Appendix G

This text was taken from Section 4.0 of the May, 2005 Revised Section 404 Wetland Permit Application for Minnesota Steel Industries, LLC project, prepared by Barr Engineering Company

4.0 Alternatives Analysis

4.1 Mining Activities

The taconite ore bodies of the Biwabik Iron Formation are developed only where the mineral resource exists in economically minable quantities. Minnesota Steel has mineral leases or lease options on the proposed mine area. Minnesota Steel is currently in the process of securing surface lease and or ownership within the project site. The decision on the location of the mining area is based on ore quality and stripping ratio.

Before mining takes place, extensive exploration programs are conducted, utilizing diamond drill coring techniques to sample the ore body. This provides information for proper planning and sequencing of the mining operation. The taconite ore reserves (iron formation materials) within the former Butler Taconite Mine represent some of the only ore available on the Iron Range with the grinding characteristics needed to produce economically viable DRI and sheet steel.

Stripping ratio is an important factor in determining the location of the mine. Uncovering the taconite ore by removing (or stripping) the surface overburden, low-grade taconite, and waste rock materials is expensive and is avoided if the underlying taconite does not have the required quality and cost properties. These properties include adequate iron unit recovery; requisite iron, silica, and phosphorous contents; compatible plant processing attributes; and acceptable stripping ratios (tons of stripping materials per ton of taconite), and are essential in guaranteeing acceptable costs of operating the mine, processing plant, DRI, EAF, thin slab caster and rolling mill. For Minnesota Steel to operate competitively, taconite ores that meet these cost and quality characteristics must be mined at the proper locations and in the appropriate sequence.

Additionally, to remain competitive Minnesota Steel relies on the efficiencies obtained by operating large scale mining equipment. Utilizing large mining equipment minimizes costs but also mandates that adequate sized working areas be maintained for loading faces, haul roads, and stockpile sites if the associated operating efficiencies are to be achieved. The operation of large scale mining equipment does not lend itself to avoiding small, selective areas of land.

Minnesota Steel must extract taconite ores from their mining areas in order to maintain a viable taconite mining and rolled steel producing facility. The geology of the taconite ore bodies, taconite ore quality and distribution, amount of stripping materials to be removed, operating efficiencies and economic conditions dictate the specific location and sequence of the mining activities. There are no practicable or feasible alternatives for avoiding or minimizing the impacts to wetlands that occur within the limits of the economically minable taconite ore reserves.

4.2 Plant

Integrating all the processing facilities needed to produce taconite pellets, DRI pellets, and sheet steel at the project site presents constraints that limit the possible location. The plant must be located close to the mine in order to minimize transportation costs. Since processing facilities cannot be located over economically minable resource (existing or future ore reserves) the plant must be located either north or south of the mine. The potential locations for the plant are also limited by Highway 169 on the south (Figure 2). It is not practicable to locate the primary processing facilities across a major public highway from the mine. While the plant should not directly interfere with public transportation, it is necessary to have easy access by rail and roads for steel and ore transport, materials shipping and employee access.

The process of producing sheet steel from raw ore requires many steps which must occur in succession as outlined in Figure 17 and described in Section 3.2. The processing facilities for each step must be located adjacent to one another to eliminate unneeded transportation and maintain continuous flow of materials to create operating efficiencies. Approximately 200 acres of contiguous property with flat to gently sloping land surface is needed to plan an efficient processing operation. In addition, the DRI and steelmaking processes require much larger equipment than traditional taconite processing and need stable footings on bedrock or deep pilings. Another important factor considered in siting the plant was the avoidance of wetlands.

All areas within the Minnesota Steel project boundary, as shown on Figure 2, were evaluated for their feasibility in locating the plant. Most of the large contiguous open areas immediately north and south of the ore reserves contain old tailings basins or stockpiles which are generally not suitable for construction (Figures 2 and 16). Similarly, the area located west of the Patrick B Tailings Basin and southwest of Little Sucker Lake is not feasible due to transportation constraints.

