in the ambient air.

Ozone exposure can lead to eye irritation at concentrations above 0.1 parts per million (ppm). Coughing and chest discomfort are caused at concentrations of 0.3 ppm (Davis and Cornwell, 1998). Ozone impairs lung function and reduces resistance to colds and diseases such as pneumonia. Ozone plays a role in bronchitis, emphysema, asthma, and heart disease (NDEQ, 2002). With long-term exposure, ozone may cause permanent lung damage. In addition, high levels of ozone have been documented to damage certain trees, plants, and crops.

Additional Air Quality Concerns

In addition to the six criteria pollutants outlined in the CAA, several other substances raise concerns with regard to air quality. Four of these elements and chemical compounds are briefly discussed below:

Mercury (Hg)

A toxic heavy metal that is a byproduct of the combustion of fossil fuels, especially coal. Mercury can accumulate in the environment and is highly toxic to humans and animals if inhaled or swallowed. Exposure can permanently damage the brain, kidneys, and fetuses (EPA, 2003d).

Carbon Dioxide (CO_2)

Burning fossil fuels releases carbon that has been stored underground for tens of millions of years into the atmosphere in the form of carbon dioxide, the dominant gas contributing to an enhanced greenhouse effect. Equilibrium in the natural carbon cycle is disrupted when large amounts of carbon dioxide are released to the atmosphere by human activities, such as the burning of fossil fuels (EPA, 2003d).

Methane (CH_4)

Methane (CH_4) also is a greenhouse gas that traps heat in the atmosphere. A molecule of methane is estimated to be 21 times more potent as a greenhouse gas than a molecule of carbon dioxide. Over the last two centuries, methane's concentration in the atmosphere has more than doubled due to increasing methane emissions from human activities, including placing municipal solid waste in landfills, producing natural gas and petroleum, mining coal, burning fossil fuels, and as a byproduct of large scale cattle and domestic animal operations (EPA, 2003d).

Volatile Organic Compounds (VOCs)

Also known as hydrocarbons, VOCs are liquids or solids that contain organic carbon, and that readily vaporize. VOCs participate in the smog reaction and also contribute to the formation of secondary pollutants in the atmosphere, including ozone. Some VOCs are toxic and carcinogenic (most are not), while some add to global warming (de Nevers, 2000).

Lead (Pb) is a highly toxic metal that is emitted by industrial processes (including smelters and power plants) and resides in the atmosphere as particulate matter. Pb affects the brain, nerves, heart, and blood, and can lead to seizures, mental retardation, behavioral disorders, memory problems, kidney and liver damage, heart disease, anemia and mood changes. Infants and young children are especially vulnerable to lead exposure (EPA 2003c).

Table 3-3 lists the health and environmental effects of criteria pollutants in more detail.

Regulation of Criteria Pollutants

The Clean Air Act gives the states (e.g. Montana) the primary authority to manage their air quality resources. However, to ensure a certain amount of consistency from state to state, EPA requires air pollution control agencies to develop control plans based on broad Federal statutes and regulations. The overall control strategy is called the State Implementation Plan (SIP), which includes, among other programs, orders, and control plans, the Montana Air Quality Permitting Program under ARM 17.8701 *et seq.* and the major New Source Review (NSR) Permitting Program, under ARM 17.8.801 *et seq.* and 17.8.901-906. The Montana Clean Air Act (75-2-101 *et seq.*, MCA) provides the means through which the federal CAA is implemented in Montana. Pursuant to the Montana CAA, an air quality permit is required from DEQ for the construction, installation, alteration, or use of equipment of facilities that may cause or contribute to air pollution. Section 4.5.2.2.1 discusses the regulatory requirements in greater detail. Appendix I contains the DEQ's supplemental preliminary determination on the air quality permit for SME-HGS (DEQ, 2006a), which is subject to public comment along with the DEIS.

State Implementation Plan

Section 110 of the Clean Air Act requires state and local air pollution control agencies to adopt federally approved control strategies to minimize air pollution. The resulting body of regulations is known as a State Implementation Plan (SIP). SIPs generally establish limits or work practice standards to minimize emissions of the criteria air pollutants or their precursors. The Proposed Action must meet the requirements of the Montana SIP.

New Source Review Permitting Program

Congress established the NSR permitting program as part of the 1977 Clean Air Act Amendments. NSR is a preconstruction permitting program that serves two important purposes:

- First, it ensures that air quality is not significantly degraded from the addition of new and modified factories, industrial boilers and power plants. In areas with unhealthy air, NSR assures that new emissions do not slow progress toward cleaner air. In areas with clean air, especially pristine areas like national parks, NSR assures that new emissions do not significantly worsen air quality.

- Second, the NSR program assures people that any large new or modified industrial source in their neighborhoods will be as clean as possible, and that advances in pollution control occur concurrently with industrial expansion.

Table 3-3. General Sources and Health/Environmental Effects of Criteria Pollutants

Pollutant	Description	Sources	Effects
Carbon Monoxide (CO)	An odorless, tasteless, colorless gas which is emitted primarily from any form of combustion	Carbon black manufacture Refineries Oil and gas liquids Mobile sources Other combustion sources Open burning	Deprives the body of oxygen by reducing the blood's capacity to carry oxygen, causes head-aches, dizziness, nausea, listlessness, and in high doses, death
Ozone (O_3)	A toxic gas associated with photochemical smog, formed when nitrogen oxides (NO_x) and volatile organic com-pounds (VOCs) react together in the presence of sunlight and warm temperatures	VOCs and NO_x from: -Fossil fuel power plants -Refineries -Natural gas transmission -Chemical manufacture -Mobile sources (i.e. vehicle tailpipe exhaust)	Irritates eyes, nose, throat and respiratory system; especially bad for those with chronic heart and lung disease, as well as the very young, old, and pregnant women
Particulate Matter (PM_{10} and $PM_{2.5}$)	Respirable particles less than 10 µm and 2.5 µm (microns) in size	Paper industry Fugitive dust Construction activities Fossil fuel power plants Other combustion sources Open burning	Aggravates ailments such as bronchitis and emphysema, especially bad for those with chronic heart and lung disease, as well as the very old, young, and pregnant women
Sulfur Dioxide (SO_2)	A pungent, colorless gas that combines with water vapor to become sulfurous acid, a mildly corrosive compound; when sulfurous acid combines with oxygen, it produces sulfuric acid (H2SO4), a very corrosive and irritating chemical	Inorganic chemical manufacture Refineries Calciners Fossil fuel power plants	Increases risk of adverse reactions in asthmatic patients, irritates respira-tory system; harmful to plants; dissolves stone and corrodes iron and steel; causes "acid rain" which harms water bodies and aquatic life
Nitrogen Dioxide (NO_2)	A poisonous gas produced when nitrogen oxide is a byproduct of sufficiently high- temperature combustion	Combustion processes: -Fossil fuel power plants -Motor vehicles -Industry -Fertilizer manufacturing -Oil and gas development	Harmful to lungs; irritates bronchial and respiratory systems; increases symptoms in asthmatic patients; precursor to ozone
Lead (Pb)	A widely-used metal that may accumulate in the body	Secondary smelting and refining of nonferrous metals; Steel works Blast furnaces	Disturbs motor function and reflexes; impairs learning, causes intestinal disease, anemia, and damage to the central nervous system, kidneys, and brain; children most vulnerable

NSR permits are legal documents by which the facility owners/operators must abide. The permit specifies what construction is allowed, what emission limits must be met, and often how the emissions source must be operated. NSR requires stationary sources of air pollution to get permits before they start construction. NSR is also referred to as construction permitting or preconstruction permitting.

There are three types of NSR permitting requirements. A source may have to meet one or more of these permitting requirements. The three types of NSR requirements are:

1. Prevention of Significant Deterioration (PSD) permits which are required for new major sources or a major source making a major modification in an attainment area (ARM 17.8.801 *et seq.*).

2. Non-attainment NSR permits which are required for new major sources or major sources making a major modification in a non-attainment area (ARM 17.8.901-906); and

3. Minor source permits.

Hazardous Air Pollutants (HAPS)

HAPs, also known as air toxics, are those pollutants that are known or suspected to cause cancer or other serious health or environmental effects (EPA Toxics). HAPs are emitted in much lower quantities than the more common criteria air pollutants and are generally not found in the ambient environment in measurable amounts. EPA has identified 188 HAPs, which are included on the Hazardous Air Pollutants List (as defined in Section 112(b) of the CAA). The formation and emissions of HAPs from industrial sources are regulated through the National Emission Standards for Hazardous Air Pollutants (NESHAPs).

Section 112 of the Clean Air Act identifies and establishes the regulations of for HAPs. Until EPA's mercury regulations were finalized in 2005, reductions of mercury emissions from electric generating units were being addressed through the HAP regulations. Any new plant that could be a major source for mercury had to undergo a case-by-case technology review. This analysis was referred to as a 112(g) preconstruction approval and was implemented by state agencies like DEQ through federally-approved state rules.

The main HAPs emissions of concern from the proposed power plant are mercury (Hg), hydrogen chloride (HCl), hydrogen fluoride (HF), trace metals and radionuclides (including radon). DEQ performed Best Available Control Technology (BACT) analyses for these HAPs during the SME air quality permit application review.

3.3.3 Air Quality in Class II Areas

As mentioned in Section 3.3.2, for criteria air pollutants, air quality is described by the concentration of various pollutants in the atmosphere. The significance of a pollutant concentration is determined by comparing the concentration in the atmosphere to applicable national and/or state ambient air quality standards. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare with a reasonable margin of safety. The U.S. EPA has established the National Ambient Air Quality Standards (NAAQS) described above. The PSD permitting program establishes PSD Increments, which are maximum allowable increases in air contaminant concentrations. The Montana Board of Environmental Review has also established Montana Ambient Air Quality Standards (MAAQS). The NAAQS, MAAQS, and PSD Increments for criteria air pollutants are provided in Table 3-4.

Table 3-4. NAAQS, MAAQS, and PSD Increments

Pollutant	Averaging Period	NAAQS[1] (μg/m³)	MAAQS[2] (μg/m³)	PSD Class II Increment[3] (μg/m³)
PM_{10}	Annual	50	50	17
	24-hour	150	150	30
PM2.5	Annual	15	15	NA
	24-hour	65	65	NA
NO_2	Annual	100	94	25
	1-hour	-	564	
SO_2	Annual	80	52	20
	24-hour	365	262	91
	3-hour	1300	-	512
	1-hour	-	1300	
CO	8-hour	10,000	10,000	-
	1-hour	40,000	26,000	-
Ozone	1-hour	-	196	-
	8-hour	157	-	-
Pb	Quarterly	1.5	-	-
	90-day	-	1.5	-

[1] Code of Federal Regulations Title 40 Part 50.
[2] Administrative Rules of Montana (ARM) 17.8.201-230
[3] Administrative Rules of Montana (ARM) 17.8.804.

The NAAQS and MAAQS generally are defined as the maximum acceptable ground level concentrations that may be exceeded once per year, except that annual standards may never be exceeded and the 1-hour average MAAQS for SO_2 may not be exceeded more than 18 times in any consecutive 12 months.

The PSD Increments are pollutant-specific ambient air concentrations above an ambient air baseline concentration that may be exceeded once per year, except that annual standards may never be exceeded. The baseline concentration is defined for each pollutant and is the ambient concentration existing at the time that the first PSD application affecting an area is submitted.

The PSD program was established to prevent areas where the ambient air is currently in attainment with the NAAQS from degrading such that ambient air concentrations rise above the NAAQS. Attainment means that the maximum concentrations of the particular criteria pollutant in the area are less than the NAAQS. Nonattainment means that maximum concentrations of the particular criteria pollutant in the area are above the NAAQS. Nonattainment designations are further categorized as serious nonattainment and moderate nonattainment. At this time, the air quality classification for the Cascade County area is "Better than National Standards" or Unclassifiable/Attainment for the NAAQS (40 CFR 81.327).

Air pollutants of most concern in the Great Falls area are SO_2 and CO. The primary source of SO_2 emissions is the Montana Refining Company (MRC) petroleum refinery. Dispersion modeling performed on behalf of MRC has been used to identify an area of potential concern where MRC is required to operate an SO_2 ambient air quality monitor (DEQ, 2003a). Ambient CO monitors have measured elevated CO concentrations near major intersections in Great Falls in the past. CO data are still being collected in Great Falls near high traffic areas to ensure that the CO concentrations do not exceed ambient standards.

$PM_{2.5}$ data are being collected in most major population centers in Montana, including Great Falls. $PM_{2.5}$ monitoring began at Great Falls High School on January 1, 2000. This site is in a residential neighborhood near the city's center. Fine particulate is the pollutant most likely to accumulate and become troublesome during stagnant conditions so the values coming from this site provide an excellent measure of air quality in Great Falls (DEQ, 2003a).

Ambient air quality data collected in Great Falls have been reported to EPA and are listed in Table 3-5.

Table 3-5: Cascade County Monitoring Data

Pollutant	Avg. Period	Monitored Concentration ($\mu g/m^3$)	NAAQS	MAAQS
PM_{10} (1)	24-hr	23 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
	Annual	7 $\mu g/m^3$	50 $\mu g/m^3$	50 $\mu g/m^3$
$PM_{2.5}$ (2)	24-hr	12 $\mu g/m^3$	65 $\mu g/m^3$	65 $\mu g/m^3$
	Annual	4.5 $\mu g/m^3$	15 $\mu g/m^3$	15 $\mu g/m^3$
SO_2 (2)	24-hr	0.025 ppm	0.14 ppm	0.10 ppm
	Annual	0.003 ppm	0.03 ppm	0.02 ppm
CO (2)	1-hr	3.7 ppm	35 ppm	23 ppm
	8-hr	2.0 ppm	9 ppm	9 ppm

(1) PM_{10} Data Collected by SME at the Project Site in 2004/2005.
(2) USEPA, Air Data, County Air Quality Report, Criteria Air Pollutants. Accessed at www.epa.gov, May 11, 2006.

Existing air quality in Cascade County is impacted by existing industrial sources as well as area source activities such as vehicles, road dust, residential wood burning and agriculture. Table 3-6 contains a list of major industrial sources in the Great Falls area along with the reported 2004 emissions from existing sources and permitted allowable emissions from proposed sources.

Table 3-6. Six Cascade County Major Industrial Emissions Sources

Facility Name	Type of Source	Actual Emissions[1]	
Agri-technology Corporation	Ethanol Plant	CO – 122 tpy VOC – 96.2 tpy PM_{10} – 233 tpy	NO_x – 214 tpy SO_2 – 1.69 tpy
International Malting Company	Malting Plant	CO – 78.9 tpy VOC – 5.16 tpy PM_{10} – 56.3 tpy	NO_x – 69.2 tpy SO_2 – 37.1 tpy
Malmstrom Air Force Base	Heating Boilers	CO – 17.7 tpy VOC – 0.54 tpy PM_{10} – 1.27 tpy	NO_x – 28.0 tpy SO_2 – 37.1 tpy
Montana First Megawatts Plant	Proposed Gas-fired Power Plant	CO – 90.3 tpy VOC – 17.7 tpy PM_{10} – 98.9 tpy	NO_x – 98.2 tpy SO_2 – 6.14 tpy
Montana Refining Company	Petroleum Refinery	CO – 40.6 tpy VOC – 279 tpy PM_{10} – 13.0 tpy	NO_x – 190 tpy SO_2 – 782 tpy
Highwood Generating Station	Proposed Power Plant	CO – 1160 tpy VOC – 35.6 tpy PM_{10} – 422 tpy	NO_x – 847 tpy SO_2 – 443 tpy

Note: [1] 2004 Emission Reported to DEQ for Existing Sources. Permitted allowable emissions for proposed sources.
Source: Data compiled from DEQ records.

3.3.4 AIR QUALITY IN CLASS I AREAS

In accordance with applicable requirements of the federal CAA and the Administrative Rules of Montana (ARM), potential impacts on the PSD Class I increments in all Class I areas and Air Quality Related Values (AQRVs) in federal mandatory Class I areas are required to be assessed for PSD projects. Federal mandatory Class I Areas, as defined in the CAA, are national parks over 6,000 acres (2,428 ha), national wilderness areas and national memorial parks over 5,000 acres (2,023 ha), and international parks that were in existence as of August 7, 1977. Three Indian reservations in Montana have been redesignated as a Class I areas, but are not mandatory Class I areas. All of the Class I reservations are located outside the area that would be impacted by the Proposed Action. Table 3-7 documents the federal mandatory Class I areas within 250 km of the proposed project site and Figure 3-16 displays their location on a map of Montana.

AQRV's are resources, as identified by the Federal Land Managers (FLMs) for one or more federal mandatory Class I areas, which may be adversely affected by a change in air quality. The resource may include visibility or a specific scenic, cultural, physical, biological, ecological, or recreational resource identified by the FLMs for a particular area that is affected by air quality. While the sensitivity of an AQRV to air pollution may be known, the long term monitoring of its health or status may not have been accomplished. While the sensitivity of an AQRV to air pollution may be known, the long term monitoring of its health or status may not have been accomplished. Figures 3-15 and 3-17 are scenes from two of the Class I areas in Table 3-7.

Table 3-7. Federal Mandatory Class I Areas Considered

Class I Area	Distance from Proposed Site miles (km)
Gates of the Mountains Wilderness Area (GMW)	53 (86)
Scapegoat Wilderness Area (SGW)	73 (118)
Bob Marshall Wilderness Area (BMW)	80 (129)
Glacier National Park (GNP)	114 (184)
Mission Mountain Wilderness Area (MMW)	124 (199)
UL Bend Wilderness Area (ULBW)	134 (215)
Anaconda Pintler Wilderness Area (APW)	142 (228)

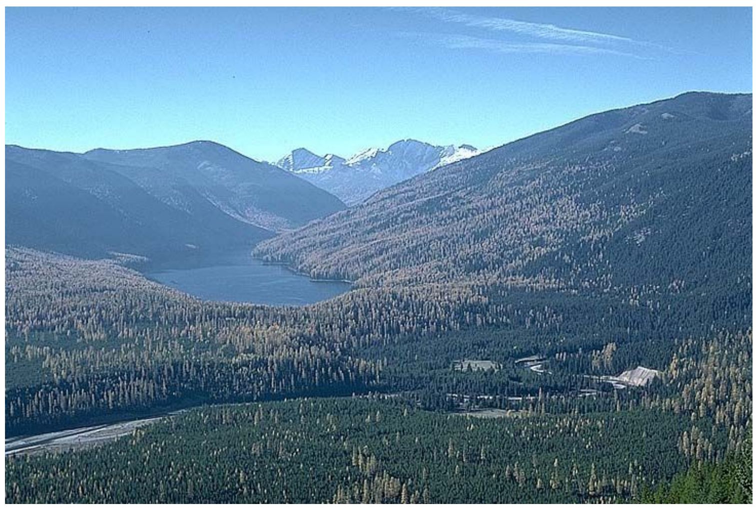


Figure 3-15. Class I Area: Big Salmon Lake in Bob Marshall Wilderness Area

The PSD Class I increments are defined as the maximum allowable increase in pollutants over baseline concentrations in Class I areas. The PSD Class I increment demonstration can be performed in a two-step process. In the first step, the highest modeled impacts from a proposal are compared to the EPA proposed Class I increment significance levels that were established as four percent of the corresponding Class I increments. If the impacts from a proposal are below the significance levels, the Class I increments demonstration is complete and no further analysis is necessary. If any significance levels for applicable pollutant(s) are exceeded, a cumulative impact analysis should be conducted for all averaging periods with modeling results that exceed the significance levels. The cumulative analysis should include impacts from the project and other PSD-major sources in the surrounding area that could impact the Class I area. Table 3-8 lists the EPA proposed Class I significance levels and the Class I PSD increments.

Under the regulations promulgated for visibility protection (40 CFR §51.301 301 and ARM 17.8.1101(3)) visibility impairment is defined as "…any humanly perceptible change in visibility (visual range, contrast, coloration) from that which would have existed under natural conditions." Visibility can be affected by plume impairment (heterogeneous, visual plume) or regional haze (homogeneous). Plume impairment results from a contrast or color difference between a plume and a viewed background such as the sky or a terrain feature. Plume

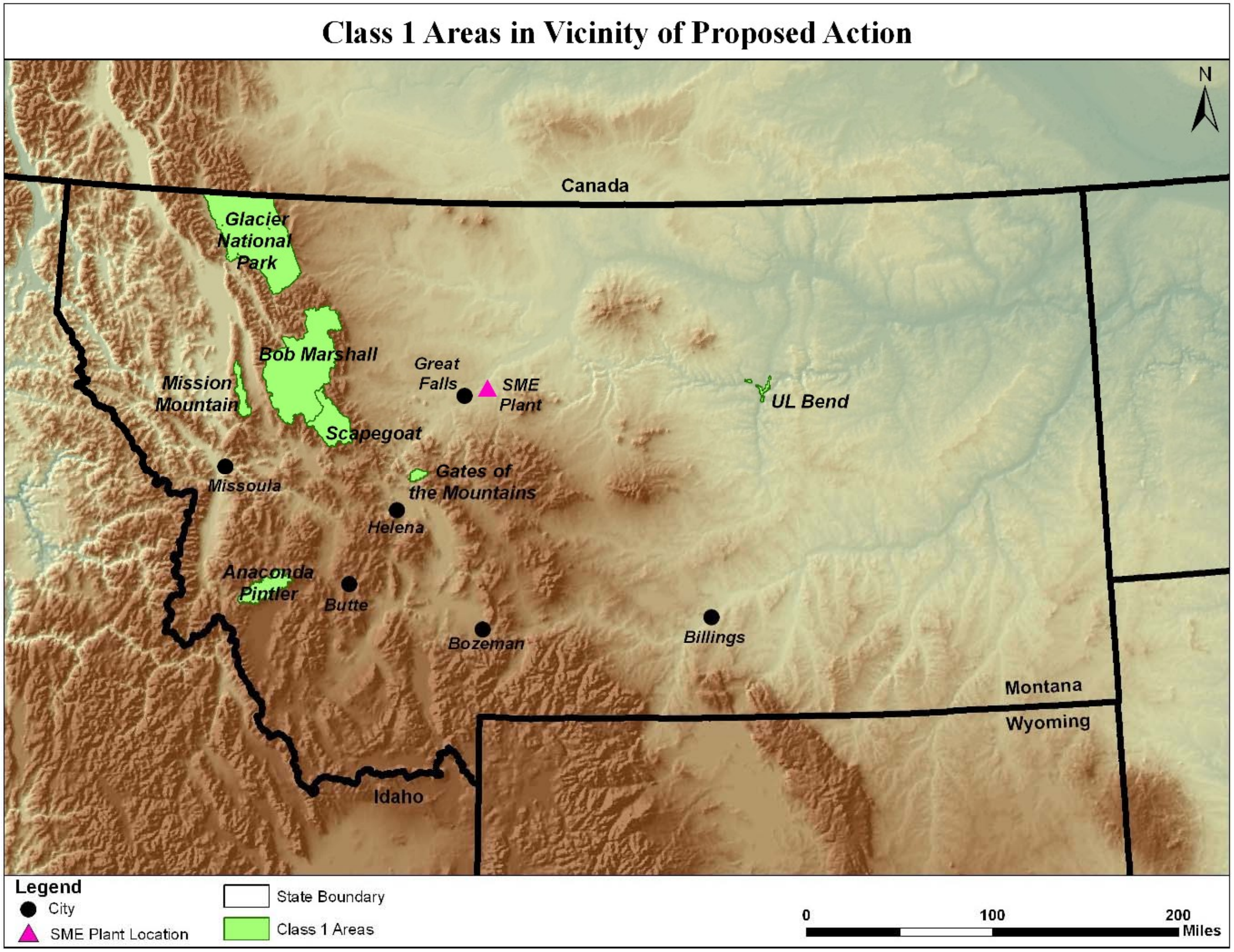


Figure 3-16. Federal Mandatory Class I Air Quality Areas Within 250 Km of the Proposed SME CFB Power Plant

Table 3-8. PSD Class I Significance Levels and Increments

Pollutant	Averaging Period	EPA Proposed Class I Significance Level (μg/m^3)	Class I Increment (μg/m^3)
Nitrogen Dioxide (NO_2)	Annual	0.1	2.5
Sulfur Dioxide (SO_2)	Annual	0.1	2
	24-hour	0.2	5[a]
	3-hour	1.0	25[a]
PM_{10}	Annual	0.2	4
	24-hour	0.3	8[a]

[a] Not to be exceeded more than once per calendar year

Figure 3-17. Class I Area: Glacier National Park's St. Mary Lake with Wild Goose Island

impairment is only a concern in cases where the federal mandatory Class I area is within a 50-kilometer (km) (31-mile) distance from the source, so that minimal dispersion of the plume occurs before reaching the Class I area.

Regional haze occurs at distances (over 50 km) where the plume has become evenly dispersed in the atmosphere and there is no definable plume. The primary causes of regional haze are sulfates and nitrates (primarily as ammonium salts), which are formed from SO_2 and NO_X through chemical reactions in the atmosphere. These reactions take time, such that near a source little NO_X or SO_2 will have formed nitrate or sulfate, whereas far from a source nearly all SO_2 will have formed sulfate and most NO_X will have formed nitrate.

For this proposed action, the evaluated AQRVs for the federal mandatory Class I areas within a 250-km radius of the proposed site include:

- Visibility – Visual Plume
- Visibility – Regional Haze
- Acid Deposition

Note that these AQRVs are not air quality standards for specific pollutants like the NAAQS. The fundamental methods and criteria for determining and interpreting impacts to federal mandatory Class I areas are set forth in several EPA and FLM documents, including –

- Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Report, December 1998 (IWAQM, 1998)
- FLMs' Air Quality Related Values Workgroup (FLAG) Phase I Report , December 2000 (FLAG, 2000)

- National Park Service (NPS) and U.S. Forest Service (USFS) guidance

EPA-approved dispersion models/programs are used to evaluate visibility and acid deposition impacts. The analyses use the FLM-established thresholds of visibility degradation measured in 24-hour light extinction change to evaluate source impacts to regional haze (far-field/multisource impacts), EPA-established criteria for visual plume impacts (near-field impacts), and the FLM-established annual Deposition Analysis Thresholds (DAT) for acid deposition.

Regional haze is measured using the light extinction coefficient (b_{ext}). The percentage change in the light extinction coefficient (Δb_{ext}) attributable to a particular project with respect to the background light extinction is used to determine the regional haze impacts from that project. The Δb_{ext} value attributable to a project that is generally considered to be acceptable is five percent on a 24-hour average basis. A predicted change in extinction between five percent and 10 percent may require a cumulative analysis that includes impacts from other nearby stationary sources.

It is important to note that the decision thresholds for AQRVs are not absolute. The FLM and DEQ are required to make a determination on a "…case-by-case basis taking into account the geographic extent, intensity, duration, frequency and time of visibility impairments…" (40 CFR §51.301 and ARM 17.8.1101(2)). However, the decision thresholds are useful as an initial benchmark for analysts to judge whether a proposed action would have an adverse impact on visibility and deposition and whether the FLM would be likely to object to a proposed action.

