

SECTION 4-1 POST-MINING LAND USE

(Sections 4.1.1, 4.1.3, 4.1.5, 4.1.6, 4.1.6a)



Section 4.1.1 - Post-Mining Land Use Narrative

This section describes post-mining land use plans for land to be affected within the Southeast Island Permit Area during the period of time encompassing all proposed coal removal activities within the permit area throughout the entire life of mine as shown on the Pit Layout and Facilities Map in Section 3.1.5. The post-mining land uses for portions of the permit area to be affected either directly or indirectly by mining during this period are shown on the map in Section 4.1.2 depicting the post-mining topography for the permit area. The pre-mining land uses within the permit area are described in detail in the narrative presented in Section 2.7.1 and are shown on the map in Section 2.7.2. A comparison of pre- versus post-mining land use acreages for each section of land comprising the permit area are provided using a tabular format in Section 4.1.3.

The following factors were considered in developing the post-mining land use plans: pre-mining land use; landowner preference; proposed post-mining topography; available soil quantity and quality; and land uses in the surrounding area. Post-Mining Land Use Preference Statement forms were mailed to all landowners other than The Falkirk Mining Company (Falkirk) within the permit area. Statements completed by the landowners within the permit area and returned to Falkirk are included in Section 4.1.4. The manner in which the post-mining land use will be achieved and the support activities needed prior to bond release are presented in Section 4.1.5.

The dominant post-mining land uses will remain agricultural, consisting of the following subcategories: cropland (cultivated); cropland (hayland); and native grassland. There will be a net increase of 31.65 acres of cultivated cropland throughout the portions of the permit area to be affected by mining. The 3.21 acre increase in Section 36 of the permit area is due to conversions of pre-mining acreages of shelterbelt (0.31 acres) and abandoned farmstead (residential land - 2.90 acres) in the NW $\frac{1}{4}$ NW $\frac{1}{4}$ of this section. The 28.44 acre increase in Section 30 is due to: 1) the conversion of 2.11 acres of abandoned farmstead located in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ of this section, and 2) the conversion of 26.33 acres of industrial/commercial (abandoned mine land) located in the S $\frac{1}{2}$ of this section; both of these changes are being made at the request of the landowner, Falkirk. No other changes to pre-mining acreages of cropland or subcategories of cropland (i.e., cultivated and hayland) are being proposed by Falkirk at this time, with the exception of the 23.26 acre tract of pre-mine cropland (hayland) located in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 30. This tract of hayland will be converted to native grassland at the request of the landowner, Falkirk, as discussed below. All pre-mining tracts of cropland disturbed either directly or indirectly by mining throughout the permit area will be reclaimed to their approximate original locations and configurations on the post-mining landscape.

There will be a net increase of 30.93 acres of native grassland throughout the portions of the permit area to be affected by mining. The 7.67 acre increase in the N $\frac{1}{2}$ N $\frac{1}{2}$ of Section 25 is due to the conversion of an abandoned farmstead, whereas the 23.26 acre increase in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 30 is due to the conversion of pre-mine cropland (hayland) discussed above. The conversions of these pre-mine land uses to native grasslands is are in accordance with the wishes of the landowner, Falkirk.

All of the pre-mine tracts of native grassland disturbed either directly or indirectly by mining throughout the permit area will be reclaimed to their approximate original locations and configurations on the post-mining landscape, in addition to the conversion of 30.93 acres of pre-mine residential land (abandoned farmstead) and cropland (hayland) in Sections 25 and 30, discussed above. The native grassland is being reclaimed in this manner to provide post-mining grazing land and to maintain a buffer zone between the gently sloping cultivated cropland and steeply sloping land associated with the valley walls overlooking "Coal Lake Coulee" and the larger ephemeral drainageways leading down to the "Coulee", located along the northwestern and northern edge of the permit area in Sections 25, 30, and 35. The native grassland disturbed by mining in the $W\frac{1}{2}W\frac{1}{2}SW\frac{1}{4}$ of Section 31 is also being reclaimed for similar reasons, i.e., to provide grazing land and to maintain a buffer zone between the cropland surrounding this tract of land and Seasonal Setland LW-SW31-01 situated in the tract of native grassland itself.