The former Butler Taconite plant site, located immediately north of Highway 169, was considered for siting the new plant site. Several constraints make this site unsuitable:

1. The former site is not adequate in size for the much larger equipment needs of the new processing facilities needed,

2. Midland Research, an independent firm, is located on a portion of the site,

3. Blasting would be restricted near the former plant site where ore reserves exist,

4. Old building and machinery foundations exist below grade. This reinforced concrete would have to be removed by hammering and blasting before new foundations could be placed, which could be a slow, expensive, and unpredictable process,

5. Considerable visual impacts would occur along Highway 169, and

6. Bedrock is located approximately 150 feet below the surface so solid footings would be expensive to construct.

The proposed plant site, as shown on Figure 8, is the only practicable and feasible location that meets the goals and objectives of Minnesota Steel and minimizes environmental impacts:

1. The plant site contains more than 300 acres of contiguous land located on a hill which will minimize costs for pumping tailings.

2. The site is not situated over any resource which may become ore in the future.

3. The site provides optimal access to the ore reserves.

4. The site will have minimal visual impact on Highway 169 and the town of Pengilly.

5. The site has shallow bedrock required for sensitive machinery footings.

6. There is adequate potential for access by road and rail.

7. Wetland impacts will be minimal.

Within the plant site area shown on Figure 8, the facilities will be planned to avoid and minimize wetland impacts to the greatest extent practicable. Certain site and facility requirements will limit the flexibility to avoid wetlands. Slopes exist on the west portion of the plant site so the concentrator, taconite pellet plant and DRI plant cannot be shifted northeast to avoid the wetlands. The plant facilities must be located adjacent to the rail line for loading and unloading. The location of the railroad, as shown on Figures 2, 16, and 18, was chosen to fit between stockpiles, the Patrick B Tailings Basin and hill slopes to the west. The crusher, concentrator, taconite pellet plant, DRI plant and steelmaking facilities must all be located in close proximity to one another so there is little flexibility for avoiding wetlands by relocating individual buildings. Some open space must be reserved for potential future changes in the layout.

The production of DRI and sheet steel from taconite pellets onsite as proposed by Minnesota Steel has significant environmental advantages over traditional steelmaking operations. Integrated steelmaking requires the use of coke, which must be prepared in coking ovens. These produce significant amounts of hazardous air pollutants, including mercury, as well as sulfur dioxide, nitrous oxides, carbon monoxide, particulates and volatile organic compounds. Blast furnaces also produce significant amounts of particulate matter, sulfur dioxide, nitrous oxides. Wastewaters from these processes typically must be treated to remove total suspended solids, lead, chromium, cadmium, zinc, fluoride, and oil and grease. All of these environmental liabilities are avoided or significantly reduced by using the DRI and EAF processes.

The existing taconite mining operations on the Iron Range produce taconite pellets which are usually shipped to steel mills by rail or ship. Taconite pellets are approximately 65 percent iron, so roughly one-third of the shipped material (which includes the oxygen

portion of the iron oxide) produces no ultimate benefit. Traditional operations require shipping the pellets to mills and then shipping steel to the end users. Minnesota Steel will minimize energy use and associated environmental impacts by only shipping the final product (steel) to the end users. There are potential additional energy savings and reduced land impacts inherent in the taconite-to-steel production operation proposed by Minnesota Steel. Minnesota Steel anticipates that taconite pellets will be used directly by the DRI process while the pellets are still hot, which will result in energy savings. Much larger energy savings will result when hot DRI pellets will be used directly by the EAF. Minnesota Steel plans to develop an operating plan to maximize these energy efficiencies. Land impacts will be minimized in comparison to traditional taconite operations for two reasons:

1. Large taconite pellet and DRI storage areas will not be needed as there is a continuous flow of materials that is used directly in the next processing step. However, a small amount of taconite pellets and DRI will be inventories for balancing production schedules.
2. The land area needed for steel-making facilities is minimized by siting them adjacent to the DRI and taconite production facilities.