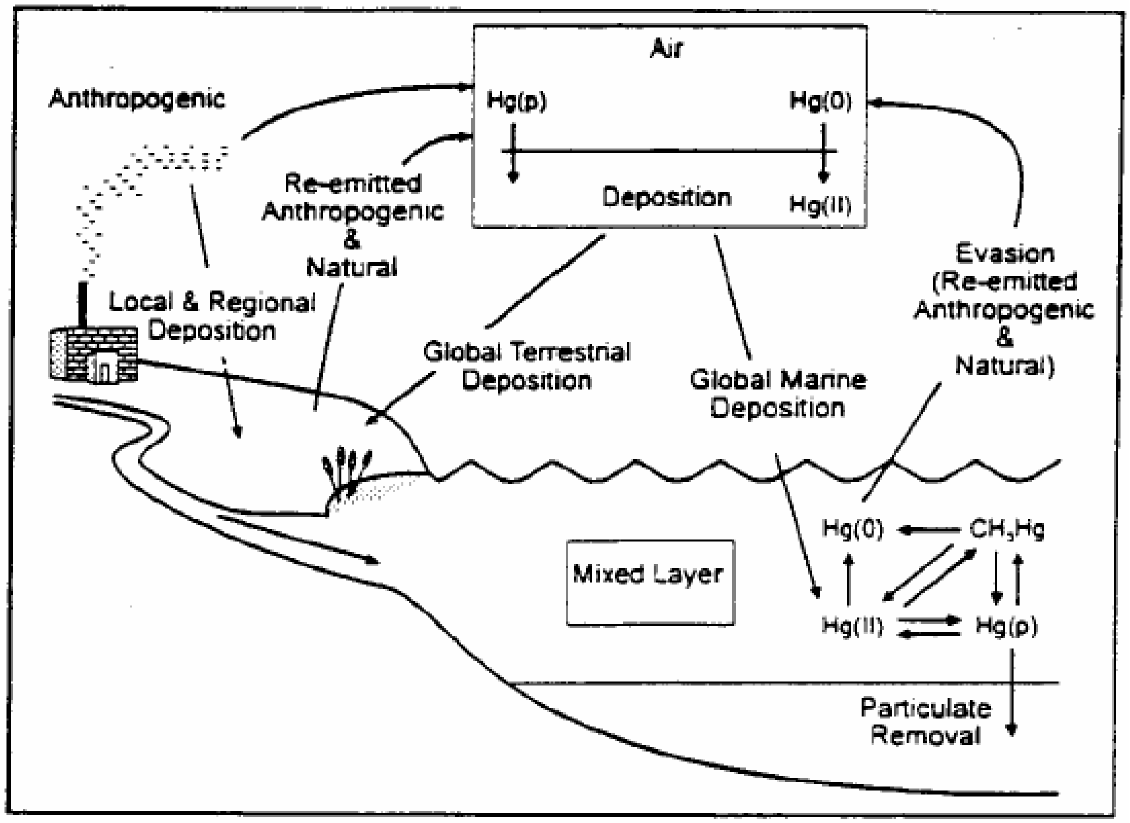
FLMs rely on the best scientific information available in the published literature and best available data to make informed decisions regarding levels of pollution likely to cause adverse impacts. They consider specific agency and Class I area legislative mandates in their decisions and, in cases of doubt, "err on the side of protecting the AQRVs for future generations" (Senate Report No. 95-127, 95th Congress, 1st Session, 1977). For air quality dispersion modeling analyses, FLMs follow 40 CFR §52.21(l) (Appendix W of 40 CFR Part 51, EPA's *Guideline on Air Quality Models*) and the recommendations of the IWAQM. FLMs allow modeling analyses conducted on a case-by-case basis considering types and amount of emissions, location of source, and meteorology. When reviewing modeling and impact analysis results, the FLMs consider frequency, magnitude, duration, and location of impacts.

3.3.5 MERCURY IN THE ENVIRONMENT

Background

At typical temperatures and pressures, elemental mercury (Hg) is a heavy, silver-white liquid metal (EPA, 1997c). Mercury is also a hazardous air pollutant and a high-priority concern for the U.S. EPA (Abbott, 2005) and Montana DEQ (AP, 2006). As a chemical element common in the earth's crust (Levin, 2001), mercury can neither be created nor destroyed. However, mercury can cycle through the environment – including air, land and water – as part of both natural and human (anthropogenic) activities (Figure 3-18). Measured data and modeling results both indicate that the amount of mercury mobilized and released into the biosphere has increased since the beginning of the industrial age (EPA, 1997a). Figure 3-19 is a graph displaying a

Figure 3-18. The Global Mercury Cycle



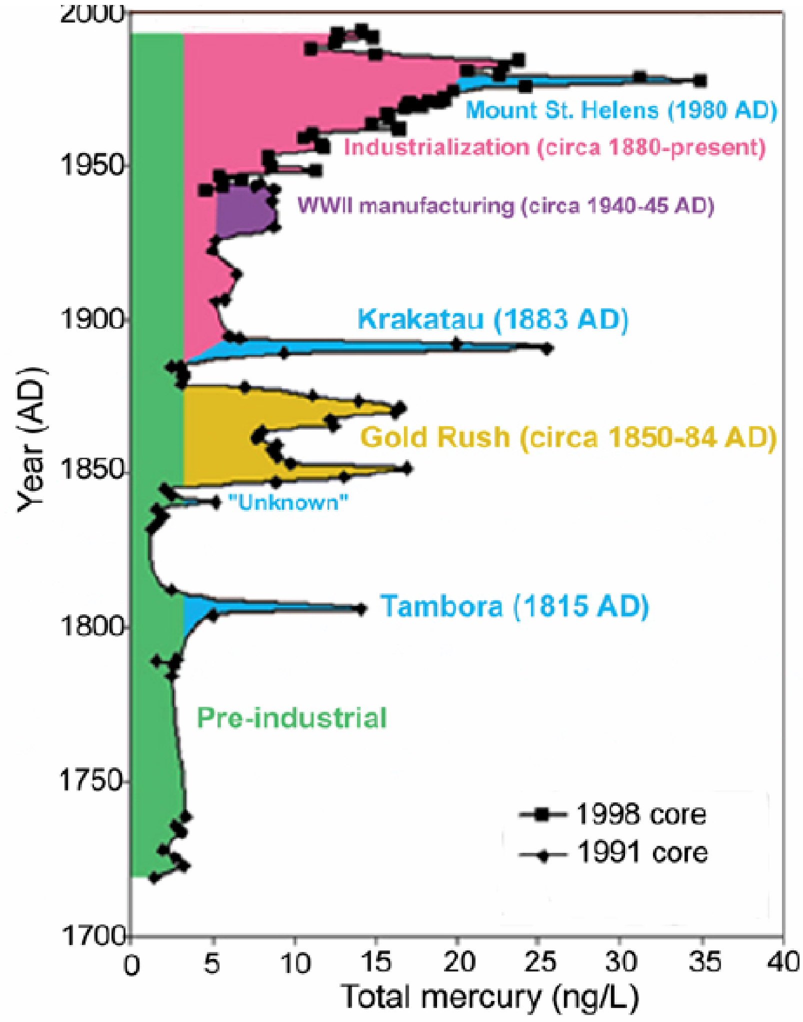
Source: EPA, 1997c

profile of historic concentrations of mercury developed from an age-dated, 160-m (530-ft) deep ice core from the Upper Fremont Glacier in Wyoming's Wind River Range (Abbott, 2004). Increasing background mercury deposition from the atmosphere is evident, with occasional spikes in concentration caused by volcanic eruptions.

Mercury plays an important role as a process or product ingredient in several industrial sectors. It has also been used in many household products, including thermometers, lamps, paints, batteries, electrical switches, pesticides, and even toys and shoes (Ohio EPA, 2000). In the electrical industry, it is used in components such as fluorescent lamps, wiring devices and switches (e.g., thermostats) and mercuric oxide batteries. Furthermore, it is a component of dental amalgams used in repairing dental caries (cavities). In addition to specific products, mercury is utilized in numerous industrial processes, the largest of which in the U.S. is the production of chlorine and caustic soda by mercury cell chlor-alkali plants (EPA, 1997a).

Mercury can exist in three different oxidation or valence states: Hg^0 (metallic or elemental), Hg^+ (mercurous) and Hg^{2+} (mercuric). The properties and behavior of mercury depend on its oxidation state. Elemental mercury is a liquid but also has a fairly substantial vapor pressure, meaning that mercury vapor will be present at normal environmental temperatures. The inorganic forms of mercury generally exist as solids in combination with other chemicals and do not have a measurable vapor pressure.

Figure 3-19. Historic Mercury Concentrations from 160-m Ice Core in Upper Fremont Glacier, Wind River Range, Wyoming



Source: Abbott, 2004
ng/L = nanograms (billionths of a gram) per liter

Mercury can also be combined with organic molecules (primarily by bacteria in sediments) to form organic mercury compounds.

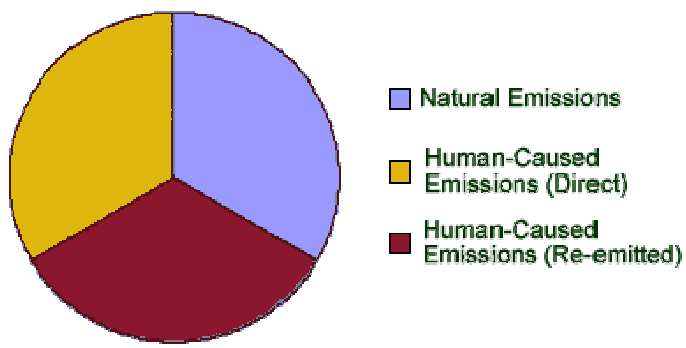
The most dominant form of mercury in the atmosphere is elemental or metallic mercury (Hg^0), which is present as mercury vapor. Reactions with other chemicals and solar radiation in the atmosphere can convert elemental mercury to ionic or charged forms (Hg^{2+}, Hg^+). Most of the mercury occurring in water, soil, sediments, or biota (i.e., all environmental media except the atmosphere) is in the form of inorganic mercury salts and organic forms of mercury (EPA, 1997a).

Mercury Emissions and Deposition

Scientists estimate that natural sources of mercury – such as volcanic eruptions, forest fires, and emissions from the ocean – constitute roughly a third of current worldwide mercury air emissions (EPA, 2006). Mercury emissions can originate from natural sources such as geysers and hot springs in Yellowstone National Park. Recent measurements have shown that Yellowstone's Norris and Mammoth thermal areas are emitting mercury to the air at the rate of 205-450 lbs/year (93-205 kg/yr) (NPS, 2005).

Anthropogenic sources account for the other two-thirds of mercury emissions. Recent estimates of annual total global mercury emissions from all sources, both natural and anthropogenic, are about 4,400 to 7,500 metric tons per year. Much of the mercury circulating through today's environment was released years ago, when mercury was more commonly used than at present in many industrial, commercial, and residential applications. Land and water surfaces can repeatedly re-emit mercury into the atmosphere after its initial release into the environment (refer to Figure 3-18). Figure 3-20 below shows that anthropogenic emissions are roughly split evenly between these re-emitted emissions from previous human activity, and direct emissions from current human activity (EPA, 2006a).

Figure 3-20. Sources of Global Mercury Emissions

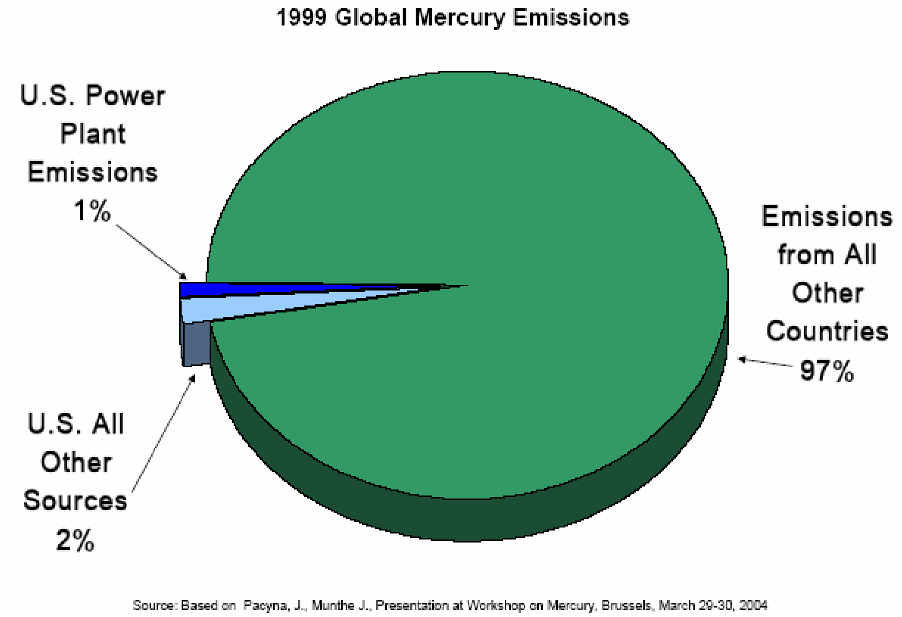


Source: EPA, 2006a

U.S. anthropogenic mercury emissions are estimated to account for roughly three percent of the global total, and emissions from the U.S. power sector are estimated to account for about one percent of total global emissions (UNEP, 2002) (refer to Figure 3-21). In recent years, with increasing awareness of mercury's toxicity, increasing regulation, and technological innovation and substitution, U.S. anthropogenic emissions of mercury have decreased. They have declined 45 percent since 1990 (EPA, 2006b) (refer to Figure 3-22). The two biggest declines were in emissions from medical waste incinerators and municipal waste combustors.

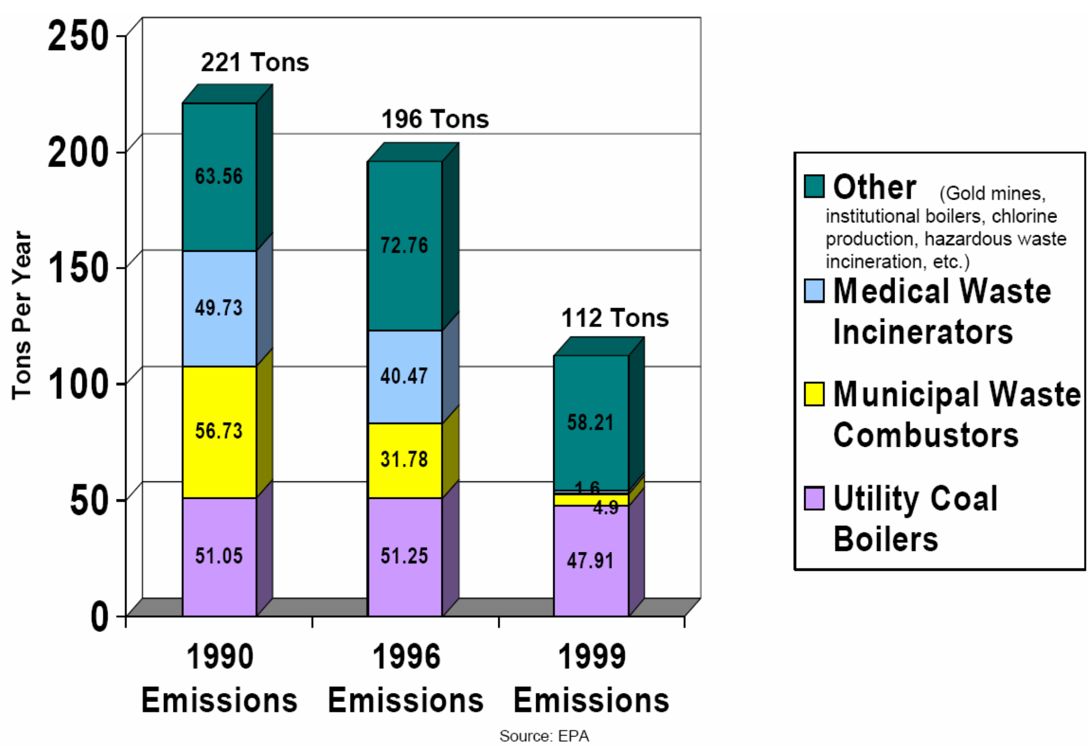
Mercury occurs naturally in coal at trace amounts, and unless controlled, is released to the atmosphere when coal is burned. It is estimated that 48 tons of mercury, or about one-third of the total amount of mercury released annually by human activities in the United States, are released into the atmosphere annually by coal-fired power plants (EPA, 2006b). Montana power plants currently emit approximately one-half ton (1,042 lbs) of mercury, or about one percent of total U.S. power plant emissions (DEQ, 2006b).

Figure 3-21. Pie Chart of U.S. and Utility Mercury Emissions Compared to Total Global Emissions



Source: EPA, 2006b

Figure 3-22. Declines in Anthropogenic U.S. Mercury Emissions Since 1990



Source: EPA, 2006b

Current estimates are that 80 percent or more of the mercury deposited within the United States was emitted from sources outside the U.S. and Canada (EPA, 2006b; see Figure 3-23).

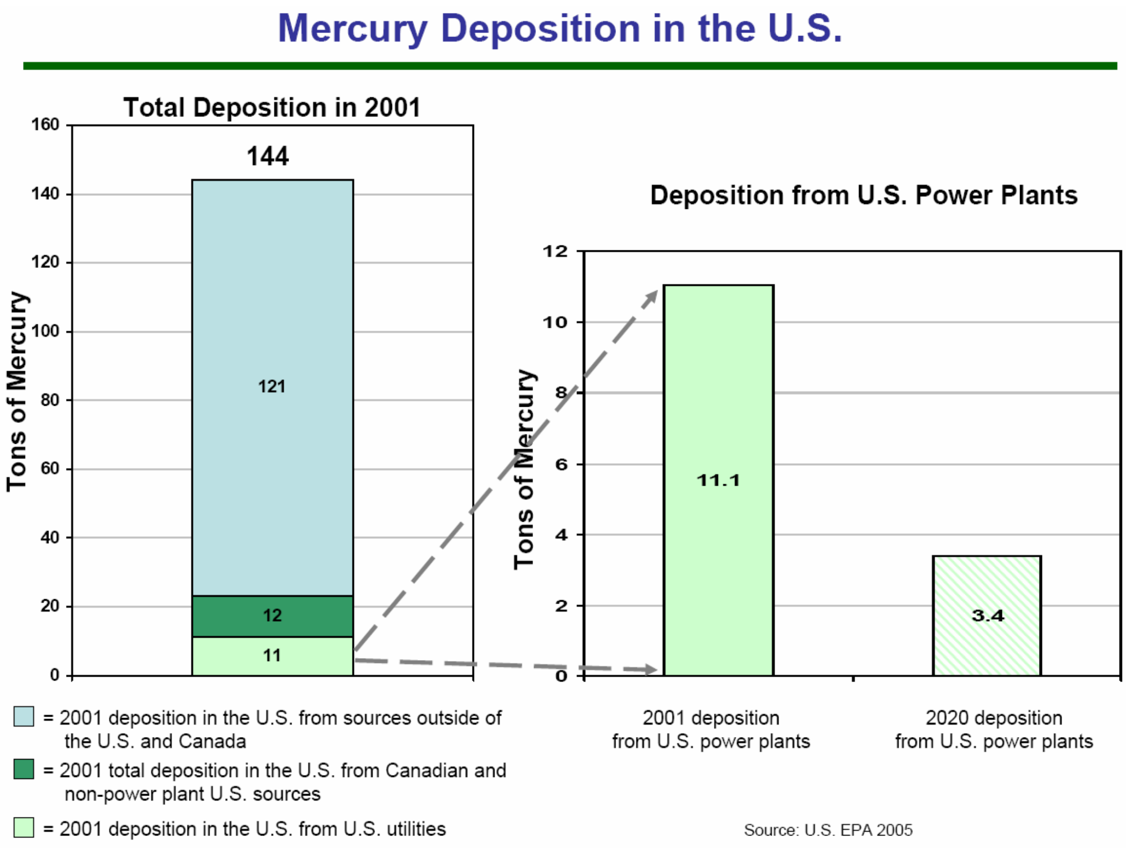


Figure 3-23. Mercury Deposition in the United States (2001) by Source
Source: EPA, 2006b

On March 15, 2005, EPA issued the Clean Air Mercury Rule (CAMR), which will permanently cap and reduce mercury emissions from coal-fired power plants (USEPA, 2005c). This rule will reduce mercury emissions in two phases. The first will reduce emissions using currently mandated technology by 2010 and the second will reduce emissions further by 2018. Additional and updated information related to CAMR from electric generating units is available at http://www.epa.gov/mercury/ . The CAMR relies on markets to reduce pollution, and allows companies to buy and sell allotted pollution limits.

The CAMR has served as the impetus for Montana and other states to develop their own rules concerning mercury emissions (AP, 2006). EPA assigned most states and two Indian tribes an emissions budget for mercury, and these states must submit a SIP revision detailing when they will meet their budget for reducing mercury from coal-fired power plants (USEPA, 2006d).

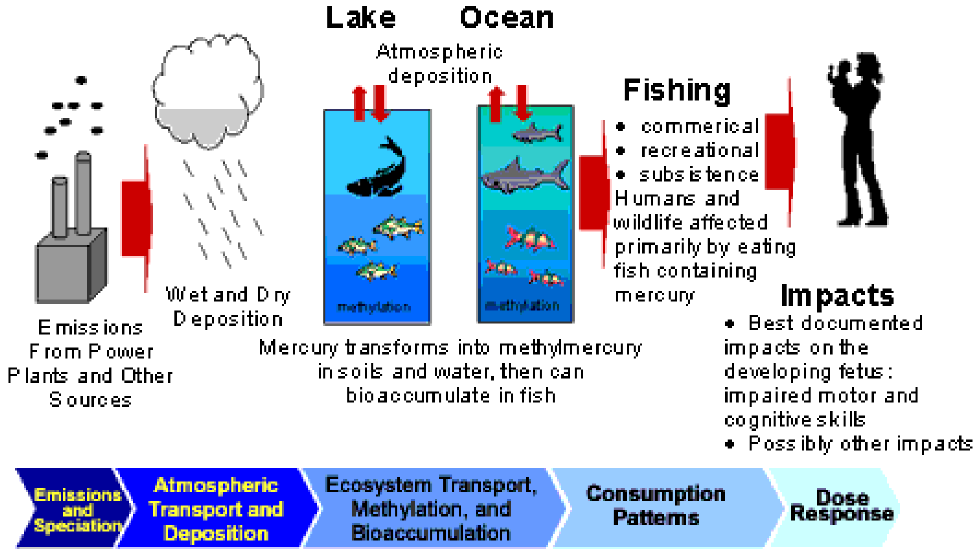
Montana has until November 16, 2006 to comply. On March 23 of this year, the Montana Board of Environmental Review authorized rule making to regulate mercury emissions at coal-fired power plants in the state. A draft of Montana's proposed rule, which provides for more stringent mercury emissions control requirements and deadlines than CAMR, has been prepared by DEQ and is now under review by the Board (DEQ, 2006c).

While the overall trend in the global mercury burden since pre-industrial times appears to be increasing (by an estimated two to five times), there is some evidence that mercury concentrations in certain locations have been stable or decreasing over the past few decades. The downward trend in mercury concentrations observed in the environment in some geographic locations over the last few decades generally corresponds to declining regional mercury use and consumption patterns over the same time frame (USEPA, 1997c).

Transformation to Methylmercury and Exposure Pathways

Once in aquatic systems, mercury can exist in dissolved or particulate forms and can undergo a number of chemical transformations (Figure 3-24). Sediments contaminated with mercury at the bottom of surface waters can serve as an important reservoir of the element, with sediment-bound mercury recycling back into the aquatic ecosystem for decades or longer. Mercury also has a long retention time in soils, from which it may continue to be released to surface waters and other media for long periods of time, possibly hundreds of years (EPA, 1997a).

Figure 3-24. Mercury Exposure Pathways



Source: EPA, 2006e

Mercury that enters water bodies and sediments can ultimately be transformed through "methylation" (attachment of one carbon and three hydrogen atoms) into a more toxic form, methylmercury (CH_3Hg). Methylmercury can be formed in the environment both by microbial metabolism as well as by abiotic, chemical processes, although it is generally believed that microbial metabolism is the dominant process (UNEP, 2002).

Plants, animals and humans can be exposed to mercury by direct contact with contaminated environmental media or ingestion of mercury-contaminated water and food. Unlike other forms of mercury, methylmercury is readily absorbed across biological barriers and the gastrointestinal tract. Methylmercury can build up in tissues of organisms (bioaccumulation) and increase in concentration along the food chain (biomagnification) (EPA, 1997c).

Almost all human exposure to methymercury is through fish consumption (EPA, 1997d). Estimates developed by the World Health Organization and published by the U.S. Agency of Toxic Substances and Disease Registry (ATSDR) indicate that 99.6 percent of methylmercury intake arises from fish consumption and that 97.7 percent of inorganic mercury intake is associated with the diet (ATSDR, 1999).

As of the year 2000, some forty states (including Montana) had issued fish consumption advisories for methylmercury on certain water bodies while 13 states had statewide advisories for some or all game fish from lakes and rivers. The Montana Sport Fish Consumption Guidelines provide recommendations on the amount and type of sport fish that can be safely eaten, how to prepare caught fish, and what special precautions should be taken by higher-risk individuals. By employing a margin of safety, the guidelines are intended to protect consumers from the first symptoms of mercury toxicity. The guidelines are generally designed to protect higher-risk segments of the population, in particular, pregnant women, women of childbearing age, children, and anglers who regularly consume fish caught in Montana waters in larger quantities over long periods of time (MDPHHS and FWP, no date).

The Long Term Hazards of Toxic Substances –
Bioaccumulation and Biomagnification

Bioaccumulation: The process by which organisms, including humans, can take up toxins and contaminants more rapidly than their bodies can eliminate them. For example, the body burden of mercury can grow over time if an organism continually ingests this heavy metal, perhaps accumulating to toxic levels. If, on the other hand, an organism ceases to ingest mercury, the body burden will decline at a rate specific to each species. In human beings, about half the body burden of mercury can be eliminated within 70 days of ceasing to ingest it.

Biomagnification: The incremental increase in the concentration of toxins at each higher level in the food chain or food pyramid of an ecosystem. Biomagnification occurs because the food sources for species higher on the food chain are progressively more concentrated in persistent toxins like mercury.

Montana fish consumption guidelines vary substantially by fish species and size, water body, and consumer (adult men or women and children). They apply to approximately 30 water bodies in the state, all but two of which are lakes and reservoirs. The Missouri River does not have a fish consumption guideline (MDPHHS, 2005).

Generally, mercury levels in Montana fish are low. For example, the state's brook, rainbow and cutthroat trout, perch, and small panfish average less than 0.15 ppm of methylmercury. By way of comparison, commercially available canned tuna averages 0.17 to 0.20 ppm. However, certain species and size classes of fish in some locations do contain levels that warrant concern for those eating these fish on a frequent or prolonged basis (MDPHHS, 2005).

Health and Ecological Effects

The study of mercury's effects on health reflect the dose-response principle, which states that organisms respond to toxic substances according to the amount or dose of the substance that gets into their bodies. This is one of the fundamental principles of the field of toxicology – with increasing dose or exposure to a substance, there are likely to be greater effects.

Mercury is a well-documented human toxin at certain doses. Clinically observable neurotoxicity has been observed following exposure to large amounts of mercury (e.g., "Mad Hatters' Disease") and consumption of highly contaminated food also has also induced acute mercury neurotoxicity. Generally, the most subtle indicators of methylmercury toxicity are neurological changes. These impaired motor skills and sensory ability occur at comparatively low doses, and progress to tremors, inability to walk, convulsions and death at extremely high exposures (EPA, 1997e). Mercury poisoning can also permanently damage kidneys and fetuses (EPA 2003).