The reclamation plans for post-mine native grassland appear to be in accordance with most of the landowners affected by these plans as indicated by a review of the Post-Mine Preference Statements submitted to Falkirk and presented in Section 4.1.4 of the permit application. The only exceptions that Falkirk is aware of at the present time are Marlyn L. Seidler, who owns land containing native grassland in the $N\frac{1}{2}SW\frac{1}{4}$ of Section 25 and James H. Sheldon who owns land containing native grassland in the $N\frac{1}{2}NE\frac{1}{4}$ of Section 30. Mr. Seidler wanted all the land affected by mining under his ownership throughout the permit area reclaimed to cultivated cropland. However, Mr. Seidler's request could not be granted by Falkirk for the native grassland under his ownership in the $N\frac{1}{2}SW\frac{1}{4}$ of Section 25 for the reasons cited above. Falkirk and Mr. Seidler have signed a purchase agreement covering all the land under his ownership in the permit area which becomes effective on February 28, 1997. Please note that Mr. James H. Sheldon, the owner of the $N\frac{1}{2}NE\frac{1}{4}$ of Section 30, requested that portions of native grassland disturbed by mining within this tract of land be converted to cropland following mining. However, as indicated on the Post-Mining Land Use Map in Section 4.1.2 of the permit application, only a very minor portion of native grassland associated with a large ephemeral draw leading down to Coal Lake Coulee will be disturbed by mining. This portion of native grassland will be reclaimed to its approximate original location and configuration for the reasons cited above.

The native grassland tract located in the $NW\frac{1}{4}$ of Section 25 also contains a small 0.20 acre dugout designated as developed water resources for land use purposes since it was constructed to provide grazing livestock with a water source. The dugout will not be disturbed by mining.

There are a total of 15.61 acres of pre-mine shelterbelts located within the permit area. Only 2.17 acres of the total pre-mine acreage will be disturbed by mining. As discussed above, the 0.31 acres affected by mining in the $NW\frac{1}{4}NW\frac{1}{4}$ of Section 36 will be converted to cropland along with the adjacent acreage of residential land consisting of an abandoned farmstead. The remaining 1.86 acres to be disturbed by mining consists of two five-row plantings located in the $N\frac{1}{2}N\frac{1}{2}NE\frac{1}{4}$ of Section 25. The two shelterbelts will be reclaimed with the same number of rows, configuration, areal extent, and in the same approximate locations as their pre-mine counterparts, in accordance with the wishes of the landowner, Falkirk.

~~The vast majority of pre-mine acreage of native woodland vegetation within the permit area will not be affected by mining. Of the 69.85 acres of woodlands, only 1.93 acres will be disturbed, all of which occurs in the SW¼ of Section 25. The 1.93 acres of woodlands to be affected by mining is comprised of 1.53 acres of low shrub vegetation communities and 0.40 acres of tall shrub communities. The post-mine woodlands will be reclaimed in the same approximate locations and areal extent (including identical pre-mine acres of each respective community, i.e., 1.53 acres of low shrub and 0.40 acres of tall shrub communities) as their pre-mine counterparts.~~

As discussed in Section 2.7.1 of the permit application, there are 26.33 acres of land designated as Industrial/Commercial (Abandoned Mine Land). The 26.33 acres, all of which are located in the S½ of Section 30, are underlain by underground coal mining operations that were abandoned in the 1940s (refer to Section 2.1.1 for more information regarding these operations, which are designated as Cultural Resource Sites No. 32ML882 and 32ML883). The tracts of land associated with these abandoned, underground coal mining operations contain numerous mine sinks which have precluded agricultural activities, including grazing and cropping during the period following termination of mining. As shown on the Pit Layout and Facilities Map in Section 3.1.5, all of these tracts will be redisturbed by mining. As discussed above, this land will be converted to cropland following mining and reclamation. To achieve reclamation on these tracts, topsoil from all of the Falkirk owned lands in Section 30 (i.e., the W½ and S½SE¼) will be averaged after salvaging (excluding the abandoned mine land and wetlands) and respread to a depth of ten inches; topsoil salvage on the abandoned mine land tracts themselves is not feasible due to safety considerations (refer to Section 4.2.1 of the permit for more information regarding topsoil salvage and replacement plans in Section 30 of the permit area).