4.3 Stockpiles

Mining operations at Minnesota Steel require that the stripping and stockpiling of surface overburden, lean ore, and waste rock materials be done in the proper sequence to allow access to the underlying taconite ores. In order to minimize haulage costs and maintain operating efficiencies, surface overburden, lean ore, and waste rock stockpiles must be located in or adjacent to the mining area. The Wetland Conservation Act (WCA) and Section 404 of the Clean Water Act (CWA) require that impacts to wetlands be avoided and minimized to the extent practicable. Two provisions of the Mineland Reclamation rules are also pertinent to determining stockpile locations:

1. "Existing stockpiles shall be incorporated or extended to the extent possible." Minnesota Rules 6130.2100(A)

2. "Mining shall be conducted to maximize use of past, present and future mining areas so as to minimize the amount of land disturbed by mining and reduce the loss of non-mineral resources." Minnesota Rules 6130.1400, Subp. 1.

Due to the subcrop extent of the Biwabik Iron Formation in the Minnesota Steel area, suitable stockpile sites located within reasonable haul distances are limited to locations near the active mining area or within previously mined out areas. All of these factors have been considered in determining the optimal locations for stockpiling. Three general areas within the Minnesota Steel permit boundaries satisfy the general requirements: stockpiling on disturbed areas such as former tailings basins and stockpiles, in-pit stockpiling, and stockpiling north of the iron formation limits. The suitability of each strategy is discussed in the following sections.

4.3.1 Stockpiling on Disturbed Areas

The proposed stockpile area includes large portions of the former Patrick B tailings basin, a waste disposal area for natural ore beneficiation processes. This fulfills the mandate of the Minnesota Mineland Reclamation Rules.

4.3.2 In-Pit Stockpiling

In-pit stockpiling is not proposed initially but may be pursued as the project evolves. Such a practice could reduce the overall stockpile area required. Stockpiling lean ore, waste rock, and possibly surface overburden in mined-out pits typically has favorable haul distances and minimizes impacts to undisturbed lands and wetlands. This method is also favorable with respect to the requirements of the WCA, the CWA and portions of the MN DNR reclamation rules. An added benefit would result if pits can be filled to within 6.6 feet (2 meters) of the eventual water level, which would allow for the possibility of creating lacustrine wetland habitat to provide mitigation for unavoidable wetland impacts elsewhere in the operation. However, several additional factors must be considered in determining the feasibility of stockpiling in mined-out pits:

1. The MN DNR has authorized in-pit stockpiling in the past, but not over existing or future taconite resources.

2. For trust fund lands, the MN DNR would issue the stockpiling agreement, but for tax-forfeited lands, which are present within the planned mining boundaries, the county would issue the agreement. To date, Itasca County has never issued a stockpiling agreement.

3. The sequence of mining will restrict the use of mined-out areas for stockpiling until no future work is scheduled in those areas.

4. Potential surface and ground water impacts must be evaluated.

5. Stockpiling of certain grades of lean ore may not be allowed below the ultimate water line of the pit.

6. Mine leasing provisions may not allow in-pit stockpiling in certain areas.

A limited number of parcels near the Minnesota Steel mine currently contain mined-out zones where no currently economical ore exists. During the life of the mine, Minnesota Steel expects that extensive mined-out areas might be utilized for in-pit stockpiling. The potential for in-pit stockpiling will be evaluated with the fee owners and regulatory agencies as the ore reserves are depleted.

4.3.3 Stockpiling North of the Iron Formation

The least desirable area for stripping materials stockpiles is on lands adjacent to the plant and north of the iron formation. This strategy would generally have the longest haul distances, would impact relatively undisturbed lands and would likely impact natural wetlands. Stockpiling in these areas is not proposed