Links between mercury exposure and autism have been suggested, but these possible links remain speculative rather than definitive. For example, a recent study in Texas reported a positive correlation between environmentally released mercury pollution and rates of special education and autism at the county level (Palmer et al., 2005). However, this study did not look specifically at mercury released from power plants and it is unclear what significance power plant emissions played in their reported association.

In addition to neurotoxicity from acute and chronic exposure in human beings, mercury poisoning can potentially cause adverse health effects on individual animals and plants, up to and including mortality, and therefore may potentially affect wildlife populations and ecological communities (EPA, 1997a). Severe neurological effects were already observed in animals at Minamata, Japan, prior to the recognition of human poisonings – birds experienced severe difficulty in flying and exhibited other grossly abnormal behavior (UNEP, 2002). However, these effects occurred at levels of fish contamination that were 10 to 20 times higher than the Food and Drug Administration (FDA) limit for human consumption of 1 ppm and roughly 100 times higher than the levels in Montana fish cited earlier in this section (FDA, 1994).

Adverse effects of elevated mercury levels in fish include death, reduced reproductive success, impaired growth and development, and behavioral abnormalities. Reproductive effects are the primary concern for mercury poisoning in wildlife and can occur at dietary concentrations well below those which cause overt toxicity. Effects of mercury on birds and mammals include death, reduced reproductive success, impaired growth and development and behavioral abnormalities. Sub-lethal effects of mercury on birds and mammals include liver damage, kidney damage, and neurobehavioral effects (EPA, 1997a).

In sum, mercury is ubiquitous in the earth's biosphere, occurring in the air, water, land, and soil, as well as in living organisms. In the industrialized era, human activities have mobilized greater amounts of mercury, thereby exposing organisms, ecosystems, and human beings to a particularly toxic form, methylmercury. Almost all human exposure to methylmecury is from ingesting contaminated fish. In low doses, methylmercury can be voided by the body and is not generally problematic; at sustained, excessive doses, it may accumulate in certain tissues and organs to concentrations that can cause a variety of adverse health effects on humans and wildlife. These negative effects may be acute or chronic, and from sub-lethal to lethal. While mercury contamination is widespread, indeed global, the most serious incidents to date have tended to involve specific point source discharges to water rather than dispersed emissions to air.

3.3.6 Global Climate Change

In recent decades climatologists and other earth scientists have expressed growing concern that the earth's climate appears to be warming as a result of an accumulation of greenhouse gases (GHGs) in the atmosphere. The earth's surface temperature has risen by about one degree Fahrenheit over the last century, and the warming process has accelerated during the past two decades (Figure 3-25) (EPA, 2000c).

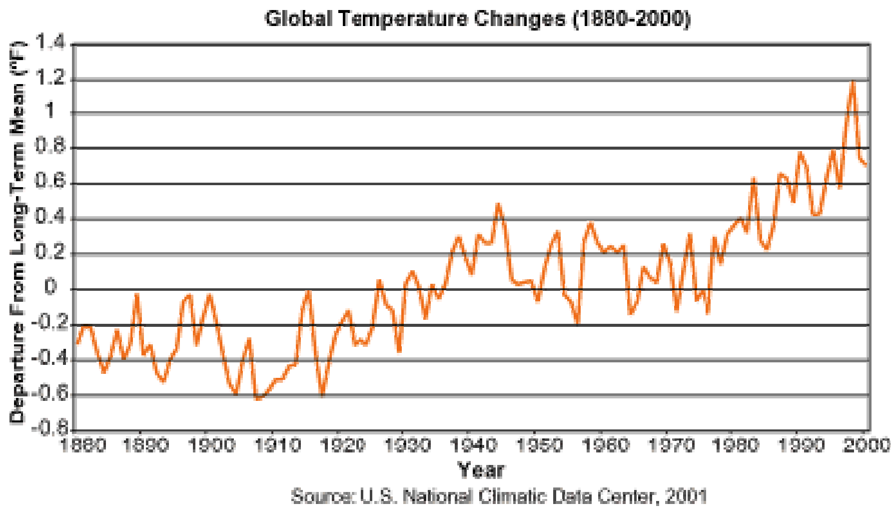


Figure 3-25. Average Global Temperature Trend from 1880 to 2000
Source: EPA, 2000c

Some GHGs occur naturally in the atmosphere, while others result from human activities (EPA, 2005h). Naturally occurring GHGs include water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Certain GHGs are being released in growing quantities by expanding human populations and economic activities, particularly the combustion of fossil fuels (oil, natural gas, and coal) and the clearing/burning of forests, all of which emit carbon dioxide, the principal greenhouse gas, adding to the levels of this naturally occurring gas. Another important greenhouse gas – methane – escapes to the atmosphere from cattle flatulence and rice paddies, as well as from natural gas pipeline leaks and decomposition in landfills; in other words, methane levels in the atmosphere are rising due to expanding food and energy production and waste generation. Still other greenhouse gases include nitrous oxide emitted during combustion and chlorofluorocarbons (or CFCs, which also attack the stratospheric ozone layer), now banned as a result of the Montreal Protocol and other international agreements (EPA, 2000c).

In 1997, DEQ inventoried GHG emissions in Montana for 1990, during which approximately 40 million tons of CO_2 equivalent were emitted in the state. Carbon dioxide was the major GHG emitted in Montana, comprising 74 percent of 1990 emissions. Methane was next, accounting for approximately 14 percent of emissions, followed by halocarbons at 9.5 percent, and nitrous oxide at 2.5 percent.

Fossil fuel consumption was the major source of GHGs released in Montana, accounting for 71 percent of emissions. Petroleum comprised 53 percent of fossil fuel-related GHG emissions, coal 35 percent, and natural gas 12 percent. Emissions of halogenated fluorocarbons from Montana aluminum production made up 11 percent of total state emissions in 1990, while methane emissions from livestock were responsible for 10 percent. Overall, energy-related emissions accounted for 72 percent of GHGs, industrial production and agriculture each accounted for approximately 12.5 percent, and waste-related facilities accounted for three percent (DEQ, 1997). In 1999, funded by a grant from EPA, DEQ prepared a draft "Foundation for an Action Plan" to control GHGs emissions in the state; among other emissions sectors it considered, this document investigated strategies to reduce or offset utility industry GHG emissions (DEQ, 1999).

Energy from the sun heats the earth's surface and drives the earth's weather and climate; in turn, the earth radiates energy back out to space (Figure 3-26). GHGs are transparent to incoming solar radiation but trap some of the outgoing infrared (heat) energy, retaining heat rather like the glass panels of a greenhouse. Without this natural "greenhouse effect," temperatures would be much lower than they are now, and life as we know it would not be possible. Because of greenhouse gases, the earth's average temperature is a more hospitable 60 degrees Fahrenheit (EPA, 2000c).

Since the beginning of the Industrial Revolution, atmospheric concentrations of carbon dioxide have increased nearly 30 percent, methane concentrations have more than doubled, and nitrous oxide concentrations have risen by about 15 percent. These increases have enhanced the heat-trapping capability of the earth's atmosphere. Sulfate aerosols, common air pollutants, cool the atmosphere by reflecting light back into space; however, sulfates are short-lived in the atmosphere and vary regionally (EPA, 2000c). Also, with national and worldwide efforts to curb emissions of these pollutants, their offsetting influence is believed to be diminishing.

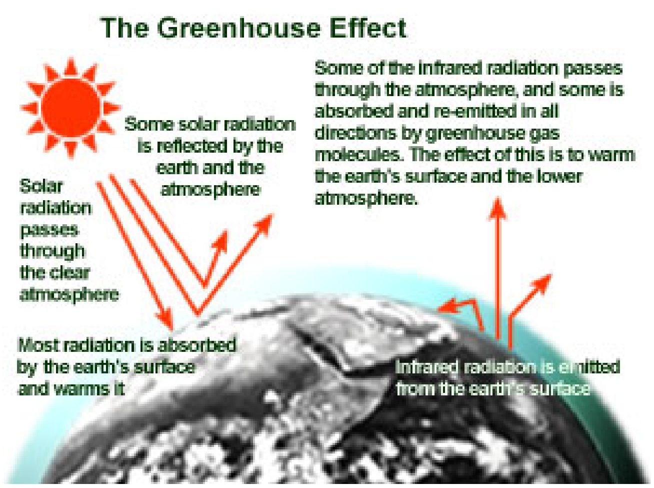


Figure 3-26. The Greenhouse Effect
Source: EPA, 2000c

The National Research Council of the National Academy of Sciences concluded in 2001 that the "warming process has intensified in the past 20 years, accompanied by retreating glaciers, thinning arctic ice, rising sea levels, lengthening of the growing season in many areas, and earlier arrival of migratory birds" (NRC, 2001). Among the predicted changes in the United States are "potentially severe droughts, increased risk of flood, mass migrations of species, substantial shifts in agriculture and widespread erosion of coastal zones" (NAST, 2000). While U.S. agricultural production could increase, due to "fertilization" of the air with carbon dioxide, "many long-suffering ecosystems, such as alpine meadows, coral reefs, coastal wetlands and Alaskan permafrost, will likely deteriorate further. Some may disappear altogether" (Suplee, 2000; Anon., 2000).

In 2001, the Intergovernmental Panel on Climate Change (IPCC) released *Climate Change 2001: Impacts, Adaptation and Vulnerability*, a report prepared by Working Group II (which included approximately 50 lead authors from more than 20 countries). The report concludes:

> *The stakes associated with projected changes in climate are high* [emphasis in original]. Numerous Earth systems that sustain human societies are sensitive to climate and will be impacted by changes in climate…Impacts can be expected in ocean circulation; sea level; the water cycle; carbon and nutrient cycles; air quality; the productivity and structure of natural ecosystems; the productivity of agricultural, grazing, and timber lands; and the geographic distribution, behavior, abundance, and survival of plant and animal species, including vectors and hosts of human disease. Changes in these systems in response to climate change, as well as direct effects of climate change on humans, would affect human welfare, positively and negatively. Human welfare would be impacted through changes in supplies of and demands for water, food, energy, and other tangible goods that are derived from these systems; changes in opportunities for nonconsumptive uses of the environment for recreation and tourism; changes in non-use values of the environment such as cultural and preservation values; changes in incomes; changes in loss of property and lives from extreme climate phenomena; and changes in human health (IPCC, 2001).

While climate change is the ultimate global issue – with every human being and every region on earth both contributing to the problem and being impacted by it to one degree or another – it does manifest itself in particular ways in specific locales like Montana. During the past century, the average temperature in Helena increased 1.3°F and precipitation has decreased by up to 20 percent in many parts of the state (EPA, 1997h).

Over the next century, Montana's climate may change even more. In this region and state, concerns have been expressed by scientists and conservationists over a range of potential impacts, including:

- glaciers melting and disappearing in Glacier National Park and elsewhere in the Rocky Mountains (ABC News, 2006; NWF, 2005);
- a potential decline in the northern Rockies snowpack and stressed water supplies both for human use and coldwater fish (USGS, 2004; ENS, 2006; NWF, 2005; Farling, no date);
- survival of ski areas receiving more rain and less snow (Gilmore, 2006), drying of prairie potholes in eastern Montana and a concomitant decline in duck production (NWF, 2005);
- an increase in the frequency and intensity of wildfires as forest habitats dry out, and perhaps a conversion of existing forests to shrub and grasslands (NRMSC, 2002; NWF, 2005; Devlin, 2004);
- loss of wildlife habitat (USGS, 2004; NWF, 2005);
- possible effects on human health from extreme heat waves and expanding diseases like Western equine encephalitis, West Nile virus, and malaria (EPA, 1997h; RP, 2005);
- possible impacts on the availability of water for irrigated and dryland crop production alike (EPA, 1997h; RP, 2005)

3.4 BIOLOGICAL RESOURCES

3.4.1 INTRODUCTION

The biological resources analysis has been prepared and submitted as a part of the environmental review process described in the NEPA, MEPA, and the Endangered Species Act (ESA). The purpose of this report is to characterize the general biological resources, rare and sensitive species, threatened and endangered species, and wetlands in the vicinity of the project area. The analysis includes an assessment of the potential impacts to these biological resources (Section 4.6) for each alternative as a result of the proposed project.

General descriptions for the project area are from McNab and Avers (1994) for Section 331D, the northwestern glaciated plains. This section includes level to gently rolling continental glacial till plains and rolling hills on the Missouri Plateau. Steep slopes border some of the larger rivers. Elevation ranges from 2,500 to 5,000 ft (763 to 1,525 m). This section is within the Great Plains physiographic province. Glacial till is underlain by soft Cretaceous marine shale. These soils are generally deep and range in texture from loamy to clayey.

Annual precipitation averages 10 to 15 inches (250 to 380 mm), with maximums occurring in spring and early summer. Winters are extremely cold with desiccating winds and snow. Climate is cold continental, with dry winters and warm summers. Temperature averages 37 to 45^{o} F (3 to 7^{o} C), and the growing season lasts 100 to 130 days. There are high densities of dendritic drainage patterns on areas of exposed marine shales. Low to medium density drainage patterns occur on the better drained glacial till. The higher order streams show subtle structural and glacial influence. Major rivers include the Missouri, Milk, and Poplar. Fire and drought are the principal sources of natural disturbance, and most of the area is in cropland or is grazed by livestock.

The area surrounding Great Falls is characterized by large tracts of grasslands that have been heavily cultivated for decades, with clusters of urban, suburban, industrial and rural development. The climate is semi-arid and the few rivers and tributaries present drain into the Missouri River. Topography is mostly flat or gently rolling hills and buttes, with incised canyon drainages created by creeks, rivers, and wind erosion. Shrubs and trees are mostly confined to these small canyon habitats or cultivated near structures. Development at either site for the boilers, turbine-generator, pollution control equipment, solid waste storage facilities, and associated infrastructure would affect about 320 acres (130 ha).

The Salem plant site is cultivated for small grains, and is mostly agricultural fields. A few home sites with outbuildings are located in the area, and dirt access roads mostly follow Section lines. This site was surveyed in detail and is discussed below.

Because the Industrial Park site is currently considered an alternative to the Salem site, specific locations and lengths of connections for raw water, potable water, wastewater, and power transmission lines have not been formally identified. The Industrial Park site has been cultivated in the past, but is currently vegetated with a mixture of grasses including smooth brome (*Bromus* *inermis*), crested wheatgrass (*Agropyron spicatum*), thickspike wheatgrass (*A. dasytachyum*), and Kentucky bluegrass (*Poa pratensis*), and a variety of weedy forbs. Past developments have disturbed the area, and buildings, storage sheds, and roads are common. Wildlife species recorded at the site included western meadowlark (*Sturnella neglecta*), unidentified vole (likely *Microtus pennsylvanicus*), Richardson's ground squirrel (*Spermophilus richardsonii*), and badger (*Taxidea taxus*). If this site is selected, the electrical interconnections, potable water and wastewater would likely be shorter than for the Salem site due to closer proximity to established infrastructure; the raw water line from the Morony Reservoir would be longer, however.

The project is divided into infrastructure components, and survey results and potential project impacts are discussed for each segment. Wildlife data for the potential project area and each segment are organized for brevity and clarity. The existing Montana Natural Heritage Program (MNHP) database query results, wildlife sightings during project area surveys, fish species in Morony Reservoir, and noxious weeds are in table format, and other general wildlife and vegetation are included in descriptive text sections.

3.4.2 Pre-Field Research

Biologists conducted pre-field research for previously recorded wildlife sighting records within a 10-mile (16-km) radius of the proposed Salem plant site, and the alternate GFIP location (WESTECH, 2005). Sighting data were also collected for the 28.4 miles (46 km) of transmission lines connecting the proposed plant sites to main conductor lines. Pre-field research consisted of contact with landowners, evaluation of aerial photographs, query of the MNHP database for past sightings within a 10-mile (16-km) radius of HGS (Table 3-9), and interviews of state and federal resource specialists at Montana Fish, Wildlife, and Parks (FWP) and the U.S. Fish and Wildlife Service (USFWS) (WESTECH 2005).

Wildlife habitats in the vicinity of proposed sites for the HGS were identified using designations by WESTECH (1993). This typing method is based on Coenenberg et al. (1977) and has been used in numerous wildlife studies in Montana and other states, and has been accepted for use in NEPA documents. Habitat type and subtype codes are based on existing, rather than climax, vegetation and/or other features such as rock outcrops and ponds.

Lists of fish, amphibians, reptiles, mammals and birds that could potentially occur in the region encompassing the HGS were developed from published and unpublished literature sources, including Montana Bird Distribution Committee (MBDC, 1996), Foresman (2001), Holton and Johnson (2003), Maxell et al. (2003), Werner et al. (2004), and FWP (2005). Water quality status of affected water bodies was obtained from the 2004 DEQ integrated report (DEQ 2004d). During the field reconnaissance all fish and wildlife species were recorded by the habitat in which they or their evidence occurred. Suitable habitat was defined as any useable habitat for fish; breeding habit for amphibians; foraging, security and denning habitats for reptiles and mammals; and preferred breeding/nesting habitat for birds. Consequently some migrant birds may occur seasonally and may have been recorded in the study area even though "suitable habitat" is not present (WESTECH, 2005).

Table 3-9. Montana Species of Concern Recorded Within 10 miles of Great Falls, MT

Species		Suitable Habitat[b]
Common Name	**Scientific Name**	
Plants		
Roundleaf water hyssop	*Bacopa rotundifolia*	Muddy shores of ponds and streams; last recorded in 1891
Many-headed sedge	*Carex sychnocephala*	Moist meadows; lake shores; thickets at low elevations; last recorded in 1890
Chaffweed	*Centunculus minimus*	Drying vernal pools (seasonal wetlands); last recorded in 1891
	Entosthodon rubiginosus	Moss; last recorded in 1887
	Funaria americana	Moss; last recorded in 1902
Guadalupe water-nymph	*Najas guadalupensis*	Submerged in shallow fresh water of oxbow sloughs and ponds; drying vernal pools; last recorded in 1891
Dwarf woolly heads	*Psilocarphus brevissimus*	Drying vernal pools; last recorded in 1891
California waterwort	*Elatine californica*	Shallow waters and mudflats along the edges of wetlands; last recorded in 1891
Fish		
Blue sucker	*Cycleptus elongatus*	Missouri River below Morony Dam
Amphibians- none		
Reptiles		
Spiny softshell	*Apalone spinifera*	Missouri River below Morony Dam
Mammals - none		
Birds		
Ferruginous hawk	*Buteo regalis*	Sagebrush steppe, grasslands with rolling to steep slopes
Bald eagle	*Haliaeetus leucocephalus*	Larger rivers, lakes and reservoirs
Burrowing owl	*Athene cunicularia*	Grasslands with rodent and badger burrows
White-faced ibis	*Plegadis chihi*	Wetlands
Black-crowned night heron	*Nycticorax nycticorax*	Wetlands
Franklin's gull	*Larus pipixcan*	Wetlands
Common tern	*Sterna hirundo*	Wetlands
Black tern	*Chlidonias niger*	Wetlands

a *Source:* MNHP (2005b) and USFWS letter dated May 12, 2005.
b Suitable habitat for animals is defined in Section 3.2.4.1.

3.4.3 FIELD INVENTORY

The reconnaissance field dates were selected in response to project timing, regulatory schedule/procedures, and landowner availability. They were not selected as a function of reproductive season for threatened and endangered species (TES) or species of concern. Field reconnaissance was conducted on April 18-19, and July 6, 2005 by driving all accessible public roads (some were impassable due to rain/mud) in the project vicinity. These roads provided vantage points for the GFIP and Salem sites, transmission line corridors, several sections of the Missouri River that may be crossed by transmission lines, Morony Dam and Reservoir, the fresh (potable) and waste water pipeline corridor, the raw water pipeline route including the area of the pump house on the Missouri River bank, and the proposed railroad route (WESTECH 2005). Species observed during the field surveys are shown in Table 3-10.

The proposed project covers a large area, and therefore different methods were used to assess habitat during surveys. Habitat that was accessible and surveyed on the ground comprised 34 percent of total area; not accessible but visible from vantage points was 38 percent; and not accessible nor visible from vantage points, therefore not surveyed comprised 28 percent (WESTECH, 2006a).

Proposed Railroad Spur

The proposed railroad spur running south from the Salem plant site would cross lands that are almost entirely cultivated for small grains, except for small strips of grass (primarily smooth brome and Kentucky bluegrass) associated with gravel barrow pits and field edges. No vegetated drainages are crossed by the route (WESTECH, 2005).

Two alternatives to the proposed rail spur alignment were considered. One would follow the abandoned railroad grade to Great Falls, the same corridor proposed for the fresh and waste water pipelines discussed below. The other would place the rail spur in the incised drainage habitat on the south side of the Missouri River, spanning Box Elder Creek and deeper drainages (WESTECH, 2005).


Figure 3-27. Transmission Line Crossing of Incised Drainage

Transmission Line 1

The proposed electrical transmission line from the Salem plant to the Great Falls substation north of the Missouri River would cross cultivated grain fields, several gentle-to-moderately steep incised drainages (Figure 3-27), Box Elder Creek, and the Missouri River including its associated upland habitats and rolling grasslands. The actual amount of each habitat disturbed by construction of the transmission line would depend on the final route location, spacing and location of structures, etc. The transmission line would span the Missouri River; there are 5-6 other transmission lines, including Northwest Energy's 230kV Broadview-to-Great Falls transmission line, already spanning the

Table 3-10. Wildlife Species Observed During Project Area Surveys

Site Observed	Common Name	Scientific Name
Railroad spur	Gray partridge	*Perdix perdix*
	Mourning dove	*Zenaida macroura*
	Common nighthawk	*Chordeiles minor*
	Horned lark	*Eremophila alpestris*
	European starling	*Sturnus vulgaris*
	Vesper sparrow	*Pooecetes gramineus*
	Western meadowlark	*Sternella neglecta*
	White-tailed jackrabbit	*Lepus townsendii*
	Northern pocket gopher	*Thomomys talpoides*
	Richardson's ground squirrel	*Spermophilus richardsonii*
	Red fox	(*Vulpes vulpes*)
Transmission line 1	Loons	Gaviiformes
	Grebes	Podicipediformes
	Pelican	Pelecaniformes
	Herons	Ciconiiformes
	Geese	Anseriformes
	Cranes	Gruiformes
	Plovers	Charadriiformes
Transmission line 1, Box Elder Creek, several upland sites	Killdeer	*Charadrius vociferous*
Transmission line 1, grasslands	Longbilled curlew	*Numenius americanus*
Box Elder Creek	Common snipe	*Gallinago gallinago*
Missouri River, fallow grain fields	Franklin's gull	*Larus pipixcan*
Box Elder Creek or along river	Beaver	*Castor canadensis*
	Muskrat	*Ondatra zibethicus*
	Raccoon	*Procyon lotor*
Fresh and Waste Water Pipeline Corridor	Horned lark	*Eremophila alpestris*
	American robin	*Turdus migratorius*
	European starling	*Sturnus vulgaris*
	Clay-colored sparrow	*Spizella pallida*
	Vesper sparrow	*Pooecetes gramineus*
	Savannah sparrow	*Passerculus sandwichensis*
	Western meadowlark	*Sternella neglecta*
	Northern pocket gopher	*Thomomys talpoides*
	Richardson's ground squirrel	*Spermophilus richardsonii*
Raw Water Pipeline	Common carp	*Cyprinus carpio*
	Unidentified sucker	*Catostomidae*
	Unidentified minnows	*Cyprinidae*
Wetlands	No species observed	N/A

Missouri River between Rainbow Dam and Morony Dam. Box Elder Creek would also be spanned (WESTECH, 2005).

The upland habitats provided by incised coulees, the Missouri River uplands, and the rolling grasslands near the substation provide year-round range for mule deer (*Odocoileus hemionus*), the only big game species recorded during the reconnaissance; most raptors (i.e., birds of prey including eagles, hawks, falcons and owls) would nest in these habitats as well (WESTECH, 2005). No active nests were found during the reconnaissance, but surface access limitations precluded searches of large portions of these habitats.

Shrubs, including rose (*Rosa* spp.), skunkbush sumac (*Rhus trilobata*), western snowberry (*Symphoricarpos occidentalis*), junipers (*Juniperus* spp.), chokecherry (*Prunus virginiana*) and currants (*Ribes* spp.) were an important component of the incised drainages and uplands associated with the Missouri River (WESTECH, 2005). Shrub stands provide habitat for species such as ring-necked pheasant (*Phasianus colchicus*), yellow warbler (*Dendroica petechia*), common yellowthroat (*Geothlypis trichas*) and spotted towhee (*Pipilo maculates*), as well as browse for mule deer.

Some trees are found in the drainage and Missouri River uplands habitats, primarily Rocky Mountain juniper (*Juniperus scopulorum*) with occasional Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*) and Russian olive (*Eleagnus angustifolia*). Scattered willows (*Salix* spp.) and cottonwood (*Populus* spp.) were present along the moist river and creek banks. Trees and taller shrubs provided nesting substrate for several species of birds observed during the reconnaissance, and provided potential nest sites for raptors (WESTECH, 2005).

Box Elder Creek and the Missouri River provided the only perennial stream habitat observed during the survey. Box Elder Creek, in the vicinity of the transmission line crossing, could not be accessed but appeared to be a small (3-5 feet or 1-1.5 m wide), shallow perennial stream. According to the Montana Fisheries Information System (MFISH) information for Box Elder Creek (FWP 2005), it is managed as trout water, although brook trout in this reach of the stream are considered rare. Fathead minnows (*Pimephales promelas*) and longnose dace (*Rhinichthys cataractae*) are considered common (FWP, 2005; WESTECH, 2005).

Transmission Line 1 would cross the Missouri River downstream from Cochrane Dam, above the pool formed by Ryan Dam. The river in this reach has steep banks with little or no emergent vegetation. According to MFISH information (FWP, 2005), this reach of the Missouri River is managed as non-trout water. Although there is good species diversity in this reach of the river, most game species are rare (FWP, 2005; WESTECH, 2005).

Transmission Line 2 and Switchyard

Depending on final design, the transmission line that would run west/southwest from the Salem plant site to the proposed switchyard on the existing NWE 230kV transmission line would be placed in cultivated fields and would span Box Elder Creek parallel to Transmission Line 1 (discussed above) (WESTECH, 2005).

Fresh and Waste Water Pipeline Corridor

Depending on final design, the fresh and waste water pipelines that would run south/southwest from the Salem plant site to Great Falls would be buried in cultivated fields alongside a gravel county road and an abandoned railroad grade, and would also cross Box Elder Creek (discussed above) on the existing railroad grade (WESTECH, 2005).

Raw Water Pipeline

The raw water pipeline can be described in two distinct segments: 1) the portion from the Salem plant site to the directional drill site on the top of the hill above the Missouri River; and 2) the portion that will be directionally drilled from the hilltop to the collector well at the river (Figure 3-28).

Figure 3-28. Proposed Raw Water Intake Route

Segment 1 would be buried in existing grain fields. Segment 2 would be directionally drilled from hilltop to the collector well.

Figure 3-29. Morony Reservoir at Site of Proposed Intake

The intake structure for the raw water pipeline would be placed in the Missouri River pool above Morony Dam (Figure 3-29). The river bank at this location is grassland with a few scattered non-native Russian olive trees. The river bed visible from the bank appeared to be cobble and gravel with considerable sediment (WESTECH, 2005).

Several species of fish are known to be present in Morony Reservoir (Gardner, 2005; PPL Montana, 2006). The utility PPL Montana has conducted long-term sampling of fishes in several reservoirs, including Morony, summarized in Table 3-8 (PPL Montana, 2006). These data cover gillnetting results from 10 years sampled between 1992 and 2005. The data include total fish caught by species and catch per unit hour, which divides numbers of fish by net hours to estimate fish caught by level of effort. Gillnetting tends to under-represent small fish, such as fingerlings and minnows, and thus does not provide a complete inventory of species. However, the results show a reasonable diversity of fish in the reservoir with white sucker most abundant; walleye

Table 3-11. Fish Species in Morony Reservoir; Gillnet Sampling 1992 to 2005 Catch per Unit Effort (CPUE)[1]

Year	Total Net Hours	Rainbow trout		Brown trout		Walleye		White sucker		Longnose sucker		Yellow perch	
		#	CPUE	#	CPUE	#	CPUE	#	CPUE	#	CPUE	#	CPUE
1992	127	0	0.00	1	0.01	25	0.20	183	1.44	1	0.01	5	0.04
1995	102	1	0.01	2	0.02	2	0.02	153	1.50	3	0.03	7	0.07
1997	119	0	0.00	1	0.01	5	0.04	275	2.30	0	0.00	1	0.01
1998	80	0	0.00	0	0.00	2	0.03	180	2.25	0	0.00	9	0.11
1999	130	3	0.02	0	0.00	9	0.07	154	1.18	0	0.00	24	0.18
2000	120	1	0.01	0	0.00	14	0.12	152	1.27	0	0.00	9	0.08
2001	110	1	0.01	0	0.00	11	0.10	104	0.94	0	0.00	25	0.23
2002	103	1	0.01	0	0.00	10	0.10	81	0.78	0	0.00	2	0.02
2003	101	2	0.02	0	0.00	7	0.07	110	1.09	0	4.00	0	0
2005	119	1	0.01	0	0.00	11	0.09	42	0.35	0	0.00	4	0.03
Totals		**10**	**0.088**	**4**	**0.036**	**96**	**0.828**	**1434**	**13.11**	**4**	**4.037**	**86**	**0.77**

[1]Source: PPL Montana 2006.

Table 3-11 (cont.). Fish Species in Morony Reservoir; Gillnet Sampling 1992 to 2005 Catch per Unit Effort (CPUE)[1]

	Carp		Mountain whitefish		Flathead chub		Black bullhead		Sauger		Total Fish
	#	CPUE	#	CPUE	#	CPUE	#	CPUE	#	CPUE	
1992	0	0	0	0		0	0	0	0	0	**215**
1995	1	0.01	0	0	1	0.01	7	0.1	0	0	**176**
1997	3	0.03	0	0	0	0	1	0	0	0	**286**
1998	0	0	0	0	0	0	0	0	0	0	**191**
1999	0	0	0	0	0	0	0	0	0	0	**187**
2000	0	0	0	0	0	0	4	0	2	0	**181**
2001	0	0	0	0	0	0	0	0	0	0	**140**
2002	1	0.01	0	0	0	0	0	0	0	0	**94**
2003	0	0	0	0	0	0	0	0	2	0	**119**
2005	0	0	0	0	0	0	1	0	2	0	**60**
Totals	**5**	**0.04**	**0**	**0**	**1**	**0.01**	**13**	**0.1**	**6**	**0.1**	**1649**

[1]Source: PPL Montana 2006.

and yellow perch fairly abundant; and rainbow trout, brown trout, longnose sucker, black bullhead, carp, sauger and flathead chub in low numbers. FWP and PPL Montana are using Morony Reservoir to rear sauger (*Sander canadensis*), a Montana species of concern, for reintroduction into riverine habitats (Gardner, 2005; WESTECH, 2006c).

Water Quality

The reach of the Missouri River from Rainbow Dam to Morony Dam is listed as impaired on Montana's 2000 303(d) list. This list classifies water bodies based on the level of pollutants that reduce water quality, and impair designated uses (DEQ, 2004d). Waters on the 303(d) list must have Total Maximum Daily Loads (TMDLs) developed to return the waters to full support of all designated uses. The river reach adjacent to the proposed site is listed as impaired due to excess metals, siltation, fish habitat degradation, suspended solids, turbidity, and other habitat alterations (DEQ, 2004d).

Wetlands

Wetlands delineations satisfying Section 404 of the Clean Water Act were not conducted in the HGS project areas during field survey (WESTECH, 2005). However, field work and review of aerial photographs of the entire area suggested that jurisdictional wetlands are generally limited to narrow fringes of perennial streams such as Box Elder Creek and the Missouri River. There appeared to be few if any permanent, seasonal or temporary wetlands in upland habitats that would be affected by the various aspects of the project (WESTECH, 2005). Five small, isolated wetlands (designated as "freshwater emergent wetland" and "other") are shown within the proposed Salem site on the USFWS National Wetlands Inventory (USFWS, 2006). These wetlands are not jurisdictional under current federal agency interpretation of Section 404.

Another isolated wetland appears to be near the proposed water pipeline route; this wetland can be easily avoided. The upper ends of several incised drainages visited during the survey did not show defined channel (bed and bank) characteristics, but a channel (often intermittent) was present farther down the drainage. However, drainages with water flow for more than 95 days out of the year are considered state waters, and most drainages classified as "intermittent" on USGS topographic maps meet this criteria.

3.4.4 FEDERALLY LISTED ENDANGERED OR THREATENED, AND STATE LISTED SPECIES OF CONCERN

Endangered or Threatened Species

The USFWS identified two federally listed species that could occur in the project region, bald eagle (threatened) and Canada lynx (threatened) (WESTECH, 2005).

Bald eagle
There is a bald eagle nest near the confluence of Belt Creek and the Missouri River, approximately one mile (1.6 km) downstream from Morony Dam (Dubois, 2005; WESTECH, 2005). The site is about two miles (3.2 km) from both the Salem plant site and the proposed raw

water pipeline intake on the Missouri River above Morony Dam, and is not visible from either site. The nest was inactive in 2004 (Dubois, 2004; WESTECH, 2005) but was active in 2005 and produced one fledgling (Taylor, 2005; WESTECH, 2005). There are no other known bald eagle nests or territories upstream from Belt Creek to the City of Great Falls (Taylor, 2005; WESTECH, 2005).


Figure 3-30. Bald Eagle

Canada lynx
Eastward range extensions of lynx into Montana, Idaho and Washington follow boreal forests at higher elevations (Foresman, 2001). Lynx distribution and abundance is closely associated with those of their primary prey species, the snowshoe hare (*Lepus americanus*), found in young, dense lodgepole pine stands. Lynx den in areas of dense canopy closure with a high density of downed trees, located near stands that provide suitable foraging habitat. Both stand types must be adjacent to each other to provide suitable lynx habitat, or suitable travel corridors must exist between them (Foresman, 2001). The project area does not support suitable Canada lynx habitat, and lynx have not been reported within 10 miles (16 km) of the project vicinity (MNHP, 2005a; WESTECH, 2005).

Animal Species of Concern

One fish, one reptile and eight bird species that are considered to be of special concern in Montana (that is, at risk or potentially at risk of declining or disappearing in the state) have been recorded within 10 miles (16 km) of the HGS project (Table 3-6; MNHP, 2005a). Additional species may occur but have not been documented by MNHP (WESTECH, 2005).

Aquatic species
The blue sucker (*Cycleptus elongatus*) and spiny softshell turtle (*Trionyx spiniferus*) are known to occur along the Missouri River below Morony Dam (WESTECH, 2006d), downstream of the proposed project site. Both species prefer large prairie rivers and streams. Construction of dams on these rivers is credited with restricting the distribution of both species (MNHP, 2005b). FWP is rearing sauger in Morony Reservoir, the body of water which includes the proposed raw water intake site (WESTECH, 2006c). Sauger is a state species of concern, and the fish in this Morony Reservoir population will be used in reestablishment programs in other Montana waters (Gardner, 2005; WESTECH, 2006c).

Avian species
In Montana, ferruginous hawks (*Buteo regalis*) prefer to nest in prairie shrub habitats, often with steep slopes, with an abundance of small mammals (rodents to jackrabbits) for prey; they generally avoid nesting in areas converted to agriculture (MNHP, 2005b). The incised drainage habitat and uplands associated with the Missouri River could be considered nesting habitat for the ferruginous hawk, along with several other species such as prairie falcon (*Falco mexicanus*), Swainson's hawk (*B. swainsoni*), and red-tailed hawk (*B. jamaicensis*) (Taylor, 2005). There are

no known nests in the project vicinity; the nearest reported nest is about 10 miles (16 km) to the northwest (MNHP, 2005a; WESTECH, 2005). Ferruginous hawks, along with many other species of raptors, would be expected to be present in the HGS project vicinity during migration.

Similarly, the burrowing owl (*Athene cunicularia*) is a ground-dwelling bird associated with burrows of ground squirrel (*Spermophilus* spp.), prairie dogs (*Cynomys* spp.) and badgers in prairie grasslands (MNHP, 2005a). Therefore the species could occur in the incised drainage and grassland habitat of the HGS project vicinity, although no nests are known from the area (WESTECH, 2005).

The white-faced ibis (*Plegadis chihi*), black-crowned night heron (*Nycticorax nycticorax*), Franklin's gull (*Larus pipixcan*), common tern (*Sterna hirundo*) and black tern (*Chilidonias niger)* are generally associated with wetlands and large rivers. All five species could occur along the Missouri River in the HGS project vicinity during migration, but none would be expected to nest there (MNHP, 2005b). Franklin's gulls were observed in agricultural fields during the survey in April 2005. All nesting records of these species are from Benton Lake National Wildlife Refuge, about 7-12 miles (11-19 km) from the HGS project (WESTECH, 2005).

Mammalian Species of Interest

Mule deer (*Odocoileus hemionus*) are the most common big game animal in the project vicinity (Figure 3-31). They are non-migratory, year-round residents of the area, primarily using the "breaks" habitats (also referred to as "incised drainages" and "Missouri River associated uplands") but also feeding in adjacent grain fields and Conservation Reserve Program (CRP) fields. The Salem plant site is on the west edge of a 70 square-mile (181 sq.-km) "mule deer census area", which is surveyed four times per year (one aerial survey after hunting season and three more in spring). In recent years with mild winters FWP typically counts about 500 mule deer in this area, which extrapolates to approximately seven deer per square mile (18/sq. km). Similar densities would be expected in the Highwood Generating Station project area (WESTECH, 2006e).

Figure 3-31. Mule Deer

There are a few white-tailed deer (*Odocoileus virginianus*) along Belt Creek and Rogers Coulee (the first drainage east of the Salem plant site), and they could be expected in low numbers in most drainages with riparian habitat. FWP typically counted about 50 white-tailed deer in the adjacent mule deer census area, indicating that they are much less common than mule deer, or about 0.7 deer/mi^2, or just one-tenth the density of mule deer (WESTECH 2006e).

The area affected by the HGS is not particularly good pronghorn (*Antilocapra americana*) habitat, primarily because the native vegetation on level-to-gently rolling areas has been converted to agriculture. In the mule deer census area east of the Salem site, FWP typically counted about 100 pronghorn, or about 1.4/mi^2 (WESTECH 2006e).

Other game/furbearer species in the area are sharp-tailed grouse (*Tympanuchus phasianellus*), gray partridge (*Perdix perdix*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), mountain lion (*Puma concolor*), and bobcat (*Lynx rufus*) (WESTECH 2006e).

Plant Species of Concern

Within 10 miles (16 km) of the HGS there are records of eight species of plants considered species of concern in Montana from (Table 3-6; MNHP, 2005d; WESTECH, 2005).

Two species of moss (*Entosthodon rubiginosus* and *Funaria americana*) were recorded along the Missouri River upstream of the current Cochrane Dam in the late 1880s and early 1900s (WESTECH, 2005).

Noxious Weeds

Table 3-12 includes the species found in the proposed project area:

Table 3-12. Noxious Weeds Observed During the Field Reconnaissance[1]

Common name	Scientific name	Locations
Canada thistle	*Cirsium arvense*	Common and widespread. Observed in small patches in barrow pits and pastures throughout the area, and particularly at the Great Falls Industrial Park site and along Box Elder Creek near the crossing of the fresh and waste water pipeline corridor.
Field bindweed	*Convolvus arvensis*	Common. Spotty distribution along road edges, barrow pits and fields. Observed at the Great Falls Industrial Park site.
Whitetop	*Cardraria draba*	Spotty. Observed along Box Elder Creek near the crossing of the fresh and waste water pipeline corridor, and in incised drainages and mesic sites along the Missouri River.
Leafy spurge	*Euphorbia esula*	Spotty in small patches near the existing Great Falls substation and in incised drainages along the north shore of the Missouri River between Rainbow and Cochrane Dams.
Spotted knapweed	*Centaurea maculosa*	Common and widespread in incised drainages and uplands along the Missouri River.
Dalmatian toadflax	*Linaria dalmatica*	Observed along Highway 87/89 near Malmstrom AFB. May be more widely distributed than observed.

[1]Source: WESTECH, 2006f

3.5 ACOUSTIC ENVIRONMENT

3.5.1 NOISE TERMINOLOGY

Noise is generally defined as "unwanted sound." It varies enormously, and can be intermittent or continuous, steady or impulsive, stationary or transient. Noise can influence humans or wildlife by interfering with normal activities or diminishing the quality of the environment. Human and animal perception of noise is affected by intensity, frequency, pitch and duration, as well as the auditory system and physiology of the animal. Noise levels heard by humans and animals are dependent on several variables, including distance, ground cover, and objects or barriers between the source and the receiver, as well as atmospheric conditions.

The loudest sounds that can be detected comfortably by the human ear have intensities that are 1 trillion (1,000,000,000,000) times larger than those of sounds that are barely audible. Because of this vast range, a logarithmic unit known as the decibel (dB) is used to represent the intensity of a sound. Such a representation is called a sound level. Humans typically have reduced hearing sensitivity at low frequencies compared with their response at high frequencies, and the "A-weighting" of noise levels, or A-weighted decibels (dBA), closely correlates to the frequency response of normal human hearing. Common noise levels and their effects on the human ear are shown in Table 3-13.

Table 3-13. Common Noise Levels and Their Effects on the Human Ear

Source	Decibel Level (dBA)	Exposure Concern
Soft Whisper	30	Normal safe levels.
Quiet Office	40	
Average Home	50	
Conversational Speech	66	
Busy Traffic	75	May affect hearing in some individuals depending on sensitivity, exposure length, etc.
Noisy Restaurant	80	
Average Factory	80 – 90	
Pneumatic Drill	100	Continued exposure to noise over 90 dB may eventually cause hearing impairment.
Automobile Horn	120	

(DOD, 1978)

Certain land uses, facilities, and the people associated with these noise levels are more sensitive to a given level of noise than other uses. Such "sensitive receptors" include schools, churches, hospitals, retirement homes, campgrounds, wilderness areas, hiking trails, and some species of threatened or endangered wildlife. Recommended land use and associated noise levels are illustrated in the following table (Table 3-14).

Table 3-14. Recommended Land Use Noise Levels

Land Use Category	Noise Levels (dBA)			
	Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential	< 60	60-65	65-75	> 75
Commercial, Retail	< 65	65-75	75-80	> 85
Commercial, Wholesale	< 70	70-80	80-85	> 85
Manufacturing	< 55	55-70	70-80	> 80
Agriculture, Farming	< 75	> 75		
Natural Recreation Areas	< 60	60-75	75-85	> 85
Hospitals	< 60	60-65	65-75	> 75
Schools	< 60	60-65	65-75	> 75
Libraries	< 60	60-65	65-75	> 75
Churches	< 60	60-65	65-75	> 75
Nursing Homes	< 60	60-65	65-75	> 75
Playgrounds	< 55	55-65	65-75	> 75

(HUD, 1991)

For environmental noise studies, noise levels are typically described using A-weighted equivalent noise levels, Leq, during a certain time period. The Leq metric is useful because it uses a single number to describe the constantly fluctuating instantaneous ambient noise levels at a receptor location during a period of time, and accounts for all of the noises and quiet periods that occur during that time period.

The 90th percentile-exceeded noise level, L_{90}, is a metric that indicates the single noise level that is exceeded during 90 percent of a measurement period, although the actual instantaneous noise levels fluctuate continuously. The L_{90} noise level is typically considered the ambient noise level, and is often near the low end of the instantaneous noise levels during a measurement period. It typically does not include the influence of discrete noises of short duration, such as car doors closing, bird chirps, dog barks, car horns, wind gusts, etc. For example, if a continuously operating piece of equipment is audible at a measurement location, typically it is the noise created by the equipment that determines the L_{90} of a measurement period even though other noise sources may be briefly audible and occasionally louder than the equipment during the same measurement period (BSA, 2005).

The day-night average noise level, L_{dn}, is a single number descriptor that represents the constantly varying sound level during a continuous 24-hour period. The L_{dn} is typically calculated using 24 consecutive one-hour L_{eq} noise levels. The L_{dn} includes a 10 dBA penalty that is added to noises which occur during the nighttime hours between 10:00 p.m. and 7:00 a.m. to account for people's higher sensitivity to noise at night when the background noise level is typically low.

The ambient noise at a receptor location in a given environment is the all-encompassing sound associated with that environment, and is due to the combination of noise sources from many directions, near and far, including the noise source of interest. Noise levels typically decrease by approximately 6 dBA every time the distance between the source and receptor is doubled, depending on the characteristics of the source and the conditions over the path that the noise travels. A 6 dBA change in noise level is clearly perceptible to most people, and a 10-dBA increase in noise level is judged by most people as doubling of the sound level. The reduction or attenuation in noise levels is increased if a solid barrier – such as a man-made wall or building – or natural topography, blocks the direct line-of-sight (and noise propagation) between the noise source and receptor.

3.5.2 NOISE GUIDELINES

Federal guidelines as well as City of Great Falls noise regulations or ordinances exist that may govern environmental noise levels or to limit noise generated by the Proposed Action. As a result of the Noise Control Act of 1972, the U.S. Environmental Protection Agency (EPA) developed acceptable noise levels under various conditions that would protect public health and welfare with an adequate margin of safety. EPA identified outdoor L_{dn} noise levels less than or equal to 55 dBA as sufficient to protect public health and welfare in residential areas and other places where quiet is a basis for use (EPA, 1979). Although the EPA guideline is not an enforceable regulation, it is a commonly accepted target noise level for environmental noise studies. Both NEPA and the Endangered Species Act (1973) define noise-related disturbances on wildlife as "harassment". No guidelines or regulations have been developed to quantify animal annoyance noise levels, and there are no well-established limits or standards for limiting noise exposure in animals (Bowles, 1995).

Train noise is regulated through the Federal Railroad Administration (49 CFR 210 and 40 CFR 201). A partial summary of the railroad noise standards is listed in Table 3-15.

Table 3-15. Summary of Railroad Noise Standards (40 CFR 201)

Noise Source	Noise Level at 100 feet (dBA)	Noise Level at Receiving Property Line (dBA)
Locomotive – stationary, idle throttle setting.	70	65
Locomotive – stationary, all other throttle settings.	87	65
Locomotive – moving.	90	65
Rail car operations – moving at speeds of 45 mph or less.	88	65
Rail car operations – moving at speeds greater than 45 mph.	93	65

Notes: Locomotive standards listed are for equipment manufactured after December 31, 1979.
Source: BSA, 2005

The Montana Department of Transportation (MDT) determines traffic noise impacts based on the noise levels generated by peak-hour traffic. The MDT criteria state that traffic noise impacts occur if predicted one-hour L_{eq}(h) traffic noise levels are 66 dBA or greater at a residential property during the peak traffic hour (MDT, 2001a).

The City of Great Falls has a noise ordinance defined in the municipal code (City of Great Falls, 2005a). Tables 3-16 and 3-17 list the noise ordinance limitations.

Table 3-16. Noise Level Limitations for Structures and Open Spaces – Great Falls Municipal Code

Zoning District	Daytime Noise Level Limit (8 a.m. to 8 p.m.)	Nighttime Noise Level Limit (8 p.m. to 8 a.m.)
Residential	55 dBA	50 dBA
Light commercial	65 dBA	60 dBA
Heavy commercial	70 dBA	65 dBA
Industrial	80 dBA	75 dBA

Notes:
1 At boundaries between zones, the lower noise level shall be applicable.
2 Construction projects shall be subject to the maximum permissible noise levels specified for industrial districts.
3 All railroad right-of-ways and the operation of trains shall be considered as industrial districts.
4 Source: City of Great Falls 2005a; BSA, 2005.

Table 3-17. Maximum Permissible Noise Levels for Motor Vehicles – Great Falls Municipal Code

Vehicle Type	Weight	Maximum Noise Level Measured at 50 feet (dBA)	Maximum Noise Level Measured at 25 feet (dBA)
Trucks and buses	Over 10,000 pounds	82	88
	Under 10,000 pounds	74	80
Passenger cars and motorcycles	NA	74	80

Source: City of Great Falls 2005a; BSA, 2005

The Salem and Industrial Park sites both are located in unincorporated areas of Cascade County. However, according to the City of Great Falls planning department, SME has approached the City regarding annexation. If either site is annexed into the City, then the City noise ordinance would be applicable for the specified zoning district. For example, the malt plant located adjacent to and northeast of the Industrial Park Site was recently annexed into the City and zoned I2 – Heavy Industrial. The City noise ordinance also is applicable for transportation (e.g., trains and heavy trucks) of power plant materials through the City limits (City of Great Falls 2005b).

3.5.3 EXISTING ACOUSTIC ENVIRONMENT AT BOTH ALTERNATIVE SITES

The Salem site is located in a rural area approximately eight miles (13 km) east of Great Falls in Cascade County. The surrounding land use is agricultural with scattered rural residences. Approximately eight residences are located within three miles of the Salem Site, and the closest residence is located about 0.5-mile (0.8-km) northwest. A Lewis and Clark Interpretative site (i.e., the Portage Staging Area) is located about one mile north, the Morony Dam on the Missouri River is located approximately 1.5 miles (2.4 km) northwest, and the closest point on Belt Creek is located approximately 1.5 miles northeast. Primary noise sources include traffic on county roads, noise generated by wind blowing through grass, water flowing in nearby creeks, wildlife, insects, birds, and aircraft flying overhead (BSA, 2005). These noise sources are characteristic of rural settings.

The Industrial Park site is located in Cascade County, Montana northeast of Great Falls and about 0.5 mile (0.8 km) north of Black Eagle. The surrounding land use is mixed with residential, commercial, and industrial uses, which are primarily unincorporated. Approximately seven groups of residences are located within one mile of the Industrial Park site, primarily along Black Eagle Road, Rainbow Dam Road, and Bootlegger Trail. Primary noise sources include traffic, industrial equipment (e.g., large fans), wind-generated noise, insects, birds, and aircraft flying overhead (BSA, 2005). The more developed condition of the Industrial Park site is reflected in these predominantly artificial noise sources compared to the predominantly natural noise sources of the Salem location.

In late August and early September 2005, the acoustical consulting firm Big Sky Acoustics (BSA) conducted ambient (background) noise level measurements at both the Salem and Industrial Park sites in general accordance with the American Society for Testing and Materials (ASTM) E1014, *Standard Guide for Measurement of Outdoor A-weighted Sound Levels* (ASTM, 2000). These measurements were taken to establish the typical ambient noise levels within approximately three miles of the Salem Site and one mile of the Industrial Park Site, where the primary noise sensitive receptors are located. Short-term measurements of 10-minute duration were conducted at a total of seven locations, and the L_{eq} and L_{90} for each 10-minute period were recorded. BSA completed two continuous 24-hour measurements, and the L_{eq} and L_{90} in 30-minute increments were also recorded (BSA, 2005).

Around the Salem Site, the L_{90} ambient short-term noise levels ranged from 20 to 47 dBA, and were influenced by chirping insects. Around the Industrial Park Site, the short term noise levels ranged from L_{90} 28 to 44 dBA, and were influenced by nearby traffic and chirping insects (Table 3-18).

BSA also conducted 24-hour measurements to determine the general existing ambient noise level trends versus time of day in the vicinity of the proposed Salem and Industrial Park sites. The 48 consecutive, 30-minute L_{eq} data were used to calculate the L_{dn} levels at the measurement locations. The measured L_{dn} data at the 24-hour measurement locations are listed in Table 3-19. The calculated noise levels based on the measurements were L_{dn} 47 dBA at the Salem site and L_{dn} 53 dBA at the Industrial Park site. Since the measurements were completed in the summer months, insect noise appears to have influenced the measured L_{dn} values. Based on site

Table 3-18. Measured Short-term Ambient Noise Levels at Salem and Industrial Park Sites

Measurement Location	Date and Start Time (hours)	Measured L_{eq} (dBA)	Measured L_{90} (dBA)	Dominant Noise Sources
Salem Site				
1A	8/25/05 at 2151	29 dBA	25 dBA	Insects chirping.
	8/26/05 at 0837	34 dBA	31 dBA	Insects chirping and wind in grass.
	9/01/05 at 1814	48 dBA	47 dBA	Insects chirping.
1B	8/25/05 at 2211	22 dBA	20 dBA	Insects chirping.
	9/01/05 at 1832	46 dBA	45 dBA	Insects chirping.
1C	8/25/05 at 2241	28 dBA	23 dBA	Insects chirping.
	9/01/05 at 1843	47 dBA	38 dBA	Insects and birds chirping.
Industrial Park Site				
2A	8/25/05 at 2325	37 dBA	31 dBA	Pump station hum.
	9/01/05 at 1640	38 dBA	34 dBA	Insects chirping.
2B	8/25/05 at 2344	42 dBA	38 dBA	Traffic on US 87 and insects chirping.
	8/26/05 at 1024	52 dBA	44 dBA	Traffic on 36th Avenue NE, insects chirping, and heavy equipment to south.
	9/01/05 at 1721	45 dBA	39 dBA	Traffic on 26th Avenue NE and insects chirping.
2C	8/26/05 at 0002	41 dBA	39 dBA	Hum of industrial machinery to the west.
	8/26/05 at 1048	48 dBA	44 dBA	Traffic on US 87 and Rainbow Dam Road.
	9/01/05 at 1602	49 dBA	39 dBA	Traffic on Rainbow Dam Road.
2D	8/26/05 at 0020	31 dBA	28 dBA	Insects chirping.
	9/01/05 at 1622	42 dBA	35 dBA	Insects chirping.

Source: BSA, 2005

observations and the 10-minute measurement results around each site (Table 3-16), the estimated L_{dn} values during quiet periods would be approximately L_{dn} 30 dBA at the Salem site and L_{dn} 45 dBA at the Industrial Park site.

Table 3-19. Long-term 24-hour Ambient Noise Levels at Salem and Industrial Park Sites

Measurement Location	Site	Date and Time (hours)	Calculated L_{dn} (dBA)	Estimated L_{dn} During Quiet Periods (dBA)
1	Salem	8/31/05 at 1800 to 9/01/05 at 1800	47 dBA	30 dBA
2	Industrial Park	8/31/05 at 1730 to 9/01/05 at 1730	53 dBA	45 dBA

Source: BSA, 2005

At the Salem site, the L_{90} ambient noise levels were 18 to 35 dBA from 8:00 p.m. to 8.00 a.m., which is typical for quiet rural environments at night. At the Industrial Park site, the L_{90} ambient noise levels were 36 to 45 dBA from 8:00 p.m. to 8:00 a.m., which is typical for quiet suburban areas at night (Harris, 1998). At both locations, L_{90} ambient noise levels were substantially higher during the daytime (8:00 a.m. to 8:00 p.m.) (Figures 3-32 and 3-33).