4.3.4 Minimization Strategies

The extensive amount of stripping material that must be removed at Minnesota Steel in order to expose the underlying taconite ore requires the development of large stockpile areas. Since the Minnesota Steel project area contains numerous wetlands it is not possible to construct these large stockpiles without impacting some wetlands.
Hauling the stripping materials long distances to avoid individual wetlands is not practical or feasible for several reasons. Large expanses of land area containing no wetlands are very limited, if not nonexistent, in this part of the state. The large haulage trucks used to move the stripping materials from the mine to the stockpile sites require substantial haul roads, constructed with a solid rock base to support the heavy loads. Haul roads must be built to a minimum width of 150 feet to ensure adequate travel lanes and provide for required edge of road safety berms. Excessive haul distances increase truck haulage and haul road construction costs and directly impact the overall viability of the mining operation. Because of their size, the mine's haulage trucks are restricted to travel within the mine property, so potential stockpile areas are limited.
Another approach to minimize wetland impacts is to reconfigure the stockpiles away from, or around wetlands. This method generally results in a significant loss of stockpile capacity and this reduction of stockpile volume would have to be compensated for in other areas that likely contain similar wetlands. If additional stockpile capacity is not provided for, the economic viability of the mining area would be adversely affected. Also, the ecological value of a wetland is greatly diminished when it is completely encircled by stockpiled material.

4.4 Tailings Basin

Two alternative tailings basin locations are being considered for use in the 20-year project described. Table 1 includes a brief comparison and Table 2 includes a more detailed comparison of the wetland impacts resulting from the alternative tailings basin locations for the 20-year project.
A description of the tailings disposal method is included in Section 3. The disposal method was chosen because the concentrating process that will be utilized by Minnesota Steel does not separate coarse and fine tailings prior to pumping the tailings to the disposal site. Since coarse and fine tailings are pumped to the tailings basin as one slurry, the dikes can be constructed by natural deposition of coarse tailings at spigotting locations which are moved around the basin to form continuous dikes. This method (sometimes referred to as "stacking" of tailings or "upstream construction of tailings dams") eliminates the need for engineered dikes constructed with coarse tailings hauled by trucks or constructed with natural earthen materials.
Several critical factors are being evaluated to determine the economic and engineering feasibility of the alternatives along with an evaluation of environmental impacts associated with each alternative. One of the primary considerations evaluated in planning

the tailings basin is the volume of starter dam construction required and the timing of the construction relative to the project. Another consideration being studied is the integrity and stability of the existing dams for the Stage I tailings basin alternative. A strategy was employed to utilize existing hills as embankments where feasible to minimize dam construction costs. In addition, the development of nearly round basins without points or bays maximizes the storage and operating efficiencies and minimizes the land area disturbed and wetland impacts.

Another consideration being evaluated is the relative pumping and maintenance costs, which are governed by pumping distance and elevation. Longer pumping distances require larger pumps and a greater number of pumps along with a greater length of pipeline. Longer pumping distances will also require greater electricity usage for pumping. The distance from the processing plant to each basin and the perimeter length of each basin will affect the overall pumping cost. The potential pipeline routes are also being evaluated for each alternative to determine if obstacles might be present that would hamper construction of the pipeline or that might present problems in the event of a shutdown or malfunction of the pipeline.

Several land use issues are being evaluated for the alternative tailings basins. The physical land area of each alternative tailings basin and the land ownership within each area are being considered to evaluate economic considerations and potential difficulties with property acquisition. The land use within each alternative area is being evaluated to determine potential social issues such as the presence of residential or recreational facilities. Land uses in areas surrounding each alternative basin are being evaluated to determine the potential for visual and air quality impacts. The presence and quality of wetland, stream, and other water resources within and downstream of each alternative basin are also being considered to determine the potential environmental impacts of each. Some of the other factors evaluated in determining the feasibility of each alternative tailings basin include the presence of utilities, roads, cultural resources, and rare and endangered species.

1.4.1 Stage I Butler Tailings Basin Alternative

The Stage I tailings basin was used for tailings deposition by Butler Taconite from the 1940s to the 1980s. The proposed Stage I basin is nearly entirely an artificial land surface composed of taconite tailings. The basin was reclaimed after tailings deposition activities ceased. The land surface is currently composed of a mix of hybrid poplar wooded areas, grasslands, and wetlands that developed on the tailings surface. Use of the proposed Stage I tailings basin for the 20-year project would result in the stacking of tailings approximately 85 feet above the current land surface.

Following is a list of the primary factors considered in determining the feasibility of utilizing the Stage I Butler tailings basin:

1. The Stage I basin is a completely artificial land surface created by tailings deposition conducted by Butler Taconite which complies with the mandate in the MN DNR permit to mine rules to use previously disturbed lands where feasible. The continued use of the basin for tailings disposal would avoid impacts to a large area of undisturbed land elsewhere in the area.

2. When the Butler Taconite and National Steel Pellet Company (now called KeeTac) pellet plants were developed, the operator of both plants, the Hanna

Mining Company, and the State of Minnesota traded the land, streams, lakes, and wetlands contained within both the Stage I and II basins (Butler Taconite's 9,700 acre basin and National Steel Pellet Company's basin) for about 1,400 acres of land east of Hibbing. This Hibbing land is now Carey Lake Park. At that time, the MN DNR relinquished jurisdiction over wetlands and waters contained in these areas for tailings disposal use as described in the 1968 Land Exchange Documents (Appendix E).

3. A study is currently underway to evaluate the integrity of the existing dams within the Stage I basin. In order to determine the feasibility of utilizing the Stage I basin, this detailed study of the existing dams will have to be completed to determine if tailings can be stacked over the existing footprint of the basin. If the existing dams are determined to not be suitable for stacking tailings, new starter dams may be required resulting in the need for the expanded Stage I basin as shown on Figure 9.
4. The existing Stage I tailings basin covers 1,929 acres and the expanded tailings basin area covers approximately 2,587 acres.
5. The existing Stage I basin is located approximately 2.3 miles from the processing plant with a perimeter length of approximately 7.6 miles resulting in an average pumping distance of 6.1 miles and a total pipeline construction length of about 9.9 miles.
6. The need for starter dam construction is unknown at the present time. Potentially, tailings deposition could be restarted on the Stage I basin with relatively minor starter dam construction. However, little documentation has been found regarding construction specifications of the existing dams surrounding the basin. In order to stack tailings on the existing Stage I basin, the current dam study will need to be completed to determine if they could be used or if new dams would need to be constructed outside of the existing basin footprint. Therefore, there is considerable uncertainty as to the feasibility of the existing Stage I basin for use in Minnesota Steel project.
7. The tailings pipeline may have to cross mine pits from the plant site (Figure 11), however it may be possible to cross the land bridge between Pits #1 and #5 (Figure 11). There are physical and engineering considerations that must be evaluated to determine the feasibility of the tailings pipeline route. If it is necessary to span the tailings pipeline across an open mine pit, this may introduce potential issues regarding contingencies in case of an emergency shutdown or leaks in the pipeline.
8. Based on off-site wetland identification methods and knowledge of the site, it appears that there are approximately 432 acres of wetlands present within the existing Stage I tailings basin area (Figure 9 and Table 2) and approximately 528 acres of wetlands within the expanded Stage I tailings basin (assuming that new starter dams would need to be constructed). The majority of the wetlands identified within the existing Stage I basin (with the exception of the large wetland in the northwestern portion of the basin) have developed on an artificial land surface composed of taconite tailings. The majority of the 96 acres of

wetlands identified within the incremental area of the expanded Stage I tailings basin (those in the southwest corner of the Stage I tailings basin) were previously used by Butler Taconite as return water ponds.

9. No homes would be directly impacted by reactivating the former Stage I Butler tailings basin. The city of Nashwauk lies directly north of the Stage I basin on the north side of Highway 169. The closest residential homes appear to be located less than one-quarter mile north of the Stage I basin.
10. O'Brien Lake is located within one-half mile east of the existing Stage I basin and directly adjacent to the expanded Stage I basin (Figure 9).
11. Two populations of the state-listed endangered species tubercled orchid (*Platanthera flava*) were found in the northeast corner of the Stage I tailings basin during the 1999 field survey (Figure 12). Three populations of the state-listed special concern species, least moonwort (*Botrychium simplex*) were found within the Stage I basin including one population in the center of the basin and the other two in the northeast portion of the basin. The potential for avoiding the northern populations will be evaluated; however it does not appear possible to avoid the center population.
12. There does not appear to be any significant issues with utilities or roads related to the use of the Stage I basin.