Figure 3-32. Measured 24-hour Ambient Noise Levels – Salem Site

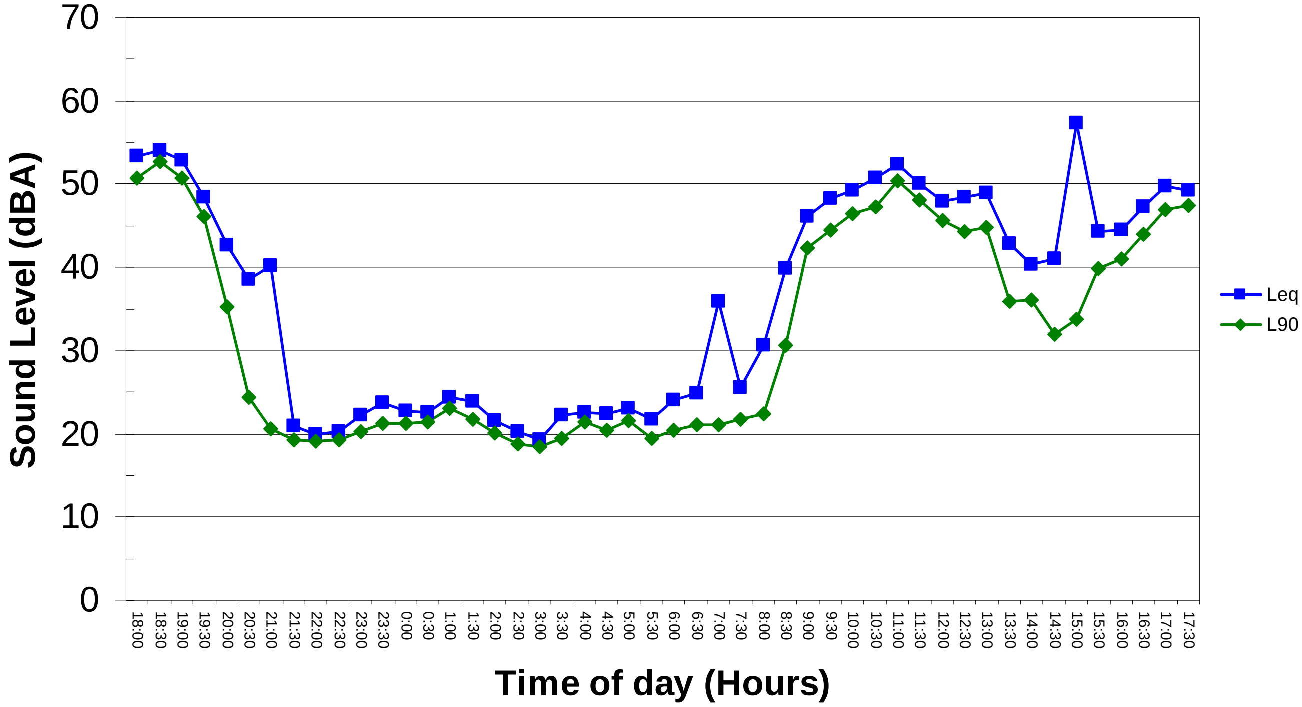
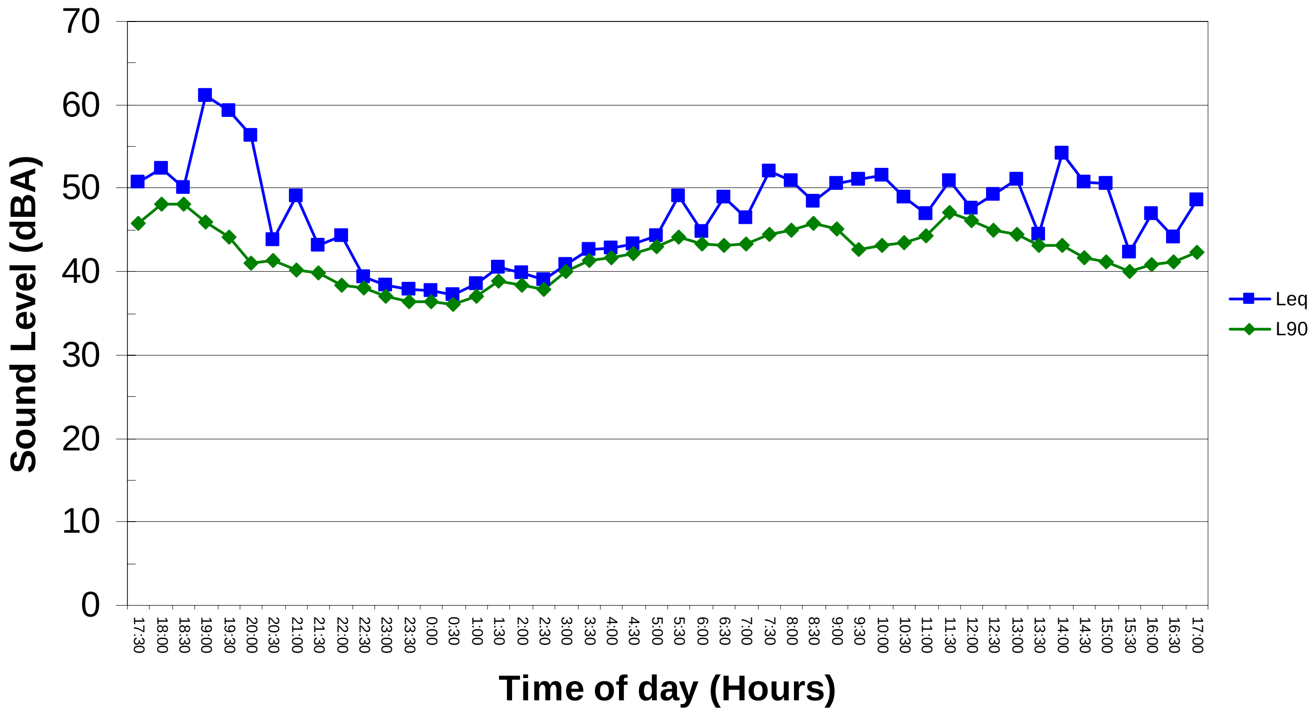


Figure 3-33. Measured 24-hour Ambient Noise Levels – Industrial Park Site



3.6 RECREATION

Montana's rugged outdoors is justly celebrated for the outstanding recreational opportunities it provides residents and visitors alike. The state boasts two national parks – Yellowstone and Glacier – that are internationally famous for their scenery, wilderness and wildlife. Set aside in 1872 and best-known for its geysers and geothermal activity, Yellowstone National Park, most of which is in Wyoming, was the first national park established not only in the United States but the entire world, initiating a global "national parks movement" that continues to this day. Renowned for its spectacular lakes, steep mountains, glaciers, and U-shaped, glacier-gouged valleys, Glacier became the country's 10^{th} national park in 1910 (Uhler, 2002), even before the National Park Service itself was created in 1916. Glacier abuts the international border with Alberta and Canada's Waterton National Park, and the two parks form a single unit known as the Glacier-Waterton International Peace Park.

Nine national forests managed by the U.S. Forest Service, concentrated in western Montana, and nearly eight million acres (3.2 million hectares) managed by the Bureau of Land Management (BLM), concentrated in eastern Montana, also furnish facilities and opportunities for hiking, backpacking, camping, fishing, hunting, cross-county and downhill skiing, snowmobiling, "off-roading," boating, canoeing, kayaking, and other recreational pursuits.

In addition to de facto and recommended wilderness areas within Montana's national parks, five designated wilderness areas in national forests and one in a national wildlife refuge are located within 150 miles (240 km) of Great Falls, the Salem site and Industrial Park alternative site: Gates of the Mountains (Helena National Forest), Scapegoat (Lewis and Clark, Lolo, and Helena national forests), Bob Marshall (Flathead, Lolo, and Lewis and Clark national forests), Mission Mountain (Flathead National Forest), UL Bend (Charles M. Russell National Wildlife Refuge), and Anaconda Pintler (Beaverhead-Deerlodge and Bitterroot national forests).

Montana Fish, Wildlife & Parks operates the State of Montana's state park system. Four state parks are located within 50 miles (80 km) of Great Falls: Giant Springs, Sluice Boxes, Tower Rock, and Ulm Pishkun (FWP, no date).

Figure 3-34. Giant Springs State Park astride the Missouri River

Giant Springs State Park (Figures 3-34 and 3-35) is located just outside Great Falls on the Missouri River at river mile 2108, a little more than one mile (1.6 km) upstream of Rainbow Falls. The 851-acre (344-ha) park is about a mile east-

Figure 3-35. Fishing the Missouri River from Giant Springs State Park near Great Falls

southeast of the alternative Industrial Park site and about nine miles west of the preferred Salem site. Giant Springs, discovered by the Lewis and Clark Expedition in 1805, is one of the largest freshwater springs in the world, discharging some156 million gallons of water per day. This day-use park offers visitors an opportunity to picnic by the Missouri River, visit the Giant Springs Trout Hatchery and visitor center, walk along the Rivers Edge Trail, view nearby Rainbow Falls overlook, or visit the neighboring Lewis and Clark Interpretive Center operated by the U.S. Forest Service. Outdoor activities available at Giant Springs State Park include boating, fishing, picnicking, bicycling, and wildlife viewing. Park facilities include a visitor center, group use area, grills, playground, an interpretive trail and sanitation facilities (FWP, no date).

Established in the mid-1970s, Giant Springs State Park encompasses slightly over 3,000 acres (120 ha) in total (most of which is conservation easement). About 90 percent is on the north shore of the Missouri River. The park receives about 160,000 visitors a year (Auchly, 2005).

Sluice Boxes State Park, located in a rugged area that features remains of mines, a railroad, and historic cabins, is situated 28 miles (45 km) southeast of Great Falls on Belt Creek, a tributary of the Missouri River that passes within a mile of the Salem site and discharges into the Missouri two miles (3.2 km) from the Salem site. However, the park is located well upstream – more than 25 miles (40 km) away – of where Belt Creek passes near the proposed HGS site.

Tower Rock State Park, the newest state park in Montana, is located on the Missouri River at river mile 2181, about 33 miles (53 km) southwest of Great Falls. Tower Rock itself is described and named in the journals of Lewis and Clark. As Lewis wrote, “It may be ascended with some difficulty nearly to it's summit and from it there is a most pleasing view of the country we are now about to leave. From it I saw that evening immense herds of buffaloe in the plains below [sic].” This park is about 36 miles (58 km) from Great Falls and the Industrial Park site and more than 40 miles (93 km) from the Salem site.

The Lewis and Clark National Historic Trail Interpretive Center is operated by the U.S. Forest Service. It is located on Giant Springs Road near the state park, above the bluffs overlooking the Missouri River (USFS, 2005). The 25,000 square-foot building includes a permanent exhibit hall, 158-seat theater, an education room for hands-on, curriculum-based activities, and a retail store (Figure 3-36). The center is handicapped accessible and offers parking for tour buses as well as recreational vehicles. Several trails offer outdoor recreation opportunities to learn about plants native to the Northern Plains. This interpretive center is about a mile (1.6 km) east-southeast of the alternative Industrial Park site and about nine miles (14 km) west of the preferred Salem site. The center's mission is to evoke in the public a personal sense of President Thomas Jefferson's vision of expanding America to the west. It seeks to inspire awe toward the challenges faced by the Corps of Discovery as they portaged the great falls of the Missouri River and explored the 'unknown.' The center also aims to bring to life the daily experiences of the expedition and the environment and native peoples of the 'uncharted West'; and lastly, celebrate "the indomitable spirit of human discovery we all share" (USFS, 2005).

Figure 3-36. Lewis and Clark Interpretive Center

The City of Great Falls Parks and Recreation Department manages and maintains a number of parks within the city limits (CGFPR, no date). The Elks Riverside Park runs along the Missouri River southwest and within a couple of miles of the alternative Industrial Park site. It has picnic shelters and tables, barbecue facilities, open space, tennis courts, horseshoe pits, and restroom facilities. Among its other parks, Great Falls Parks and Recreation also runs the River Side Railroad Skate Park, a park dedicated to skateboarding, and Gibson Park, named for Great Falls' visionary founder Paris Gibson. The Anaconda Hills Golf Course is an 18-hole, public facility about a half-mile south (0.8 km) of the Industrial Park site (TGC, 2004).

Figure 3-37. River Side Railroad Skate Park in Great Falls

The 25-mile (40 km) long River's Edge Trail meanders through the City of Great Falls area, broadly paralleling the Missouri River while connecting parks and other points of interest along the river, including Black Eagle Falls, Rainbow Falls, Crooked Falls and "The Great Falls of the Missouri" just below Ryan Dam (RT, 2000). This public trail is free and open during daylight hours for 365 days of the year to all non-motorized recreationists, including bicyclists, walkers, joggers, runners, roller blading enthusiasts, and others. The trail was developed as a cooperative partnership by the City of Great Falls, Cascade County, the Montana Department of Fish, Wildlife & Parks, the Montana Department of Transportation, the electric utility PPL Montana, a volunteer trail advocacy group (Recreational Trails, Inc.), and a supportive community. Eleven miles (18 km) of the trail are paved and wheelchair accessible; 14 miles (23 km) of the trail run along the Missouri River reservoirs and are gravel or single or double track. North and south shore trails are served by 11 trailhead parking areas. PPL Montana provides conservation and trail easements on native lands along the reservoirs that comprise much of the gravel and single track portions of the trail.

Figure 3-38. Sign at Entrance to Lewis and Clark Expedition Portage Staging Area near Salem Site

No recreation takes place directly on the two alternative sites for the proposed generating station. The preferred Salem site is a wheat field while the alternative site is former agricultural land that is now within the City of Great Falls' designated Central Montana Agricultural and Technology Park. With regard to the Salem location, the nearest public recreational site of some importance is the Lewis and Clark Expedition staging area historic site about 0.8 mile (1.3 km) away. The staging area includes a wayside along the Salem Road north of the proposed plant site; the wayside contains historic markers/signs describing the Corps of Discovery's month-long portage around the great falls of the Missouri River in June 1805 (Figure 3-38).

On this portion of the Missouri River, recreational fishing requires a warm water game fish stamp (FWP, 2005; Montana fishing regulations). However, fishing opportunities in the Morony Reservoir itself are reported to be non-existent because public access onto PPL-Montana property is prohibited (Urquhart, 2005). No other recreational facilities, parks, or opportunities are close to the Salem site.

The closest recreational sites to the alternative Industrial Park location are the several parks and River's Edge Trail mentioned above that run along the Missouri River. The closest of these is approximately a mile away from the southern edge of the Industrial Park alternative for the proposed SME generating station.

3.7 CULTURAL RESOURCES

Cultural resources are sites, features, structures, or objects that may have significant archaeological and historic values. Additionally, they are properties that may play a significant traditional role in a community's historically based beliefs, customs, and practices. Cultural resources encompass a wide range of sites and buildings from prehistoric campsites to farmsteads constructed in the recent past, as well as traditional cultural properties (TCP) still used today.

Sections 106 and 110 of the National Historic Preservation Act (NHPA, P.L. 89-655) provide the framework for federal review and protection of cultural resources, and ensure that they are considered during federal project planning and execution. The implementing regulations for the Section 106 process (36 CFR Part 800) have been developed by the Advisory Council on Historic Preservation (ACHP). The Secretary of the Interior maintains a National Register of Historic Places (NRHP) and sets forth significance criteria (36 CFR Part 60) for inclusion in the register. Cultural resources may be considered "historic properties" for the purpose of consideration by a federal undertaking if they meet NRHP criteria. The implementing regulations define an undertaking as "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency; those carried out with federal financial assistance; those requiring a federal permit, license or approval; and those subject to state or local regulation administered pursuant to a delegation or approval by a federal agency." Historic properties may be those that are formally placed in the NRHP by the Secretary of the Interior, those that meet the criteria and are determined eligible for inclusion, and those that are yet undiscovered but may meet eligibility criteria.

3.7.1 CULTURAL RESOURCES INVENTORY

3.7.1.1 Prior Investigations

Archaeologists conducted prefield research for previously recorded cultural resource sites within the general vicinity of the proposed HGS plant site and the alternate Great Falls Industrial Park location, as well as the corridors centered on the HGS's 28.4 miles (45.7 km) of connections (Dickerson, 2005). The prefield research encompassed a records search of the Montana State Historic Preservation Office (SHPO) records center and cultural resource site files at the Department of Anthropology, University of Montana, Missoula.

The file search and literature review revealed that 17 cultural resource investigations have been undertaken within one mile (1.6 km) of the HGS, its 28.4 miles of connections, and the Great Falls Industrial Park alternate plant site. Only two of those projects encompass significant portions of SME's current project area. During the early 1980s, Herbort (1981) conducted a cultural resource inventory of lands encompassing the HGS as well as adjoining areas as part of the Resource 89 Siting project. More recently, Wood (2004a) completed an intensive cultural resource examination and inventory of 328 acres (133 ha) around and within the entire Great Falls Industrial Park alternate plant site.

The 15 additional cultural resource projects previously conducted in the area overlap, or are situated adjacent to areas that SME currently proposes for development. Included are multiple inventory and subsurface testing projects completed for the Missouri-Madison Hydroelectric project (Greiser, 1980; Bowers, 1982; Deaver, 1990, 1991; Deaver and Peterson, 1992; Rossillon, 1992; Rossillon et al., 1993, 2003; Dickerson, 2000), cultural surveys near Giant Spring (Keim, 1997; Wood, 2004b) and Malmstrom Air Force Base (Greiser, 1988; Hoffecker, 1994), and documentation for the Great Northern Railway (Axline, 1995a, 1995b).

A professional archaeologist at Renewable Technologies, Inc. (RTI) completed the cultural resource inventory of the HGS project areas (Salem and Industrial Park sites) in 2005 (Dickerson, 2005). At the Salem site, the inventory encompassed a total of 1,180 acres (478 ha), covering the proposed HGS plant site and various 250-foot wide corridors, totaling 28.4 miles (46 km) in length, where proposed rail spur, electric transmission lines, as well as water intake and discharge pipelines will be located. Wood (2004a) inventoried the Industrial Park site in its entirety in 2004; hence RTI did not resurvey that portion of the project area.

The portion of the project area encompassing the Salem site had been previously inventoried in 1981, however, Montana SHPO staff consider that work to be out-dated and they requested that the area be resurveyed (Warhank, 2005).

The purpose of the RTI investigations of the project area was to: (1) identify any cultural resource properties within the surveyed portions of the project area; (2) provide baseline data regarding cultural resources, their constituents and locations; and (3) to present the current National Register status for each property and/or to provide an evaluation of each site's integrity, historic significance, as well as recommendation for determining National Register eligibility.

Section 3.7.1.2 presents a summary of the methodology for the cultural resources surveys conducted for SME's project areas. Section 3.7.1.3 presents a summary of the cultural resources located at the HGS and related connection lines. No cultural resources were found within the project boundaries of the alternate Industrial Park site during the 2004 project conducted by Wood, so no summary data are provided here.

3.7.1.2 Inventory Methodology

Prefield Research

Existing and readily available cultural site records, notes, maps, project reports, and related literature for previous cultural resource investigations within the project vicinity were collected and reviewed by RTI staff. A literature search was conducted at the Montana SHPO in Helena. All types of literature were reviewed to determine the locations of all known cultural resources with, and near, the proposed plant sites and connection line corridors. Additional information concerning specific cultural sites was obtained from the University of Montana, Department of Anthropology Archaeological Records Office in Missoula.

The identified previous cultural resource studies resulted in the identification and documentation of 21 historic and prehistoric sites located within one mile (1.6 km) of SME's proposed plant sites and connection corridors. Due to the sensitivity of cultural site location information, and its protection under federal and state laws, the locations of the various cultural sites are not presented in this document. Figure 4 in the RTI report (Dickerson, 2005:11) presents such information.

The largest of the sites is the Great Falls Portage National Historic Landmark. Many of the remaining sites are associated with historic hydroelectric developments at the Rainbow, Ryan, and Morony facilities (Dickerson, 2005:10). Other historic sites include the Giant Spring fish hatchery and access road, the Great Northern railway, the Chicago, Milwaukee, St. Paul, and Pacific railway, the Malmstrom Air Force Base Aircraft Alert Facility building, and multiple small trash dumps.

Prehistoric cultural properties are few and broadly dispersed in the project vicinity. They consist primarily of lithic scatters and sites containing small numbers of stone circles or stacked-rock cairns.

Only five of the above mentioned, previously recorded cultural properties lie within SME's project area. These sites include the Great Falls Portage National Historic Landmark (24CA238), the Chicago, Milwaukee, St. Paul, and Pacific Railroad (24CA264), historic transmission lines associated with the Morony (24CA289, Feature 2) and Rainbow (24CA291, Feature 34) hydroelectric facilities, and the Rainbow-Ryan Road (24CA416). The remaining 16 previously recorded sites are situated outside SME's project area.

Field Inventory

In 2004, Gar C. Wood and Associates (Wood, 2004a) conducted the cultural resource inventory of the area presently considered as the alternate Industrial Park site. The inventory used currently established standards from the MT SHPO and US Secretary of Interior for cultural resource pedestrian survey, inventory, analysis and recording. No sites were found or recorded within the alternate Industrial Park site area. No further discussion related to cultural resources for this particular site is warranted.

Figure 3-39 depicts the Area of Potential Effect (APE) of the Proposed Action, in particular the HGS Salem site. As noted in the figure, it includes a rectangular area whose length runs east-west and whose width runs north-south. The southwest corner of the APE is in the City of Great Falls, while the eastern and northern sides lie several miles east and north of the Salem site, respectively. Figure 3-39 shows key components of the Proposed Action as well as previously recorded and newly recorded historic properties.

Area of Potential Effect (APE)

Section 106 of the National Historic Preservation Act requires federal agencies to define and document the APE of "federal undertakings" in consultation with the SHPO. The reason for defining an APE is to determine the area in which historic properties must be identified, so that effects to any identified properties can, in turn, be assessed.

According to 36 CFR 800.16(d), the Area of Potential Effect is the **geographic area** or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The area of potential effects is influenced by the **scale and nature of the undertaking** and may be different for different kinds of **effects** caused by the undertaking.

The APE should include:

- all alternative locations for all elements of the undertaking
- all locations where the undertaking may result in ground disturbance
- all locations from which elements of the undertaking (e.g. structures or land disturbance) may be visible or audible; and
- all locations where the activity may result in changes in traffic patterns, land use, public access, etc.

RTI's 2005 inventory of the proposed Salem plant site and related 28.4 miles (46 km) of connection lines were also conducted utilizing currently accepted professional standards for cultural resource survey, inventory, and recording. RTI staff conducted an intensive pedestrian cultural resource inventory of the project area during the period of October 4-13, 2005. The area examined in 2005 covered 1,180 acres (478 ha). Field work involved walking parallel transects spaced no more than 30 meters (100 feet) apart. Specific details of the survey methodology are contained in the project report (Dickerson, 2005:12-13). Field documentation consisted of marking exact site locations on topographic maps, measuring property dimensions, and describing the nature and extent of all cultural remains. Selected artifacts and cultural features were photographed. Site maps were produced showing the relative locations of all documented remains. No subsurface testing was conducted, nor were any cultural materials collected.

Historic Research

During the current investigation, RTI consulted a myriad of sources to gather information about the documented historic sites. Maps were reviewed that display the routes of historic roads and rail lines. An informal interview was made of the local resident of an area farmstead (Dickerson, 2005:13). Numerous cultural resource reports and historic overviews were consulted for information directly pertaining to historic development of the Great Falls hydroelectric facilities as well as the Chicago, Milwaukee, St. Paul, and Pacific Railroad's (Milwaukee Road) North Montana Line. Additionally, county land and title records were examined for information of historic title transfers for all recorded farmsteads within the project area.

Previously recorded cultural sites were reexamined with amendments made to existing Montana Cultural Resource Inventory System (CRIS) site forms. All newly discovered sites were recorded on CRIS forms.

3.7.2 INVENTORY RESULTS

Ten cultural properties lie within the APE of SME's HGS Salem site. The ten include five previously recorded sites, and five discovered and recorded as part of the recent project (Dickerson, 2005:13). Nine of the ten sites were fully recorded or amended. One newly discovered farmstead (field number RTI-05025-04) was identified but not fully documented due to lack of access to the property. All of the properties are affiliated with the historic period.

Table 3-20 presents a list of the 10 sites documented within the project area. The sites include the Great Falls Portage National Historic Landmark (24CA238), the Chicago, Milwaukee, St. Paul & Pacific Railroad (24CA264), the Morony Transmission Line (24CA289, Feature 2), the Rainbow Transmission Line (24CA291, Feature 34), the Rainbow-Ryan Road (24CA416), three historic farmsteads (24CA986, 24CA987, and 24CA988), the Cooper Railroad Siding (24CA989), and another historic farmstead that has not been fully recorded (temporary field number RTI-05025-4).

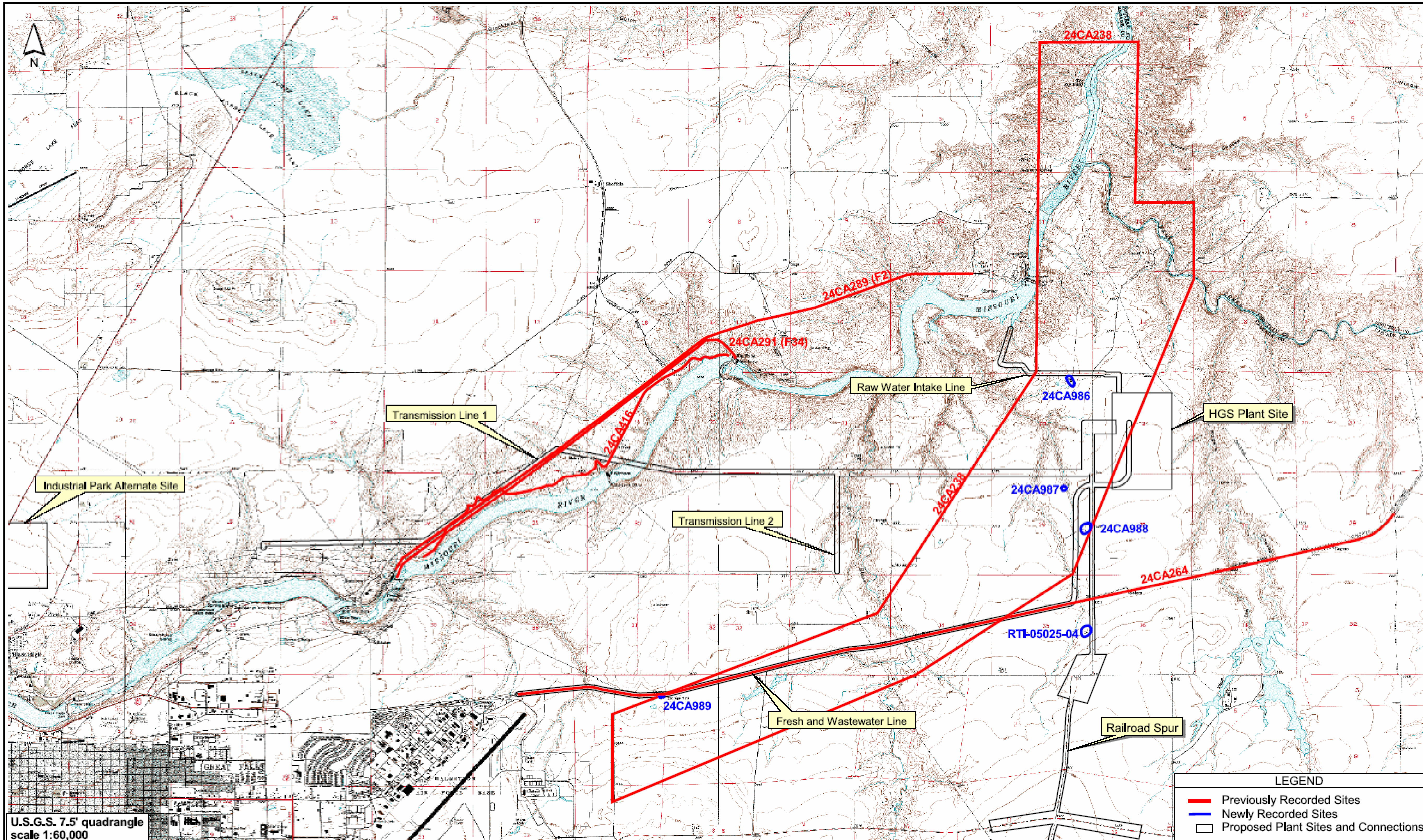


Figure 3-39. Area of Potential Effect of the Highwood Generating Station at the Salem Site

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Table 3-20. Cultural Sites Documented Within SME's Project Area

Site Number	Description	Legal Location*	National Register Eligibility/Status
24CA238	Great Falls Portage National Historic Landmark	T20N, R5E, Secs 3-7; T21N, R5E, Secs 13-14, 23-27, 33-35	Listed, National Historic Landmark
24CA264	Chicago, Milwaukee, St. Paul & Pacific Railroad	T20N, R4E, Sec 1; T20N, R5E, Secs 5, 6; T21N, R5E, Secs 32-35	Eligible; portion lying within SME's project area is a non-contributing element
24CA289 Feature 2	Morony Transmission Line	T21N, R4E, Secs 24-26	Contributing Element of an Eligible District
24CA291 Feature 34	Rainbow Transmission Line	T21N, R4E, Secs 24-26	Contributing Element of an Eligible District
24CA416	Rainbow-Ryan Road	T21N, R4E, Secs 25, 26; T21N, R5E, Sec 19	Eligible
24CA986	Historic Farmstead	T21N, R5E, Sec 23	Ineligible
24CA987	Historic Farmstead	T21N, R5E, Sec 26	Ineligible
24CA988	Historic Farmstead	T21N, R5E, Sec 26	Ineligible
24CA989	Cooper Siding	T20N, R5E, Sec 6	Ineligible
RTI-05025-4	Historic Farmstead	T21N, R5E, Sec 35	Unevaluated; presumed ineligible**

Source: Dickerson, 2005

* The legal locations listed above encompass only those portions of sites situated within SME's project area.

** Property RTI-05025-4 was noted in the field, but not formally recorded or evaluated for National Register eligibility.

Detailed descriptions and record forms for each site are contained in the project report: *Southern Montana Electric Generation and Transmission Cooperative's Highwood Generating Station, Cascade County, Montana: Cultural Resource Inventory and Evaluation* (Dickerson, 2005).

<u>The Great Falls Portage National Historic Landmark (24CA238)</u> (Figure 3-40) is a historic landscape area associated with the portage of the Lewis and Clarke, Corps of Discovery, travels around the Great Falls of the Missouri River in 1805. The site was first recorded in 1976, with revisions to the National Landmark nomination form in 1984 (Witherell, 1984). The Great Falls Portage National Historic Landmark (NHL) is an approximately one-mile (1.6-km) wide discontinuous corridor spanning from the lower portage camp, located immediately north of the mouth of Belt Creek, to White Bear Island at the southern outskirts of Great Falls. RTI's 2005 inventory covered portions of the northern section of the NHL corridor extending northeast from the eastern boundary of Malmstrom Air Force Base. Within the inventory project area, RTI found no physical evidence of the Corps of Discovery's portage activities. No camp features, artifacts, or similar evidence was found on the surface.

<u>Chicago, Milwaukee, St. Paul & Pacific Railroad (Milwaukee Road) (24CA264)</u> (Figure 3-41) A 5.5-mile (8.9-km) section of the Milwaukee Road's North Montana Line east of Malmstrom Air Force Base lies within the current project area. SME proposes to bury fresh- and waste-water discharge lines within a section of the railroad grade extending from the HGS to points connecting with the Great Falls potable water and wastewater systems.

Figure 3-40. View of the Great Falls Portage National Historic Landmark's (24CA238), Northern End with Morony Dam in the Center and Belt Creek Canyon in the Distance

Figure 3-41. View toward East-Northeast of 242A262, the Historic Chicago, Milwaukee, St. Paul & Pacific Railroad

This historic period linear site consists of discontinuous sections of the Milwaukee Road and its spur lines in the Great Falls area. The property has been documented and described by several authors, a summary of which is provided by Dickerson (2005:20-21). A 5.5-mile (8.9 km) long section of the Milwaukee Road North Montana Line located east of Malmstrom Air Force Base lies within the current project area. The Milwaukee Road linear site, in its entirety within

Cascade County, has been recommended as eligible for listing on the National Register (Dickerson, 2005:22), however due to a lack of integrity exhibited by the 5.5-mile (8.9-km) segment within the proposed SME project area, Dickerson proposes that the particular segment to be a non-contributing element of the historic property.

Morony Transmission Line (24CA289, Feature 2) and Rainbow Transmission Line (24CA291, Feature 34) SME proposes to construct a new overhead transmission line that will run from the HGS to the Great Falls Switchyard. The new transmission line will cross the historic lines in one location and will run parallel for the remainder of the project area.

These historic sites constitute two parallel electric transmission lines recorded within the project area. The lines are associated with the Morony and Rainbow hydroelectric facilities constructed in the early 1900's. The historic electric transmission lines through the project area are contributing elements to the National Register eligible property of the Great Falls Historic Hydroelectric District (RTI, 1991: Section 7, page 30; Rossillon et al., 2003:28-30). It is understood that the transmission lines played integral roles in the early twentieth century development of the Missouri-Madison hydroelectric system.

Rainbow-Ryan Road (24CA416) Approximately 0.75 mile (1.2 km) of the historic road grade is within SME's project area.

Constructed in the 1920's to aid access between the Rainbow and Ryan power plants, the road was reconstructed as part of Montana's WPA-funded highway program in 1939. The roadway within the subject project area consists of a 22-foot wide graded gravel surface with four crossing structures consisting of three culverts with stone headwalls and one timber bridge with stone abutments. Previous and recent investigators of this site have recommended that the property is eligible for listing on the National Register. Investigators have considered the site eligible for National Register listing because it embodies significant design qualities and construction techniques used for secondary highways constructed with Public Works funds during the Depression era (Rossillon et al., 2003:34).

Historic Urquhart Farmstead (24CA986) The site is about 0.5 mile (0.8 km) northwest of the HGS. SME proposes to construct a buried raw-water intake pipeline immediately north of the farmstead.

The historic Urquhart Farmstead has structures which post-date the purchase by the Urquhart family in 1929. There are 11 historic buildings (pre-1955) on the property that continue in use as a family farm. According to the recent investigation (Dickerson 2005:32), the property appears to lack integrity of materials, design, and workmanship, thus making the recommendation that it is not eligible for listing on the National Register.

Historic Somppi Farmstead (24CA987) The farmstead is 0.5 mile (0.8 km) southwest of the Salem site of the HGS. SME proposes to construct two overhead electric transmission lines immediately north of the site and to bury fresh- and waste-water pipelines to the southeast. John Somppi acquired the property, on which the documented historic structures are associated, during the period of 1934 to 1946 (Dickerson, 2005:34). There are three historic buildings including a house, granary, and a shed. All of the buildings have been abandoned for many years and are in relatively poor condition. The recent documentation of the historic property suggests that the farmstead lacks historic integrity. Many of the buildings have been moved to their current locations from other locations. Because the historic arrangement of the small farmstead has been extensively altered, the investigator recommends that the property is not eligible for listing on the National Register.

Historic Kantola Farmstead (24CA988) The site is situated over one-half mile (0.8 km) southwest of the HGS. SME proposes to construct a railroad spur line within the Salem Road corridor immediately adjacent to the farmstead, and to install underground fresh- and waste-water pipelines immediately west of the property.

The land on which the site is located was patented by Victor Kantola in 1913 and the property remains in the ownership of the Kantola family to the present day (Dickerson, 2005:36). All improvements to the property post-date 1913 with many of the structures apparently constructed after 1920. There are eight historic buildings on the site, including an historic schoolhouse that was moved to the site. The historic farm house has been subjected to considerable alterations that compromise its original form, scale, and materials. Several of the buildings are not on their original sites, but were moved to the farm for re-use. The author of the recent investigation is recommending that due to a lack of integrity, the farmstead is not eligible for listing on the National Register.

Cooper Siding (24CA989) SME proposes to install buried fresh- and waste-water pipelines within the historic railroad bed.

Cooper was one of many sidings along the North Montana Line of the Milwaukee Road. The historic siding was used beginning in the 1940's. A grain elevator was constructed adjacent to the tracks sometime prior to 1954. The line was abandoned in 1980, and the rails and ties were removed. The land later reverted to the ownership of adjacent land owners. The investigator of the recent study indicates that the Cooper Siding lacks historic integrity because almost all of the original buildings have been demolished (Dickerson 2005:25). The remains of the site do not easily convey an indication of the site's original function. In this regard, it has been recommended that the site is not eligible for listing on the National Register.

Historic Farmstead (unrecorded, RTI-05035-4) During the recent inventory and investigation, RTI noted this potentially historic farmstead. The site is located immediately west of SME's proposed railroad spur and south of the fresh- and waste-water pipelines.

The current owner did not grant RTI access to the property; therefore, formal investigation and recording could not be accomplished. The site was only briefly noted in the project report. The property contains at least seven historic buildings, including an historic house that has been extensively altered during the modern period. It is presumed from records search and a cursory and distant viewing of the property that the structures were possibly constructed sometime during the 1920's to 1930's. The investigators have presumed that, due to an apparent lack of integrity and significance, the site is potentially not eligible for listing on the National Register.

3.7.3 Traditional Cultural Properties

On January 20, 2006, RUS sent letters to eight organizations in the Montana-Wyoming Tribal Leaders Council – including the Blackfeet Tribal Business Council, Crow Tribal Council, Chippewa Cree Business Committee, Fort Belknap Community Council, Fort Peck Tribal Executive Board, Little Shell Tribe of Chippewa Indians of Montana, Northern Cheyenne Tribal Council, and Salish & Kootenai Tribal Council – informing them of the Proposed Action and EIS process and inviting comment and participation. In addition, identical letters were sent to Tribal Historic Preservation Officers at the Blackfeet Nation, the Chippewa Cree Tribe of the Rocky Boy's Reservation, the Fort Belknap Indian Community, the Northern Cheyenne Tribe, and the Confederated Salish and Kootenai Tribes of the Flathead Reservation.

By way of this letter, RUS formally requested consultation with the tribes on SME's proposal. RUS also asked tribal representatives to advise RUS if they have specific concerns regarding either of the proposed locations of the HGS, and in particular, for any information they may have on the possible presence of Traditional Cultural Properties (TCPs) or sacred sites at either of the proposed locations under study.

Traditional Cultural Property (TCP)

A Traditional Cultural Property (TCP) can generally be defined as a property that is eligible for inclusion on the National Register of Historic Places because of its association with cultural practices or beliefs of a living community that are important in maintaining the continuing cultural identity of the community. TCPs are essential to maintaining the cultural integrity of many Native American Indian nations and are critical to the cultural lives of many of their communities.

TCPs are often hard to recognize and may not come to light through conducing archeological or historical surveys. The existence and significance of such locations often can be ascertained only through interviews and consultation with traditional cultural practitioners. Moreover, it must be recognized that requiring religious practitioners to fully disclose their beliefs about a traditional place may, from their perspective, require them to violate tradition in a manner that they believe to be destructive to the place, their culture and themselves.

Due to the unique circumstances surrounding government-to-government consultation, it is incumbent upon the Federal Government to respectfully balance Native American Indian cultural values with other public interests and to view potential TCPs in a culturally sensitive manner in federal agency planning and program implementation.

Two responses were received from tribes to this request for consultation. The Northern Cheyenne Tribe expressed concern about cumulative air quality impacts and asked to receive the Draft EIS. The Blackfeet Tribal Historic Preservation Office requested a site visit, which was held on March 24, 2006. Two representatives of the Blackfeet Tribal Historic Preservation Office in Browning, MT met with the manager of SME and Montana Rural Development's Native American Coordinator and were given a tour of both possible sites and an explanation of the Proposed Action.

To date, no TCPs have been identified at either the Salem site or the Industrial Park site.

3.8 VISUAL RESOURCES

3.8.1 TERMINOLOGY AND METHODOLOGY

In environmental analysis, the term "visual resources" is often used interchangeably with "scenic resources" or "aesthetics." The very notion of visual resources or a "viewshed" denotes an interaction between a human observer and the landscape he or she is observing. The inherently subjective response of the observant human viewer to the various natural and/or artificial elements of a given landscape and the arrangement and interaction between them is at the heart of visual resources impacts analysis.

A related term, visual quality, is what viewers like and dislike about the visual resources which comprise a particular scene. While different viewers may evaluate visual resources in different lights, there is a broad consensus that, say, views of Glacier National Park's St. Mary Lake possess higher visual quality than views of, say, economically depressed urban settings or industrial facilities. Almost all observers would prefer to see the Grand Canyon of the Colorado River in Arizona when the air is crisp and clear, and the opposite rim visible in sharp relief, rather than when haze and smog from various sources obscure the vista. But as to whether a view of the Grand Canyon has higher visual quality than a view of Manhattan's skyline depends entirely on the observer's values, aesthetic sensibilities, and subjective preferences. Neighbors and travelers may, in particular, have different opinions on what they like and dislike about a scene. Viewers tend to define visual quality in terms of natural harmony, cultural order, and project coherence (MNDOT, 2005).

A "viewshed" is a subset of a landscape unit and consists of all the surface areas visible from an observer's viewpoint. The limits of a viewshed are defined as the visual limits of the views located from the proposed project. A viewshed also includes the locations of viewers likely to be affected by visual changes brought about by project features (Caltrans, no date).

Americans look to the American countryside, and especially the landscapes of their public lands, as a source of inspiration and to provide places to escape modern/urban routines/settings and enjoy the beauty of nature firsthand (BLM, 2003c). Federal land management agencies such as the Bureau of Land Management (BLM), U.S. Forest Service, and National Park Service are very concerned with managing and protecting visual resources. Any activities that occur on public lands, such as recreation, mining, timber harvesting, grazing, building and maintaining power transmission lines, or road development for example, have the potential to disturb the surface of the landscape and thus impact or impair scenic values. Visual resource management (VRM) is a system developed by BLM for minimizing the visual impacts of surface-disturbing activities and maintaining scenic values for the future. BLM manages 264 million acres (107 million hectares) – one-eighth of the land area of the U.S. – more than any other federal or state agency in the country. BLM lands are located primarily in 12 Western states and include almost eight million acres (3.2 million hectares) in Montana alone (BLM, 2005; BLM, 2003d).

While BLM's VRM was developed for application on the public lands managed by that agency, it is a useful tool to assess impacts on private lands as well. At a location like the preferred site for the HGS – the Salem site – which, while on private land, is partially located within a National Historic Landmark designated in good part for its scenic values, it also makes sense to use VRM in at least a limited form. VRM consists of two stages – inventory (visual resource inventory) and analysis (visual resource contrast rating).

VRM's visual resource inventory consists of identifying the visual resources of an area and assigning them to inventory classes using BLM's visual resource inventory process (BLM, no date-a). The process involves rating the visual appeal of a tract of land, measuring public concern for scenic quality, and determining whether the tract of land is visible from travel routes or observation points. Based on these three factors, BLM-administered lands are placed into one of four visual resource inventory classes. These inventory classes represent the relative value of the visual resources. Classes I and II are the most valued, Class III represents a moderate value, and Class IV represents the least value.

VRM's analysis stage involves determining whether the potential visual impacts from proposed surface-disturbing activities or developments will meet the management objectives established for the area, or whether design adjustments will be required. A visual contrast rating process is used for this analysis, which involves comparing the project features with the major features in the existing landscape using the basic design elements of form, line, color, and texture.

This EIS utilizes the VRM framework to identify and describe visual resources at the two sites in question. It also uses a simplified version of the VRM approach to rate the impacts of building and operating a coal-burning power plant and appurtenant facilities – primarily the power transmission line interconnectors – at both the Salem and Industrial Park sites. However, this Visual Resources section does not examine the "visibility" issue as it relates to air quality in federal mandatory Class I areas, which are covered in the Air Quality sections (Sections 3.2 and 4.4).

The first step in the VRM Visual Resource Inventory is the scenic quality evaluation. Scenic quality is a measure of the visual appeal of a tract of land. This evaluation assesses a landscape according to seven key factors and rating criteria: landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modifications (Table 3-21). In the visual resource inventory process, the landscape under evaluation is given an A, B, or C rating based on its aggregate score in the seven rating criteria.

Table 3-21. BLM's VRM Scenic Quality Inventory and Evaluation Chart

Key factors	**Rating Criteria and Score**	.	.
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features.

	exceptionally striking and intriguing such as glaciers. **5**	not dominant or exceptional. **3**	**1**
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. **5**	Some variety of vegetation, but only one or two major types. **3**	Little or no variety or contrast in vegetation. **1**
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. **5**	Flowing, or still, but not dominant in the landscape. **3**	Absent, or present, but not noticeable. **0**
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. **5**	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. **5**	Adjacent scenery moderately enhances overall visual quality. **3**	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. *** 5+**	Distinctive, though somewhat similar to others within the region. **3**	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. **2**	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**	Modifications add variety but are very discordant and promote strong disharmony. **-4**

* A rating of greater than 5 can be given but must be supported by written justification.
Source: BLM, no date-a

SCENIC QUALITY
A = 19 or more
B = 12-18
C = 11 or less

The next step in the VRM visual resource inventory is the sensitivity level analysis. Sensitivity levels are a measure of public concern for scenic quality. The landscape being inventoried is assigned high, medium, or low sensitivity levels by analyzing the various indicators of public concern. These include:

1. Type of Users. Visual sensitivity will vary with the type of users. Recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.

2. Amount of Use. Areas seen and used by large numbers of people are potentially more sensitive. Protection of visual values usually becomes more important as the number of viewers increases.

3. Public Interest. The visual quality of an area may be of concern to local, State, or National groups. Indicators of this concern are usually expressed in public meetings, letters, newspaper or magazine articles, newsletters, land-use plans, etc. Public controversy created in response to proposed activities that would change the landscape character should also be considered.

4. Adjacent Land Uses. The interrelationship with land uses in adjacent lands can affect the visual sensitivity of an area. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be visually sensitive.

5. Special Areas. Management objectives for special areas such as Natural Areas, Wilderness Areas or Wilderness Study Areas, Wild and Scenic Rivers, Scenic Areas, Scenic Roads or Trails, and Areas of Critical Environmental Concern (ACEC), frequently require special consideration for the protection of the visual values. This does not necessarily mean that these areas are scenic, but rather that one of the management objectives may be to preserve the natural landscape setting. The management objectives for these areas may be used as a basis for assigning sensitivity levels.

6. Other Factors. Consider any other information such as research or studies that includes indicators of visual sensitivity.

The third step of the VRM Visual Resource Inventory, subdivides landscapes into three distanced zones based on relative visibility from travel routes or observation points. The three zones are: foreground-middleground, background, and seldom seen. The foreground-middle ground (fm) zone includes areas seen from highways, rivers, or other viewing locations which are less than 3-5 miles (5-8 km) away. Seen areas beyond the foreground-middleground zone but usually less than 15 miles (24 km) away are in the background (bg) zone. Areas not seen as foreground-middleground or background (hidden from view) are in the seldom-seen (ss) zone.

3.8.2 SALEM SITE

The Salem site is characterized by a gently sloping landscape ranging from about 3,260 ft. MSL to about 3,320 ft. (994 - 1,012 m) MSL. Off-site, this plateau-like landscape is incised by steep-sided coulees or gullies (e.g. Rogers Coulee just to the east of the project site) that cut into the land surface and range from a few feet deep to 100-200 feet (30-60 m) deep. These coulees run largely north-south and drain to Belt Creek to the northeast of the Salem site and the Missouri River to the northwest. The lands on the site itself and in the immediate vicinity are farmed (except for the coulees), with wheat being the dominant crop. The Highwood Mountains are prominently visible to the east at a distance of about 15 miles (24 km). Looking toward the south, the Little Belt Mountains that rise to over 9,000 ft. (2,740 m) MSL also are visible about 30-40 (48-64 km) miles away. Looking westward, the front range of the main Rocky Mountains also can be seen on clear days. Figures 3-42 to 3-44 are photographs from the site that illustrate some of its primary features.

Figure 3-42. Salem Site Looking South

Figure 3-43. Salem Site Looking North

Figure 3-44. Salem Site Looking East with Highwood Mountains Visible in Distance

Table 3-22 contains the scenic quality inventory for the Salem site.

Table 3-22. VRM Scenic Quality Inventory and Evaluation Chart for Salem Site

Key factors	Score
Landform	3
Vegetation	2
Water	0
Color	2
Influence of adjacent scenery	4
Scarcity	1
Cultural modifications	1
Overall score	**13**

Table 3-23 contains the sensitivity level analysis for the Salem site.

Table 3-23. VRM Sensitivity Level Analysis for Salem Site

Indicators of public concern	Sensitivity level
Type of users	Low
Amount of use	Low
Public interest	High
Adjacent land uses	Low
Special areas	High
Other factors	Medium
Overall rating	**Medium**

The next evaluation step of VRM's visual resource inventory for the Salem site is assigning a distance zone. The three zones are foreground-middleground, background, and seldom seen. The Salem site primarily would be foreground-middleground; this zone includes areas seen from highways, rivers, or other viewing locations less than 3-5 miles (5-8 km) away.

Based on these three evaluations, the visual resource inventory would assign the landscape at the Salem site a ranking of Class III, that is, as possessing moderate visual or scenic values.

3.8.3 INDUSTRIAL PARK SITE

The Industrial Park site is characterized by a generally flat landscape at approximately 3,500 ft. (1,070 m) MSL. It appears to have been cultivated at some time in the past but currently is vegetated with a mixture of native and non-native grasses and forbs. Immediately off-site are views of the International Malting Company (IMC) malt plant, trailers, towers, transmission lines, and one or more new suburban subdivisions. When air quality and visibility are good and views are not impeded by fugitive dust or smoke from wildland fires, the Highwood Mountains to the east, Little Belt Mountains to the south, and Rocky Mountains to the west are visible in the distance. Figures 3-45 to 3-47 are photographs from the Industrial Park site that illustrate some of its primary visual features.

Figure 3-45. Industrial Park Site Looking Northeast toward IMC Malt Plant

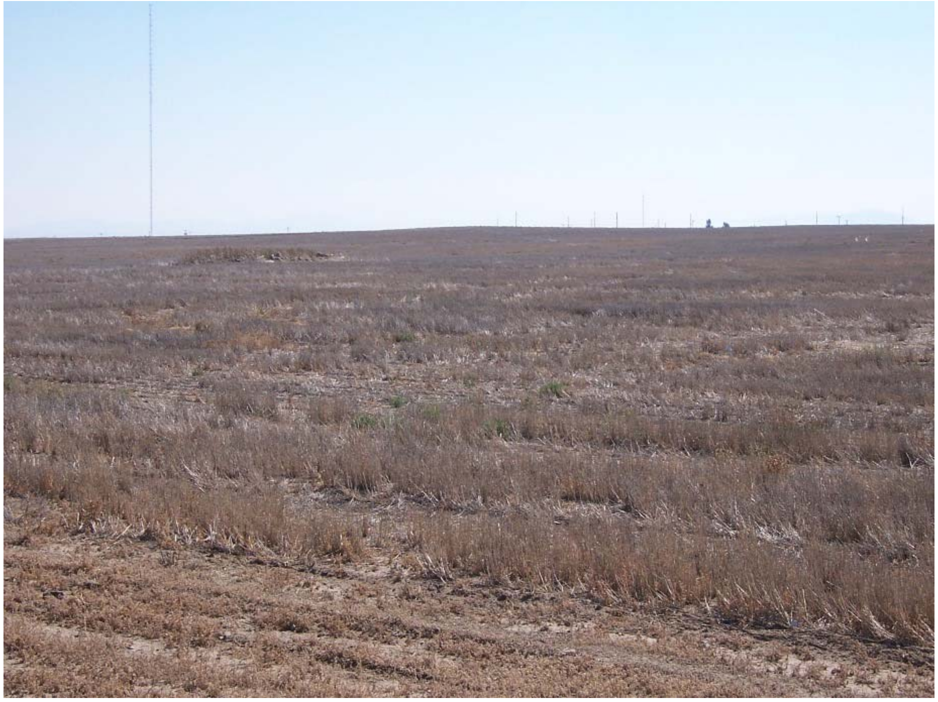


Figure 3-46. Industrial Park Site Looking Southeast toward Great Falls

Figure 3-47. Industrial Park Site Looking North

Table 3-24 contains the scenic quality inventory for the Industrial Park site.

Table 3-24. VRM Scenic Quality Inventory and Evaluation Chart for Industrial Park Site

Key factors	Score
Landform	1
Vegetation	1
Water	0
Color	1
Influence of adjacent scenery	1
Scarcity	1
Cultural modifications	-1
Overall score	**4**

Table 3-25 contains the sensitivity level analysis for the Industrial Park site.

Table 3-25. VRM Sensitivity Level Analysis for Industrial Park Site

Indicators of public concern	Sensitivity level
Type of users	Low
Amount of use	Low
Public interest	Low
Adjacent land uses	Low
Special areas	Low
Other factors	Low
Overall rating	**Low**

The next evaluation step of VRM's visual resource inventory for the Industrial Park site is assigning a distance zone. The Industrial Park site would primarily be foreground-middleground; this zone includes areas seen from highways, rivers, or other viewing locations less than 3-5 miles (5-8 km) away.

Based on these three evaluations, the visual resource inventory would assign the landscape at the Industrial Park site a ranking of Class IV, that is, as having scenic resources of least value.

3.8.4 TRANSMISSION LINE INTERCONNECTION CORRIDORS

Under each site alternative, transmission line interconnections would be developed to connect the HGS to the existing regional electricity transmission grid. From the Salem site, two corridors have been proposed for 230-kV interconnections: the first would be 4.1 miles (6.6 km) long and would connect to the grid at the Great Falls-Broadview Tap Switchyard east of Great Falls (west-southwest of the Salem site); the second would be approximately 9.2 miles (23.8 km) long and run almost due west to connect with the grid at the Great Falls Switchyard. This latter would span the Missouri River just downstream of Cochrane Dam.

No specific corridors for the alternative Industrial Park site have been delineated on maps, but one route likely would run 1-2 miles (1.6-3.2 km) east to connect with the grid at the Great Falls Switchyard.