4.4.2 Northwest Tailing Basin Alternative

The feasibility of another alternative tailings basin area (subsequently referred to as the northwest tailings basin) located west of the proposed plant site is being evaluated (Figure 10). This alternative would take advantage of a naturally occurring valley bounded by a ridge along the south and east sides. The basin is located about 1.6 miles west of the proposed Minnesota Steel plant facilities The area extends from about one-quarter mile southwest of Big Sucker Lake, west approximately 1.7 miles to an area east of a tributary to Sucker Brook. One of the three headwaters streams feeding Sucker Brook would be filled. No wetlands would be artificially impounded; however the natural drainage from the south to the north would be blocked by the basin. Surface drainage from the hill south of the basin would likely be diverted to the west and drainage from within the blocked wetland swale would likely be diverted to the south. This location has not been disturbed by past mining activities but has been disturbed by recent logging activities over nearly one-half of the site.

The alternative tailings basin would cover an area of approximately 1,119 acres with a crest elevation of approximately 1515 ft MSL. Starter dams would be constructed to an elevation of about 1400 ft MSL. The 20-year tailing basin area shown on Figure 10 includes approximately 100 ft around the perimeter for construction of a seepage collection and diversion channel system. The basin was designed to not interfere with the transmission line corridor that is located along the south side of the northwest basin location.

Wetland resources shown on Figure 10 were mapped using off-site wetland identification methods. The basin was designed to minimize wetland impacts to the greatest extent practicable. Based on the current wetland mapping, a total of approximately 192 acres of

wetlands would be impacted by the northwest tailings basin, approximately 240 acres less than the Stage I basin. Wetlands will be field delineated during June-July, 2005. There are no homes located within the alternative tailings basin location. There are approximately 3 logging roads within the northwest tailings basin area, but no public roads. The entire northwest tailings basin area is owned by Blandin Paper.
Following is a list of the primary factors considered in determining the feasibility of utilizing the northwest tailings basin:

1. The use of the northwest basin would result in the disturbance of approximately one-half previously undisturbed land and the other one-half that has been recently logged. The northwest area appears to partially comply with the MN DNR permit to mine rules to use previously disturbed lands where feasible, however, forestry activities do not represent a permanent degradation of the land, particularly since much of the area has been replanted.
2. The northwest tailings basin covers approximately 1,119 acres of land. The land within the extent of the northwest basin is all owned by one entity.
3. The northwest tailings basin is located approximately 1.6 miles from the processing plant with a perimeter length of about 5.1 miles resulting in an average pumping length of 4.2 miles and a total pipeline construction length of about 6.7 miles.
4. The tailings pipeline would cross the proposed access road to the plant site.
5. Starter dams would need to be constructed along the majority of the west and north sides of the 20-year northwest tailings basin to elevation 1400 ft MSL (Figure 10). The extent of starter dam construction is expected to be about double that required for reactivation of the Stage II basin.
6. Based on off-site wetland identification methods, it appears that there is approximately 192 acres of wetlands present within the 20-year northwest tailings basin area (Figure 10). It appears that the majority of these wetlands have not been significantly impacted by past land use activities.
7. No homes would be directly impacted by the use of the northwest tailings basin. The cities of Marble and Calumet lie over 1.5 miles south of the basin. The closest residential homes are located less than 0.5 mile north of the 20-year northwest tailings basin along the south shore of Big Sucker Lake (Figure 10).
8. The 20-year northwest tailings basin would eliminate approximately 1.5 miles of a headwater tributary feeding into Sucker Brook (Figure 10). However, two other headwater tributaries to Sucker Brook would be maintained. Use of the northwest tailings basin would not affect the existing discharge of water through O'Brien Creek to Swan Lake. The northwest tailings basin would discharge to Sucker Brook which flows west to the Prairie River and ultimately to the Mississippi River just southeast of Grand Rapids. This alternative would likely eliminate the issues raised by Swan Lake residents.
9. No field survey for state-listed rare plant species has been conducted within the Northwest tailings basin area. This area will be evaluated during June-August, 2005.