As shown in the photographs (Figures 3-48 and 3-49), there are no large, conspicuous existing power transmission lines in the immediate vicinity of the Salem site. However, there are a number of existing 230-kV power lines in the vicinity of and crossing the Missouri River and connecting into the Great Falls Switchyard (Figures 3-50 to 3-52). About 5-6 other transmission lines already span the river between Rainbow and Morony Dams. This is due primarily to the presence of the five PPL Montana Great Falls hydropower plants.

Figure 3-48. Typical Landscape West of Salem Site

Figure 3-49. Representative Habitat and Landscape Along Proposed Route of Both Transmission Lines Near Salem Site

Figure 3-50. Missouri River Downstream of Rainbow Falls; Existing 230 kV Transmission Lines Visible Approaching and Spanning River

Figure 3-51. 230 kV Transmission Lines Prominent Element in Scenery North of Missouri River and East of Great Falls Switchyard

Figure 3-52. Great Falls Switchyard from Lewis and Clark National Historic Trail Interpretive Center Parking Lot

3.9 TRANSPORTATION

3.9.1 ROADS AND TRAFFIC

Roadway evaluations focus on capacity, which reflects the ability of the road network to serve the traffic demand and volume. The capacity of a roadway depends mainly on the street width, number of lanes, intersection control, and other physical factors such as terrain and geometry. Traffic volumes typically are reported, depending on the project and database available, as the daily number of vehicular movements (e.g., passenger vehicles, buses, and trucks) in both directions on a segment of roadway, averaged over a full calendar year (average annual daily traffic (AADT)), or averaged over a period less than a year (average daily traffic (ADT)), and the number of vehicular movements on a road segment during the evening (p.m.) peak hour. These values are useful indicators in determining the extent to which the roadway segment is used and in assessing the potential for congestion and other problems.

The performance of a roadway segment is generally expressed in terms of the Level-of-Service (LOS). The LOS scale ranges from A to F, with each level defined by a range of volume to capacity ratios. LOS criteria A, B, and C are considered good operating conditions, where motorists experience minor to tolerable delays. LOS criterion D represents below average conditions. LOS criterion E corresponds to the maximum capacity of the roadway. LOS criterion F represents a gridlock situation. Table 3-26 presents the LOS designations for several types of two-lane highway segments (level terrain, rolling terrain, and mountainous terrain) and their associated volume to capacity ratios. These levels are based on the Highway Capacity Manual of the Transportation Research Board of the National Research Council of the National Academies of Science and Engineering (TRB, 1994).

Table 3-26. Level-of-Service for General Two-lane Highway Segments

			Criteria (Volume/Capacity)		
LOS	Description	**% Time Delay**	Level terrain	Rolling terrain	Mountainous terrain
A	Free flow with users unaffected by the presence of other users of the roadway.	≤ 30	0.04-0.15	0.03-0.15	0.01-0.14
B	Stable flow, but presence of the users in traffic stream becomes noticeable.	≤ 45	0.16-0.27	0.13-0.26	0.10-0.25
C	Stable flow, but operation of single users becomes affected by interactions with others in traffic stream.	≤ 60	0.32-0.43	0.28-0.42	0.16-0.39
D	High density, but stable flow; speed and freedom of movement are severely restricted; poor levels of comfort and convenience.	≤ 75	0.57-0.64	0.43-0.62	0.33-0.58
E	Unstable flow; operating conditions at capacity with reduced speeds, maneuvering difficulty, and extremely poor levels of comfort and convenience.	> 75	1.00-1.00	0.90-0.97	0.78-0.91
F	Forced or breakdown flow with traffic demand exceeding capacity; unstable stop and go traffic.	100	>1.00	>1.00	>1.00

Source: TRB, 1994

In this table, the volume to capacity ratio is the ratio of the flow rate to an ideal capacity of 2,800 persons per hour in both directions.

The HGS Salem site is located beside the Salem Road (Figure 3-53), north of the Highwood Road, in the northwestern part of Cascade County. The portion of the county-maintained Salem Road (designated L07-204 by the MDT) in Cascade County is 6.5 miles (10.5 km) long. On the east side of Belt Creek, it crosses into Chouteau County. It is an unpaved, graded, gravel road (MDT, 2001b). Salem Road is a lightly traveled, local, rural road used primarily by farmers and rural residents in the area. On an average 24-hour day, in its southern segment near Highwood Road, it is traveled 36 times – counting vehicles making trips in both directions. That is, its ADT is 36. In the north segment of Salem Road in Cascade County, toward the proposed HGS (Salem) site, its ADT is 21 (Peterson, 2005).

The Highwood Road (S-228) is a paved, two-lane, state secondary road several miles south of the Salem site that would be used to access it from Great Falls both during construction and once it was placed in operation. The nearest ADT measurement taken by MDT is about seven miles (11 km) from its intersection with the Salem Road. The combined (both directions) ADT in 2004 was 549 (Combs, 2005).

Figure 3-53. Salem Road Looking South near HGS Site

The Industrial Park site is located just east of U.S. Route 87, north of Great Falls near Black Eagle, MT. In the immediate vicinity of the Industrial Park site, U.S. 87 is a paved, undivided, two-lane principal highway or primary arterial part of the national highway system. MDT has collected ADTs at two locations along U.S. 87 in the general vicinity of the Industrial Park site. At the intersection of North River Road and U.S. 87, just across the Missouri River, south of the exit to the Industrial Park site, the combined ADT on U.S. 87 is 7,718. North of this and the exit to the Industrial Park site, at the intersection of U.S. 87 and 25th Avenue NE, the combined ADT on U.S. 87 is 4,280 (Combs, 2005).

The LOS of any given road segment can vary by time of day, especially during peak travel periods, which, around cities and towns, typically are morning and evening "rush hours," when many commuters head to and from their workplaces. During peak periods, the LOS is often lower than at other times, reflecting some degree of traffic congestion. Hourly traffic counts would be necessary to complete a thorough analysis of LOS on roads approaching the two alternative power plant sites. However, they are not available in the present instance (Combs, 2006), and in the absence of these counts, LOS can be approximated by making a reasonable assumption as to the percentage of total ADT that occurs in peak hour periods.

With respect to the proposed Salem site, the ADTs for both the Highwood and Salem Roads are so low (549 for Highwood Road and 36 and 21 for the Salem Road, respectively) that it can be safely assumed that both roads operate at LOS A over the entire day.

With respect to the alternate Industrial Park site, assuming conservatively that 50 percent of the ADT for U.S.87 occurs during four hours of peak traffic flow, this would mean 970 vehicles per hour going both directions pass the intersection of U.S. 87 and North River Road, or about 16 vehicles per minute, which is eight vehicles per minute per direction. The Highway Capacity Manual of the Transportation Research Board of the National Research Council rates this flow rate as between LOS B and LOS C. At all other times, U.S. 87 would have a LOS A. Thus, U.S. 87 generally would be considered to have good operating conditions, with motorists experiencing minor to tolerable delays.

3.9.2 AIRPORTS

Great Falls International Airport is located at an elevation of 3,677 ft. (1,121 m) MSL, three miles (five kilometers) southwest of downtown Great Falls and on the opposite side of the Missouri River (GFIAA, 2005). It is situated about four miles southwest of the Salem Industrial site and 12-13 miles (19-21 km) from the Salem site for the HGS. The airport has a 10,500-ft. (3,200-m) runway, a 24-hr. tower, and the services, communications, and facilities characteristic of a modern, international airport.

Enplanements (passenger boardings) at Great Falls International Airport have risen gradually from 122,887 in 1989 to 141,833 in 2000, for an average of about 390 passengers boardings per day in 2000 (GFIAA, 2002). The airport averages 120 aircraft operations daily. Twenty-four percent of these operations are commercial, 24 percent transient general aviation, 23 percent air taxi, 15 percent local general aviation, and 14 percent military (GFIAA, 2005).

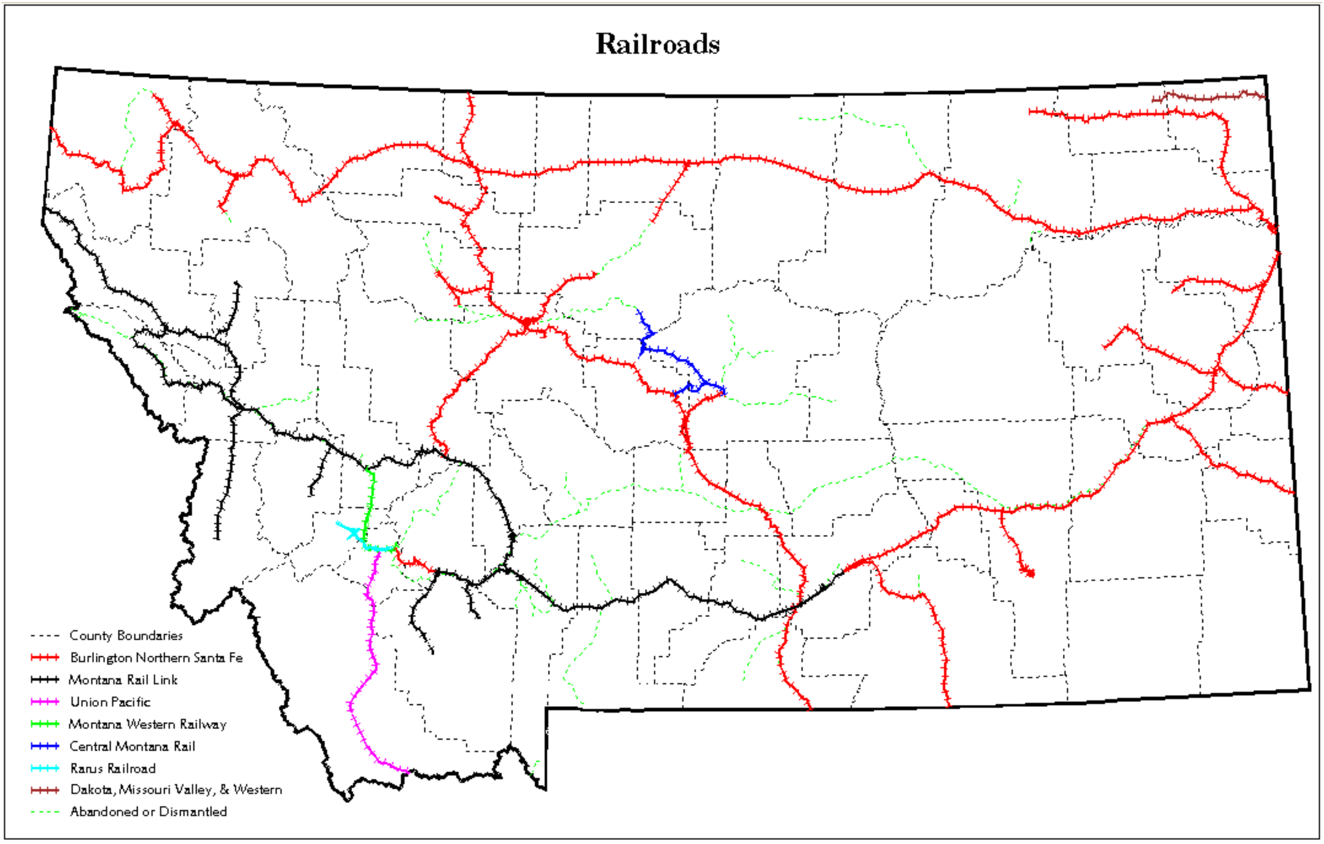
The present international airport site was recommended to the City of Great Falls in 1928 by the U.S. Department of Commerce as an excellent site for a future airport. In 1928, the City acquired 640 acres (260 ha) of land and construction was started on the first runway, which was completed in June 1929. By 1939 the airport's facilities included four runways, a large hangar, and an administration building. In 1941, the Civil Aeronautics Authority provided money for the further development of the Great Falls Municipal Airport, which was then known as Gore Field.

During World War II the airport was leased by the U.S. War Department and used as a base for the 7th Ferrying Command. During the war years, more than 7,500 bombers and fighter aircraft passed through Great Falls on their way to the war fronts in Europe and the Pacific. While using the airport as an airbase, the U.S. Army acquired an additional 740 acres (300 ha) of land and built many buildings and other facilities. In 1975, the terminal at Great Falls International Airport was replaced and all runways, aprons, and taxiways updated. With the use of Federal Aviation Administration (FAA) matching funds, the Airport Authority performs annual operations, maintenance, and capital improvements.

3.9.3 RAIL

A Burlington Northern and Santa Fe (BNSF) railroad line is located approximately six miles (10 km) south of the Salem location. (This is the railway to which the HGS proposes to build a rail spur.) Another BNSF railway passes within two miles of the Industrial Park site (MDT, 2001b). BNSF is one of the largest freight railroad operators in the United States, with 38,000 employees operating 5,675 locomotives and an average of 220,000 freight cars on a 32,000-mile (51,500-km) route system. More than 10 percent of the electricity produced in the U.S. is generated from coal hauled by BNSF, of which more than 90 percent comes from Wyoming and Montana's Powder River Basin (PRB), the world's largest single deposit of low-sulfur coal (BNSF, 2005). Figure 3-54 is a map of railroad routes in Montana.

Figure 3-54. Railroad Routes in Montana



3.10 FARMLAND AND LAND USE

3.10.1 FARMLAND

The total farmland in both Montana and Cascade County has generally decreased slightly in recent decades, while the size of the average farm unit has increased. The average size of a farm throughout the State of Montana is 2,139 acres (866 ha), while the average size of a farm in Cascade County is 1,339 acres (542 ha) (USDA, 2003). Farmland occupies approximately 70 percent of the state's total land area. Specifically, in 2002, cropland occupied 19 percent of Montana's land area, while rangeland and pasture accounted for another 51 percent (USDA, 2003).

In Cascade County, just over 80 percent of all land, or 1,388,530 acres (561,198 ha), is farmland. Of this land, 507,107 acres (205,220 ha) is in cropland, with 41,901 acres (16,957 ha) irrigated. The remaining farmland (881,423 acres or 356,700 ha) is rangeland and pasture. Nearly all the undeveloped land surrounding the proposed sites is used for cultivation, with the primary agricultural crop being winter wheat, followed by spring wheat and barley (USDA, 2003).

Figure 3-55. Typical Agricultural Land Use near Proposed Sites

The Farmland Protection Policy Act (FPPA) is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to non-agricultural uses. It assures that, to the extent possible, federal programs are administered to be compatible with state, local, and private programs and policies to protect farmland.

For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water-covered or urban built-up land.

Prime Farmland

As defined by the U.S. Department of Agriculture, this is the land with soils that possess the best combination of physical and chemical characteristics for sustainable production of food, feed, forage, fiber and oilseed crops, as well as being available for these uses.

Prime farmland may presently be under cultivation, pasture, or forest, but it may not be urban or built-up land. The soil qualities, growing season and water supply are those needed for sustained high-yield production of crops when proper management is applied.

Farmland of Statewide Importance

This is unique farmland that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable.

The Salem site is located entirely on Pendroy Clay soils. Pendroy Clays typically are used for dryland crops as well as rangeland, and are not listed as prime or any other important farmlands in the Cascade County soil survey (NRCS, 2004). The land evaluation productivity index for Pendroy Clays for the state Land Evaluation and Site Assessment (LESA) system is 46 of 100 (NRCS, 2002). A rating under 50 generally means that the soil is of marginal quality for agricultural uses, and that approximately 73 percent of soils ranked have a higher quality (NRCS, 2002).

Rangeland productivity measures the amount of vegetation that can be expected to grow annually on well-managed rangeland that is supporting the potential natural community. In a normal year, the average total dry-weight production of rangeland vegetation on Pendroy Clay soils is 1,300 pounds/acre, which is slightly less than the average rangeland vegetation productivity of soils in Cascade County (NRCS, 2004).

Pendroy Clay soils are in land capability class 4e, which consists of soils that have very severe limitations that restrict the choice of plants or require careful management, or both. The limitations of the Pendroy Clays primarily are due to their susceptibility to erosion (NRCS, no date).

The majority of the Industrial Park site is located on Ethridge-Kobase silty clay loams, with a small amount of associated facilities towards the southwest located on Linnet-Acel silty clay loams, and Kobase and Lothair silty clay loams towards the southeast.

LESA

The Natural Resources Conservation Service (NRCS) in Montana adopted a Statewide Land Evaluation and Site Assessment (LESA) System on June 20, 2003. The Statewide LESA System is used to rank and prioritize proposals for the Farm and Ranch Lands Protection Program (FRPP), and to systematically assess and identify prime agricultural lands through the use of a consistent rating scheme.

Factors are used to label a group of attributes such as soil potential, agricultural productivity, or environmental benefit. Factor scale refers to the way points are assigned to a factor, i.e. 0 to 100 points. A factor rating is the value assigned to a particular parcel. Weight refers to the relative importance of the factor in the LESA system, i.e. a multiplier applied to a factor rating (for example, 0.0 to 1.0). Score is used to denote the total of all weighted factor ratings, i.e. a LESA score.

Ethridge-Kobase and Kobase soils are used primarily for non-irrigated crops and for range, though occasionally they are used for irrigated cropland. Ethridge-Kobase soils are listed as prime farmland if they are irrigated (NRCS, 2004). The land evaluation productivity index for Ethridge-Kobase soils for the Montana State LESA system is 64 of 100 (NRCS, 2002). A rating between 50 and 75 generally indicates that the soil is of relatively good quality for agricultural uses, and that approximately 43 percent of soils ranked have a higher quality (NRCS, 2002).

Linnet-Acel soils are used mainly for non-irrigated cropland and rangeland; they are listed as farmland of statewide importance (NRCS, 2004). The land evaluation productivity index for Linnet-Acel soils for the state LESA system is 62 of 100 (NRCS, 2002), also indicating that soils are of good quality for agricultural uses.

Lothair soils are used mainly for rangeland, and are not listed as prime or any other important farmland. They have a LESA land evaluation productivity index of 46 out of 100, which generally indicates that the soil is of marginal quality for agricultural uses.

In a normal year, the average total dry-weight production of rangeland vegetation is 1,400 pounds/acre on Ethridge-Kobase soils, and 1,200 pounds/acre on Linnet-Acel and Lothair soils, which are average to slightly less than the average rangeland vegetation productivity values for soils in Cascade County (NRCS, 2004).

Ethridge-Kobase and Linnet-Acel soils all are in land capability class 3e, which consists of soils that have severe limitations that reduce the choice of plants or require careful management, or both. The limitations of these soils primarily are due to their susceptibility to erosion (NRCS, no date).

3.10.2 ZONING

CEQ regulations for implementing NEPA and MEPA require agencies to consider the consistency of a proposed action with approved state and local plans and laws, including all local ordinances and zoning policies.

In the late 1970's, the Cascade County Development Plan was adopted by the Cascade County Commissioners. The development plan labeled all land within Cascade County, that was not part of an incorporated city or town, city-county jurisdictional area, or other created zoning district, as residential/agricultural zoned land. Both the preferred location, the Salem site, and the alternative site, the Industrial site, are located entirely within Cascade County on unincorporated county land, and are thus subject to the County's zoning and permitting requirements (Clifton, 2005).

Land located within incorporated areas of the City of Great Falls is under city jurisdiction. All of the land in the City of Great Falls is zoned and subject to land development regulations. The Planning Advisory Board is designated as the City Zoning Commission. In that capacity, the Board reviews rezoning and conditional use petitions, holds public hearings, and makes recommendations to the City Commission. The Current Planning Section of the city has jurisdiction over zoning and permitting requirements and reviews land annexation applications. City building permits, safety inspection certificates, floodplain permits, design review, and zoning enforcement are the responsibility of the Community Development Department.

3.10.3 SALEM SITE

The Salem site is unincorporated county land that is zoned for agricultural uses (Clifton, 2005). This site lies eight miles (13 km) to the east of Great Falls and is currently used for dryland farming of wheat. The site is located east of the intersection between Salem Road and an abandoned railroad bed previously used by the Milwaukee, St. Paul, and Pacific railroads as a grain drop off/pick up location. The historical use

Figure 3-56. Farmstead Northwest of Proposed Salem Site

of the area has been limited to agricultural and open space activities. Though the site is currently unoccupied, there is a small abandoned building present on the site adjacent to the former railroad bed, which is most likely related to past agricultural activities.

Two single family residencies, or farmsteads, are located approximately one-half mile (0.8 km) from and adjacent to the proposed site, to the northwest and to the southwest, respectively. The raw water intake pipeline extending from the Missouri River to the proposed plant would be located immediately north of the Urquhart residence situated to the northwest (Figure 3-54).

The farmstead located to the southwest of the proposed facility is currently unoccupied. A railroad spur line within the Salem Road corridor would be constructed immediately adjacent to this farmstead and fresh- and waste-water pipelines would be buried just west of the property.

3.10.4 Industrial Park Site

The Industrial Park site remains unincorporated county land, and it is zoned for Agriculture uses by Cascade County (Clifton, 2005). The site has historically been used strictly for agricultural or open space uses. The site itself is currently undeveloped open space, and there are no existing structures on site. However, the site is located adjacent to a functioning industrial park which houses several small businesses and industries. A malting plant currently is under construction by International Malting Company (IMC) approximately one-half mile (0.8 km) southwest of the proposed Industrial site location, and is expected to be completed in the near future. The malting plant is located on previously unincorporated land which has subsequently been annexed into the City of Great Falls (Clifton, 2006). Additionally, several established and developing residential areas are located one half-mile to a mile (0.8-1.6 km) west south-west of the proposed site.

3.11 Waste Management

Under the Montana solid waste management laws (75-10-101 *et seq.* and 75-10-201 *et seq.*, MCA), licenses are required from DEQ for the disposal of solid waste and the operation of a solid waste management system in Montana.

Most municipal, commercial, and industrial solid waste, including construction debris, generated within Cascade County and disposed of off-site is delivered to the High Plains Sanitary Landfill and Recycle Center (HPSL) by either the City of Great Falls or Montana Waste Systems. The HPSL is regulated by rules adopted by DEQ in ARM 17.50.501 *et seq.*, 17.50.701 *et seq.*, and 17.50.410, 411, 415, and 416., which take the same general approach as the EPA's Criteria for Municipal Solid Waste Landfills found at 40 CRF Part 258. The landfill is exempt from liner and groundwater monitoring requirements under a waiver received from the DEQ. The waiver is based on the No Migration Demonstration approved by the DEQ based on site geology and hydrology. The HPSL is licensed under Montana Solid Waste License #225 and is owned and operated by Montana Waste Systems of Great Falls. The HPSL is located within Cascade County, approximately nine miles (14 km) north of the City of Great Falls and one mile (1.6 km) east of US Route 87. The landfill receives approximately 150,000 tons of refuse annually, or about 410 tons per day and has extensive capacity remaining (HPSL, 2006).

There are four other smaller private landfills in the Great Falls area. Three are Class III landfills that receive inert waste such as concrete rubble, and one Class IV landfill that receives mixed construction and demolition waste. These landfills primarily serve the landfill owners, all of whom are in the construction business, but occasionally take waste from outside parties. All are much smaller facilities. For example, the Shumaker Class IV landfill took in 7,505 tons of material in 2005, or 21 tons per day. The Shumaker landfill is located north of Malmstrom Air Force Base in the old railroad right-of-way. It is in the proposed water and wastewater corridor so the lines may have to be diverted slightly to the south at the landfill location.

Regulated hazardous waste cannot be accepted at the HPSL and must be delivered to a permitted hazardous waste destination, such as an incinerator or hazardous waste landfill, the nearest of which are located out of state in Oregon and Utah. A Class II landfill like the HPSL may receive household hazardous wastes or conditionally exempt small quantity generator hazardous waste.

3.12 HUMAN HEALTH AND SAFETY

3.12.1 CASCADE COUNTY AND THE CITY OF GREAT FALLS

The Cascade City-County Health Department is responsible for the prevention of disease, promotion of good health practices and protection of the environment within Cascade County and the City of Great Falls. The department administers 35 different programs in the areas of community and family, communicable disease prevention/control, health promotion/chronic disease prevention, environmental health, and public health. Additionally, the Health Department compiles and maintains statistics on the causes of mortality.

Between 1996-2000, the three leading causes of death in Cascade County were heart disease, cancer, and chronic lower respiratory disease (CLRD), while the three leading causes of death in the State of Montana were heart disease, cancer, and cerebrovascular disease (Table 3-27). The cancer incidence rate of Cascade County was slightly elevated (506.8 diagnoses per 100,000 people) compared to the overall rate of cancer in the State of Montana (443.6 diagnoses per 100,000 people) (CCCHD, 2002).

A State-funded environmental public health tracking project contracted with the Cascade City-County Health Department to identify and assess the environmental health concerns of populations within the county in 2003 and 2004 (EPHT, 2004). Of the 1,500 randomly selected households asked to participate in the study, 280 households returned useable survey responses. These survey results are summarized in Figure 3-57.

There are two National Priorities List (NPL) sites located within Cascade County: the Carpenter-Snow Creek and Barker-Hughesville sites (EPA, 2005d). The NPL is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories, and the sites listed in the NPL

Top 10 Environmental Health Issues of Concern to CASCADE COUNTY

1.	West Nile Virus	6.	Leaking Underground Storage Tanks
2.	Hantavirus	7.	Secondhand Smoke
3.	Pesticides	8.	Mining Runoff
4.	Herbicides	9.	Hazardous Waste Disposal
5.	Oil Refining	10.	Nuisance Properties

Top 10 Environmental Health Issues of Concern to FAMILIY/HOUSEHOLD

1.	West Nile Virus	6.	Oil Refining
2.	Hantavirus	7.	Pollens
3.	Dust & particulates	8.	Herbicides
4.	Carbon Monoxide from cars	9.	Restaurant Food Practices
5.	Secondhand Smoke	10.	Pesticides

Figure 3-57. Environmental Health Concerns
Source: EPHT, 2004

also are known as Superfund sites. In 2003, the Agency for Toxic Substances and Disease Registry (ATSDR), classified both sites as public health hazards.

The Carpenter-Snow Creek site is located near the town of Neihart in the Little Belt Mountains southeast of Great Falls. The site is in an historic mining district, and due to the impact of mining activities, groundwater, soils and some streams are contaminated with heavy metals and arsenic. Approximately 96 abandoned mines have been identified in the Carpenter-Snow Creek Mining District, and at least 21 of these have been identified as probable sources of contamination to surface water. There are documented impacts from mining waste to soil, surface water and stream sediments in Carpenter Creek, Snow Creek, and Belt Creek.

In 2002 and 2003, EPA collected soil/mine waste, surface water sediment and groundwater samples in the town of Neihart (Neihart Operable Unit). Concentrations of lead and arsenic were above screening levels in some residential yards and alleys. Contaminant levels in the surface water of Belt Creek as it flows through Neihart were not above drinking water standards or levels that EPA considers unhealthy for aquatic life. Contaminant levels in the sediment of Belt Creek as it flows through Neihart did not exceed levels considered safe for recreational use.

Results from two groundwater samples indicated that none of the metals were present at levels above the human health drinking water standards. In 2004, EPA conducted a cleanup of lead-contaminated soils near two historic mills within Neihart. The Neihart tailings pile along Belt Creek was capped and armored to prevent runoff or failure in floods. EPA has sampled residential soils throughout Neihart. A human health risk assessment and draft feasibility study for Neihart were completed in 2005.

The Barker-Hughesville (BH) District site is located in both Cascade and Judith Basin Counties, in the Little Belt Mountains southeast of Great Falls. The site is in an historic mining district and due to the impacts of mining activities, area groundwater, soils and surface water are now contaminated with heavy metals and arsenic. Dissolved zinc is the metal of greatest concern. Because of the contamination and risks to public health and the environment, EPA proposed the

Table 3-27. Cascade County Health Profile

Source: CCCHD, 2002

HEALTH STATUS INDICATORS	Cascade				Montana			
Fertility Rates[4] (teen births per 1,000 teen females; all births per 1,000 females of childbearing age)	Teen		All Women		Teen		All Women	
	48.4 (n=693)		65.9 (n=5,418)		36.9 (n=6,460)		58.8 (n=53,995)	
Prenatal Care (percent beginning care in the first trimester; percent receiving adequate, i.e., early and continuous prenatal care)[4]	1st Trimester		Adequacy		1st Trimester		Adequacy	
	88.2%		62.8%		82.5%		72.6%	
Percent Low Birthweight[4] (below 5 lbs. 8 oz.)	6.5%				6.5%			
Infant Mortality (deaths per 1,000 live births)[4]	8.7				6.7			
Cancer Incidence Rate (diagnoses per 100,000 population)[5]	506.8 (95% C.I. ±21.6)				443.6 (95% C.I. ±6.1)			
Leading Causes of Death[4]	1. HEART DISEASE 2. CANCER 3. CLRD				1. HEART DISEASE 2. CANCER 3. CEREBROVASCULAR DISEASE			
Heart Disease Death Rate (per 100,000 population)[4]	231.4 (n=937)				229.4 (n=10,248)			
Motor Vehicle Accident Death Rate (per 100,000 population)[4]	16.5 (n=67)				23.3 (n=1,043)			
Suicide Rate (per 100,000 population)[4]	21.5 (n=87)				18.5 (n=827)			
Traumatic Injury Death Rate (per 100,000 population)[4]	65.9 (n=267)				63.7 (n=2,847)			
Percent of Motor Vehicle Crashes Involving Alcohol	6.3% (n=783)				9.5% (n=10,688)			
Percent of the Medicaid Population Receiving Mental Health Services (FY2001)	24.0%				19.6%			
Percent of 2-yr. Olds Seen by a Health Care Provider that are Fully Immunized (2001)	78% (n=32)				92% (n=1,965)			
STD Incidence (reported cases per 100,000)	225.2 (n=912)				160.9 (n=7,191)			
HEALTH RESOURCE ASSESSMENT, 2002	**Cascade**				**Montana**			
Local Hospitals, Critical Access Hospitals (CAH), and Total Number of Beds	Local Hospitals		CAH	# beds	Local Hospitals		CAH	# beds
	2 local		0	395	36 local; 2 child/ adult psych; 1 VA		27	2,937
Rural Health Clinics, Federally Qualified Health Centers, IHS and Tribal Health Facilities (number)	RHCs	FQHCs	IHS & Tribal		RHCs	FQHCs	IHS & Tribal	
	0	2	0		36	14	17	
Availability of Basic and Enhanced 9-1-1 Services	Basic + Enhanced				Basic-all counties; Enhanced-16 counties			
Availability of Emergency Medical Services:	#	Cascade County Locations						
Basic Life Support Services	3	Belt, Great Falls						
Advanced Life Support Services	8	Great Falls						
Nursing Homes (number of facilities and beds)	3 (647 beds)				105 (7,733 beds)			
Aging Services: number of Personal Care Home [PC], Adult Foster Care [AFC], and Adult Day Care [ADC] Licenses	PC (# beds)		AFC	ADC	PC (# beds)		AFC	ADC
	15 (431)		5	2	147 (3,173)		106	64
Home Care Services: number of Home Health Agency [HHA] and Hospice Licenses	HHA		Hospice		HHA		Hospice	
	2		1		51		30	
Public Health Resources: number of full-time equivalent Public Health Nurses [PHN], Registered Sanitarians [RS], Registered Dietitians [RD], and Health Educators [HlthEd]	PHN	RS	RD	HlthEd	PHN	RS	RD	HlthEd
	7.6	5.5	0	3	116.1	81.5	14.4	26.9
Primary Care Provider Resources: number of doctors [MDs and DOs], Nurse Midwives [NMW], Nurse Practitioners [NP], and Physician's Assistants [PA-C]	MD/DO	NMW	NP	PA-C	MD/DO	NMW	NP	PA-C
	96	3	26	13	1,060	31	298	210
Dental Resources: Dentists and Dental Hygienists	52 dentists		28 hygienists		477 dentists		391 hygienists	
Health Care Provider Shortage Status:	Federal HPSA: None							
Health Professional Shortage Areas [HPSA]	Mental Health HPSA: No				Dental HPSA: Medicaid population			
Medically Underserved Areas or Populations [MUA/MUP]	MUA/MUP: Cascade CCD & CT/BNAs 3,4,5,6,7,8,9,16,104							

4 1996-2000, Office of Vital Statistics.

5 1996-2000 average, age-adjusted to 2000 standard-million population, Montana Central Tumor Registry, DPHHS.

* Non-transporting

site for the NPL for Superfund clean up in December 2000. On September 13, 2001, the site was listed as a final NPL site in the *Federal Register*.

There are approximately 46 abandoned mines in the BH District. Sixteen have been identified as water contamination sources because of their proximity to surface streams. These abandoned mines and associated contamination are dispersed throughout a 6,000-acre (2,430 ha) watershed. Metals and arsenic contamination of soils, groundwater, and surface water have been documented in several studies conducted at the site since 1990. Ten discharging adits (horizontal mine openings) also have been identified. Cleanup on the sites is ongoing.

3.12.2 SALEM SITE AND INDUSTRIAL PARK SITE

On July 1, 2004, Phase I Environmental Site Assessments (ESAs) were completed on both the Salem and Industrial Sites in order to identify recognized environmental conditions (SME, 2004c). A recognized environmental condition (REC) is defined as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The Phase I was completed in general accordance with procedures outlined in American Society for Testing and Materials (ASTM) E1527-00, Standard Practice of Environmental Assessments: Phase I ESA Process.

The ESAs included evaluation of individual properties adjacent to and within one mile (1.6 km) of the subject sites. The evaluation included assessment of historical information pertaining to the area including historic aerial photographs, historic topographic mapping, available fire insurance mapping, a review of regulatory records for the areas, and visual evaluation of the assessment areas. Historically, activities conducted within the assessment areas have been for agricultural purposes, much as they are today. There were no recognized environmental conditions or concerns identified during the site assessments at either the Salem site or the Industrial site (SME, 2004). However, the ESA at the Industrial site identified two Resource Conservation Recovery Information System (RCRIS) small quantity hazardous waste generators and a Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) – No Further Remedial Action site, within a ¾ mile (1.2 km) radius of the site. Additionally, the ESA identified one state hazardous waste site under the Montana Comprehensive Environmental Cleanup and Responsibility Act (CECRA) and one state leaking underground storage tank (LUST) within one mile (1.6 km) of the Industrial site.

3.13 SOCIOECONOMIC ENVIRONMENT

3.13.1 CASCADE COUNTY AND CITY OF GREAT FALLS – A BRIEF HISTORY

The preferred Salem site and the alternative Industrial Park site of the proposed HGS are located in Cascade County, MT. Both are also near the City of Great Falls, MT. The Salem site is approximately eight miles (13 km) to the east and the Industrial Park site a mile or two to the north, on the northern edge of the city, within the city's designated Central Montana Agricultural and Technology Park.

The City of Great Falls was settled around the Missouri River, one of the most important rivers in the American West. The Missouri has the fourth-largest drainage basin of any river in North America (after the Mississippi, St. Lawrence, and Mackenzie) and the second greatest "virgin" (original) discharge of any river in the American West (after the Columbia) (Benke and Cushing, 2005). The Missouri provided the city with its name as well as its reason for being. As the river traverses the city it drops over 500 feet (150 m) in a series of rapids and five impressive waterfalls – the Great Falls of the Missouri River (CGF, no date).

Figure 3-58. Great Falls, Montana today

In June 1805, Merriwether Lewis and William Clark were the first known white explorers to catch sight of the "great falls" of the Missouri River. Since the Corps of Discovery was traveling by keelboat and canoe, this series of waterfalls presented a formidable obstacle to their advance. In fact, the Corps of Discovery took a month to portage all its gear and equipment upstream above the last falls, a mere 18 miles (29 km) away, using the portage route north of the river described in Section 3.9 (BSF, no date). By mid-July of 1805, the expedition had left the Great Falls behind and did not return. Except for the occasional trapper or mountain man passing through, the area remained undeveloped and uninhabited by Euro-Americans until the 1880's.

Entrepreneur Paris Gibson first arrived at Great Falls in 1880, and almost immediately began to plan a city at the location. Gibson selected this site because he recognized its potential as a transportation hub for nearby coal fields and other natural resources. From the beginning, Great Falls was a planned city, unlike other Montana and western boom-and-bust mining towns. Everything from straight streets, minimum width of streets and the location of parks was meticulously planned. Gibson and railroad magnate James Hill expended considerable effort in laying out and developing the city. Great Falls officially began settlement in1884 and by 1886 had more than 1,000 residents and numerous businesses. The railroad arrived one year later, allowing the agricultural potential of the area around Great Falls to be tapped. In 1888, a silver smelter was built along the Missouri River just outside of town (BSF, no date).

Shortly after the invention of electrical generators, Gibson, recognizing the huge potential for hydroelectric power from the falls on the Missouri River, built the first dam at Black Eagle Falls, just outside downtown. Other dams and hydropower plants followed, earning Great Falls the nickname of "The Electric City". Throughout the first half of the 20th century, Great Falls continued to grow steadily, unlike many boom-and-bust mining and cattle towns throughout the West. By the late 1950's, Great Falls was the largest city in Montana, with a population of 55,000 in the 1960 census (BSF, no date).

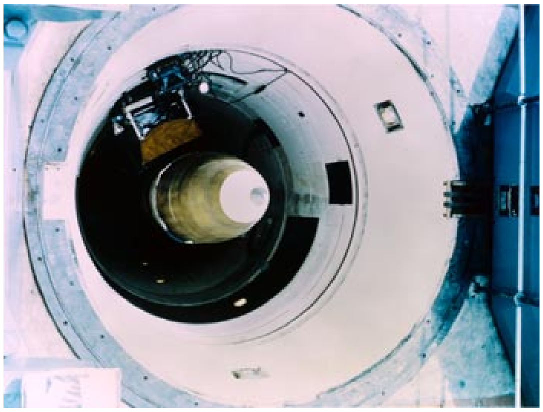


Figure 3-59. Minuteman III in its Silo

World War II facilitated this steady population growth. The city had appealed to the War Department for an Air Force Base (AFB) before World War II. With the onset of war, this airbase became a reality; known as East Base, it housed and trained bomber crews of the 2nd Air Force. East Base, located just east of Great Falls, was continuously expanded throughout the war and after it. The Strategic Air Command (SAC) took over the airbase in the 1950s and in 1959, the name of East Base was changed to Malmstrom AFB (Malmstrom or AFB). Starting in the late 1950s and continuing to the present, Malmstrom has housed a number of nuclear missile silos as an integral part of the nation's strategic defense system (BSF, no date). Malmstrom's 341st Space Wing controls 200 Intercontinental Ballistic Missiles (ICBMs), missiles tipped with nuclear warheads – originally Minuteman I and Minuteman II, now Minuteman III (Figure 3-57) – in underground silos scattered around nine central Montana counties (Anon., 2004). This missile complex is the largest in the Western Hemisphere. The 341st manages a variety of equipment, facilities, and vehicles worth more than $5 billion (MAFB, 2002).

With about 3,400 military personnel, the AFB contributes $134 million a year in payroll and direct spending in the Great Falls area. Adding in the indirect impact of Malmstrom on area businesses, the total economic impact of the base increases to about $284 million annually. The AFB accounts for 35 percent of the city's economic base. In addition to military employees and their 5,000 dependents, the MAFB also employs about 370 civilian workers, while another 1,270 civilians do at least some work involving Malmstrom under private contracts. The base also affects the Great Falls economy in less direct ways. Some 1,400 retired military people live in the Great Falls area, in part because of services available at the AFB. The 15,000 people with at least some connection to the AFB comprise more than 20 percent of Cascade County's population (Anon., 2004). City and state officials were relieved by the recent Department of Defense decision that Malmstrom AFB should be kept off the 2005 Base Realignment and Closure (BRAC) list (Baucus, 2005).

During the 1970s and 1980s, the closure of many resource extraction businesses in Montana, the departure of several railroads, and the adjustments facing agriculture all combined to stifle the growth of Great Falls. By 1990, the city still had a population of about 55,000 people, though some growth had occurred outside of the city limits (BSF, no date).

Figure 3-60. Cascade County Courthouse in Great Falls

In the 1990s certain new industries appeared in Great Falls, offsetting the disappearance of older manufacturing and resource extraction jobs. By the 2000 Census, the city had a population of 56,690 (USCB, 2005c), with additional population growth having occurred outside the official city limits.

Great Falls today still reflects the careful planning at the time of its creation in the 1880s. Virtually all streets are on a straight grid-pattern and the main streets in the downtown are wide and easy to navigate. Most streets are also tree-lined, which used to be unusual for western prairie towns. Numerous parks, especially along the Missouri River, are scattered throughout town. The changing nature of Montana's economy, from one based on raw materials extraction, manufacturing and agriculture to one based on tourism and services, has largely bypassed Great Falls (BSF, no date).

Great Falls has two colleges: the Great Falls campus of Montana State University (MSU) and the University of Great Falls. The MSU-Great Falls College of Technology provides about 2,000 students with a two-year educational curriculum that offers associate degrees and preparation for transfer to a four-year university (MSU-GF, 2004). The University of Great Falls is a private, Catholic university founded in 1932 (UGF, no date).

Great Falls is the seat of government for Cascade County. The county was created in 1887 out of four other counties two years before Montana became the 41st state (CC, no date). U.S. Census counts for Cascade County show its growth through the 20th century (Table 3-28).

Table 3-28. Cascade County Population Growth, 1900-2000

Year	Cascade County Population
1900	25,777
1910	28,833
1920	38,836
1930	41,146
1940	41,999
1950	53,027
1960	73,418
1970	81,804
1980	80,696
1990	77,691
2000	80,357

Source: USCB, 1995; USCB, 2005b

The decade of the 1950s, coinciding with the expansion of East Base/Malmstrom AFB, showed more population growth than any other in the century.

3.13.2 CASCADE COUNTY AND CITY OF GREAT FALLS – DEMOGRAPHIC DATA

The City of Great Falls is by far the largest settlement in Cascade County, which is predominantly a rural, low population density, agricultural county. Table 3-29 presents recent demographic and economic data on Montana, Cascade County, and the City of Great Falls from the U.S. Census Bureau.

Table 3-29. Socioeconomic Characteristics of State of Montana, Cascade County, and City of Great Falls

Characteristic	Montana	Cascade County	City of Great Falls
Population, 2004 estimate[1]	917,621	79,849	56,155
Population, % change, 2000-2004[2]	2.7%	-0.6%	-1.0%
Population, 2000	902,195	80,357	56,690
Population, % change, 1990-2000	12.9%	3.4%	2.4%
Land Area, 2000 (square miles)	145,552	2,698	19
Persons per square mile (population density), 2000	6	30	2,909
White persons, %, 2000	91%	91%	90%
Non-Hispanic white persons, %, 2000	90%	90%	NA[3]
Black or African American persons, %, 2000	0.3%	1%	1%
American Indian persons, %, 2000	6%	4%	5%
Asian persons, %, 2000	0.5%	0.8%	0.9%
Persons of Latino or Hispanic origin, %, 2000	2%	2%	2%
Language other than English spoken at home, %, 2000	5%	5%	5%
Foreign born persons, %, 2000	2%	2%	2%
High school graduates, % of persons age 25+, 2000	87%	87%	87%
Bachelor's degree or higher, % of persons 25+, 2000	24%	22%	22%
Persons with a disability, age 5+, 2000	145,732	13,958	NA[3]
Median household income, 1999	$33,024	$32,971	$32,436
Per capita money income, 1999	$17,151	$17,566	$18,059
Persons below poverty, %, 1999	15%	14%	15%

Sources: USCB, 2005a; USCB, 2005b; USCB, 2005c
[1]2003 estimate for City of Great Falls
[2]2000-2003 for City of Great Falls
[3]Not Available

Both the City of Great Falls and Cascade County have had relatively stable populations over the last four decades. Both the city and the county mirror the State of Montana's ethnic/racial composition, which has smaller percentages of ethnic and racial minorities than in the country as a whole. The city and county also reflect statewide averages in educational attainment, per capita and household income, and poverty rates. Thus they are relatively typical or representative of Montana.

3.13.3 CASCADE COUNTY AND CITY OF GREAT FALLS – ECONOMIC DATA

Table 3-30 shows selected economic characteristics of Cascade County taken from the 2000 Census and broken down in three ways, by occupation, industry, and class of worker (USCB, 2000a).

Table 3-30. Profile of Selected Economic Characteristics, Cascade County, 2000

Subject	Number	%
Employed civilian population 16 years and over	**34,792**	**100.0**
OCCUPATION		
Management, professional, and related occupations	10,626	30.5
Service occupations	6,401	18.4
Sales and office occupations	10,324	29.7
Farming, fishing, and forestry occupations	331	1.0
Construction, extraction, and maintenance occupations	3,478	10.0
Production, transportation, and material moving occupations	3,632	10.4
INDUSTRY		
Agriculture, forestry, fishing and hunting, and mining	1,028	3.0
Construction	2,650	7.6
Manufacturing	1,212	3.5
Wholesale trade	1,289	3.7
Retail trade	4,925	14.2
Transportation and warehousing, and utilities	1,954	5.6
Information	832	2.4
Finance, insurance, real estate, and rental and leasing	2,579	7.4
Professional, scientific, management, administrative, and waste management services	2,259	6.5
Educational, health and social services	8,297	23.8
Arts, entertainment, recreation, accommodation and food services	3,454	9.9
Other services (except public administration)	1,894	5.4
Public administration	2,419	7.0
CLASS OF WORKER		
Private wage and salary workers	25,403	73.0
Government workers	5,949	17.1
Self-employed workers in own not incorporated business	3,256	9.4
Unpaid family workers	184	0.5

Source: USCB, 2000a

The City of Great Falls, with more than 70 percent of the population of Cascade County, dominates the employment statistics. Hence, among the county's occupations, "management, professional, and related operations" and "sales and office" workers outnumber those engaged in "farming, fishing, and forestry operations" more than 60:1, even though Cascade County has 94 times more rural and agricultural land than urbanized land (USCB, 2003). Table 3-31 lists the major employers in Great Falls.

Table 3-31. Major Employers in Great Falls

Company	# of Employees
Malmstrom Air Force Base	4572
Benefis Healthcare Center	2044
Great Falls Public Schools	1417
Montana Air National Guard	979
Great Falls Clinic	663
National Electronics Warranty (N.E.W.)	600
Cascade County	500
City of Great Falls	480
Wal-Mart	480
Sletten Construction Co.	375
Albertson's	300
Davidson Companies	251
US Post Office	218
Heritage Inn	190
MSU-College of Technology	190
The Great Falls Tribune	180
Burlington Northern/Santa Fe	180
Park Place Health Care	160
Express Personnel	150
University of Great Falls	126
Target	115
Shopko	100
Montana Refining Co.	78
Pasta Montana, LLC	59

Source: Montana Department of Labor and Industry, Research & Analysis Bureau; GFDA, no date.

The breakdown of Great Falls' labor force by industry is shown in Table 3-32.

Table 3-32. Industry Annual Average Employment in Great Falls

Private Business	27,212
Agriculture, Forestry, Fish	314
Manufacturing	1,216
Transportation, Communication, Utilities	1,512
Wholesale Trade	1,557
Retail Trade	8,196
Finance, Insurance, Real Estate	2,323
Services	10,325
Government	5,356
Total of all industries	**58,011**

Source: Montana Department of Labor and Industry, Research & Analysis Bureau); GFDA, no date.

Metropolitan Statistical Area (MSA)
As defined by the federal Office of Management and Budget, an MSA is an urban area that meets specified size criteria: either it has a core city of at least 50,000 inhabitants within its corporate limits, or it contains an urbanized area of at least 50,000 inhabitants and has a total population of at least 100,000. The Great Falls MSA is coincident with Cascade County.

Between 1995 and 2005, the labor force of the Great Falls Metropolitan Statistical Area (MSA) grew slightly from about 37,000 to a peak of about 40,800; the labor force was 9 percent larger at the end of this 10-year period (Table 3-33). The unemployment rate of the Great Falls MSA held relatively steady between 1995 and 2005, ranging between 4-5 percent. In 2005 through October, the MSA has had a slightly lower unemployment rate than the United States as a whole.

Labor Market Area

Because the economic impacts of the Proposed Action at either site extend beyond the political boundaries of Great Falls, the Great Falls Labor Market Area (LMA) provides a more comprehensive look at the affected economic environment of the region. A labor market area is an economically integrated geographic area within which individuals can reside and find employment within a reasonable distance or can readily change employment without changing their place of residence (BLS, 2005). Normally, it is based on a 60-mile (97 km) radius from some pre-set point, such as the county seat, 60 miles (97 km) being about a one-hour drive. The Great Falls Labor Market Area corresponds approximately to the Great Falls MSA above.

The Great Falls Development Authority estimates that approximately 14,900 workers are available to employers, as shown in the pie chart below (Figure 3-61) (GFDA, no date).

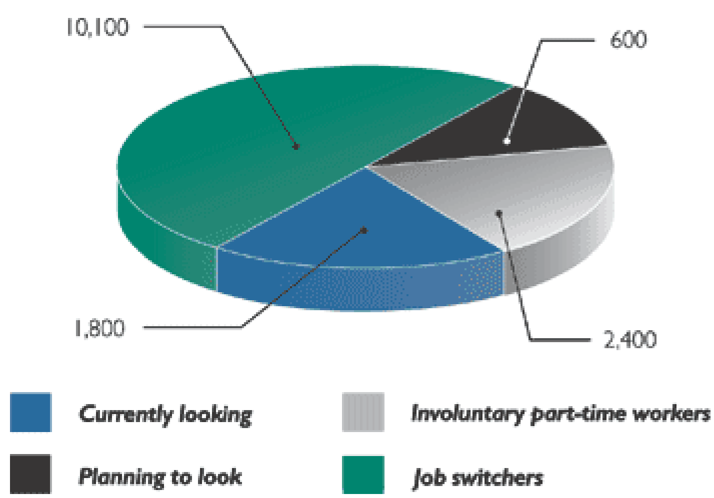
There are 13 major and/or chain hotels in Great Falls, with more than 1,300 rooms available to rent (Hotel-Guides.us, 2005). In the 2000 Census, 35,225 housing units were counted in Cascade County, of which 62 percent were detached, single-family houses and 10 percent were mobile homes; the remainder consisted of attached townhouses, condominiums, and apartments (USCB, 2000b). Of these 35,225 housing units, 32,547 were occupied, for an occupancy rate of 92 percent, a vacancy rate of 8 percent, and 2,678 vacant units. Eighty-two percent of the housing units were heated with utility-supplied natural gas.

Table 3-33. Average Annual Unemployment Rate for the Great Falls, MT Metropolitan Statistical Area vs. U.S. Unemployment Rate[1]

Year	Labor Force	Employment	Unemployment	Unemployment Rate (%)	U.S. Unemployment Rate (%)
1995	37,259	35,396	1,863	5.0	
1996	37,073	35,225	1,848	5.0	
1997	37,537	35,554	1,983	5.3	
1998	37,962	35,882	2,080	5.5	
1999	36,858	34,839	2,019	5.5	
2000	38,287	36,386	1,901	5.0	
2001	38,419	36,719	1,700	4.4	
2002	38,411	36,776	1,635	4.3	
2003	38,558	36,922	1,636	4.2	
2004	39,209	37,566	1,643	4.2	
2005 Jan.	40,262	38,116	2,146	5.3	5.2
2005 Feb.	40,217	38,178	2,039	5.1	5.4
2005 Mar.	40,376	38,268	2,108	5.2	5.2
2005 April	40,773	39,049	1,724	4.2	5.2
2005 May	40,377	38,808	1,569	3.9	5.1
2005 June	40,494	38,621	1,873	4.6	5.0
2005 July	40,740	39,156	1,584	3.9	5.0
2005 Aug.	40,542	38,895	1,647	4.1	4.9
2005 Sept.	39,861	38,300	1,561	3.9	5.1
2005 Oct.	40,723(p)	39,137(p)	1,586(p)	3.9(p)	5.0

Source: BLS, 2005
[1]Not seasonally adjusted for Great Falls; seasonally adjusted for U.S.
p= preliminary

Figure 3-61. Great Falls Labor Market and 30-mile (48 km) Radius Surrounding Area



Source: GFDA, no date

3.14 ENVIRONMENTAL JUSTICE/PROTECTION OF CHILDREN

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, directs Federal agencies to identify and address any disproportionately high adverse human health or environmental effects of its projects on minority or low-income populations.

Cascade County does not have disproportionate numbers of minorities or a disproportionate level of poverty relative to the State of Montana. Its population is 1.1 percent black (compared to 0.3 percent for all of Montana), 4.2 percent American Indian (6.2 percent for Montana), 0.8 percent Asian (0.5 percent for Montana), and 2.4 percent Hispanic (2.0 percent for Montana). In Cascade County, 13.5 percent of persons lived below the poverty line in 1999, compared to 14.6 percent for the state as a whole (USCB, 2005b).

Historically, the Great Falls area was inhabited primarily by the Plains Indians and the Blackfeet Indian Nation. There are no Indian reservations or other tribal lands currently in the County, though the Little Shell Indian Tribe, made up of approximately 4,000 Chippewa Indians, considers Cascade County its homebase. The Little Shell Indians applied for federal recognition as a tribe in 1984 and received preliminary approval in 2000. The tribe is currently awaiting final official recognition. The tribe hopes to acquire tribal lands within Cascade County following recognition. In November 2005, Cascade County commissioners passed a resolution supporting the Little Shell Tribe's quest for 200 acres (80 ha) in the Great Falls area pending their recognition. Approximately 800 Little Shell tribal members currently live in Cascade County (Tribune, 2005).

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, directs federal agencies to "identify and address environmental health risks and safety risks that may disproportionately affect children." Order 13045 further directs federal agencies to "ensure that [their] policies, programs, activities, and standards address disproportionate risks to children that result" from these risks.

Generally, children are not present on the subject properties, or in their immediate vicinity, but may be presumed to live in residences southwest of the Industrial Park site and in and around the city limits of Great Falls.

An independent report on environmental justice in Cascade County was generated from Scorecard (Scorecard Copyright © 2005). Scorecard profiles environmental burdens in every community in the U.S., identifying which, if any, groups experience disproportionate toxic chemical releases, cancer risks from hazardous air pollutants, or proximity to Superfund sites and polluting facilities emitting smog and particulates. The report indicates that there is no disproportionate distribution of environmental burdens within Cascade County to groups based on race/ethnicity, education level, job classification, or home ownership status (Scorecard, 2005). Additionally, there is no disproportionate distribution within the county of chemical releases, cancer risks from hazardous air pollutants, or proximity to Superfund sites. However, there is some increased burden from existing facilities emitting criteria air pollutants near families and children below the poverty line when compared to families and children above the poverty line. Approximately 7.4 facilities emitting criteria air pollutants are located within one square mile of families and children below the poverty line within the county, compared to an average of 3.7 such facilities located within one square mile of families and children above the poverty line (Scorecard, 2005).

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