10. The preliminary 20-year northwest tailings basin design was sited to avoid impacts to an existing transmission line that runs east-west along the south edge of the basin. If the life-of-mine tailings basin extent were to become a reality, approximately 2.5 miles of that transmission line would need to be rerouted around the tailings basin.
11. The constructed Stage II dams would still need to be maintained in accordance with the dam safety permits.
12. Since the 20-year northwest tailings basin is located in a more remote area than the Stage I basin, it is less likely that there will be significant air quality issues with nearby residents.

4.4.3 Stage II Tailings Basin

The Stage II tailings basin, which covers approximately 1,788 acres of land, was evaluated as an alternative for tailings disposal. Big and Little O'Brien Lakes were used for tailings disposal well before the earliest air photos (1940) and possibly as early as 1914. A railroad line from the Hawkins pit was used to dump mine waste on the western banks of the lake. A fines treatment plant was constructed west of the lake and tailings were discharged into the lake. A diversion ditch was created to route O'Brien Creek around the east shore of the lake to reduce tailings overflow from the lake. The tailings discharge formed a large delta at the west side of the center of the lake. Sometime after 1947, tailings and dikes had dammed the northern part of the lake from the southern part, raising water levels in the northern basin. Much of the Stage II tailings basin either received tailings deposits or was hydrologically altered between the 1940s and 1980s by dam construction, impoundments, construction of roads, tailings disposal and creation of borrow areas.

Despite the historic use of the Stage II basin, it does not appear to be the most practicable alternative and has been abandoned for the following reasons:

1. Based on off-site wetland identification methods, it appears that there is approximately 665 acres of wetlands and waters present within the Stage II tailings basin area. The majority of the 665 acres of waters identified within the Stage II basin have been impacted by impoundments and tailings deposition. However, some of the wetlands within Stage II tailings basin appear to be relatively undisturbed wetlands. The existing impounded water has resulted in steep shoreline areas with very little littoral wetland around the perimeter limiting its value for wildlife which rely on shallow lake borders. The impounded Blue Lake is known to be used as a recreational fishery, but there is no established public access to the lake.
2. Reactivation of the Stage II tailings basin would cut off the discharge of water through O'Brien Creek to Swan Lake. Lakeshore residents around Swan Lake have raised a concern over the reduction of flow to the lake.

4.4.4 Other Alternative Tailings Basin Locations

Other potential locations were considered west of Swan Lake and north of the mine. These areas were ruled out due to either the presence of extensive wetlands, the lack of

adequate storage capacity, or high pumping costs due to elevation gain or distance from the plant.

4.4.5 Minimization Strategies

The proposed design minimizes impacts within the tailings basins. The original tailings basin planned by Butler Taconite included approximately 9,700 acres of land south of Highway 169.

Minnesota Steel has greatly reduced the size of the proposed tailings basin compared to the permitted Butler basin and previous proposals by Minnesota Iron & Steel (MSI). Minnesota Steel proposes to use 4 to 1 dike slopes instead of 2.5% slopes planned by Butler and MSI. This will maximize the tailings storage volume-to-area, ratio resulting in avoidance of impacts to at least 573 acres of wetlands and open waters. The tailings basin redesign will avoid the wetland complexes located in the Stage II basin as well as the open water portions of the Stage II basin that cover the former O'Brien Lakes, also known as "Blue Lake"

4.5 Haul Roads

Since the use of existing haul roads and utilizing existing disturbed areas which do not contain wetlands to the greatest extent practicable, which will result in the minimization of environmental impacts, no alternative routes were evaluated

4.6 Dewatering

No permanent wetland fill or draining impacts are anticipated in connection with dewatering activities.