Please note that the above referenced plan to average topsoil salvaged from Falkirk owned land in Section 30 to achieve a ten-inch respread depth on land previously occupied by abandoned mine land will also occur on a portion of land in the NW¼SE¼ owned by Theodore and Ethel Barnick, which is also underlain by underground mining. The land underlain by underground mining comprises 18.59 acres and occurs along the western edge of the tract. The land has historically been used as cropland with repair of surface disturbance caused by underground mining occurring over the years as it appeared. Salvaging of topsoil from this portion of the tract will not be feasible due to safety concerns. The Barnicks have agreed to allow the respread of ten inches of topsoil from Falkirk's adjoining lands in Section 30 to occur in this portion of their tract, as indicated on their Preference Statement in Section 4.1.4.

All of the above referenced topsoil salvage and respread plans for Section 30 were discussed and agreed to by the Public Service Commission during a meeting held with Reclamation Division staff on February 26, 1998. As discussed in Section 4.2.1, a sufficient amount of subsoil exists on Falkirk owned lands in Section 30 to achieve a total SPGM thickness of 24 inches based on overburden quality projections for this portion of the permit area (refer to map in Section 2.8.3 of the permit for the overburden quality projections).

All pre-existing section line trails affected by mining throughout the permit area will be reclaimed in accordance with Section 4.1.2a - Typical Cross-Section for Reestablished Section Line Roads and Trails. All culverts shall meet a minimum design requirement of 24" in diameter, a minimum of 2' of cover above the top of the culvert, and able to pass the 10-year/6-hour

storm event. The locations of all post-mining section line trails and roads are depicted on the Post-Mining Land Use Map in Section 4.1.2. Similarly, all of the pre-mining acreages of wetlands occurring within portions of the permit area to be affected either directly or indirectly by mining will be reclaimed following mining. The reclamation of wetlands occurring on land directly affected by mining activities is being accomplished through the use of a wetland design model and restoration plan developed by Falkirk Engineering and Environmental staff members presented in Section 5.2. The model and resulting plan in Section 5.2 recognizes the existence of two hydrologically distinct wetland types, i.e., lotic versus lentic wetlands.

The lotic wetlands are those that occur, or will occur, within the main hydrologic pathways of a given pre- or post-mining watershed, whereas lentic wetlands are those that lie outside these pathways. The lotic wetlands, because they receive more runoff, tend to be larger (one acre or greater in size) than the lentic wetlands, which can be considered the smaller prairie pot-hole type of wetland. As discussed in Section 5.2.1, the term lotic describes wetlands which range in terms of water permanence from strongly seasonal to weakly semi-permanent using the classification system devised by Stewart and Kantrud (1972), whereas lentic describes wetlands ranging from strongly temporary to weakly seasonal in nature depending on the hydrologic regime of the given year. The lotic wetlands have been incorporated into the post-mining landscape by Falkirk as shown on the Post-Mining Land Use Map in Section 4.1.2. Details for each lotic wetland are presented in Section 5.2.2a, including specific wetland designs for each lotic wetland as well as capacity and water yield data for the contributing watershed. Conversely, lentic wetlands are not incorporated into the proposed post-mining topography, but will be field fit during the reclamation process. The acreages of the lotic and lentic wetlands within portions of the permit area to be directly affected by mining are provided on the Post-Mining Land Use Maps in Section 4.1.2. The acreage information is presented by landowner within each section.

~~Reclamation of Haulroad Section B, also referred to as Deadhead Route B, including the embankment crossing Coal Lake, will be addressed in Revision 13 to NAFK-9601. Falkirk plans to submit Revision 13 during the summer of 2006.~~

Revision 13 to NAFK-9601 addresses plans on the part of The Falkirk Mining Company (Falkirk) and Great River Energy (GRE) are planning to transfer approximately 740-730 acres of land located adjacent to Coal Lake to the North Dakota Department of Transportation (NDDOT) to facilitate the mitigation of 1,217 acres of "No-Mow" acres within McLean County (County). Approximately 606-666 of the 740-730 acres are included in State approved Mining Permits NAFK-8405 and NAFK-9601, 218-238 and 388-428 acres, respectively. Only 131-194 acres of the 606-666 acres were disturbed as a result of mining, with 62 acres in the NAFK-8405 Permit and 132 acres in the NAFK-9601 Permit. These 131-194 acres are mostly in final reclamation phase. The remaining area acreage is undisturbed. The primary land use within the area is native grassland and woodland with a small amount of cropland. The 388-428 acres located within NAFK-9601 has been delineated as Recreational Land on the Post-Mining Land Use Map, and Pre- and Post-Mining Land Use Acreage Comparison Tables located in Sections 4.1.2 and 4.1.3, respectively, to reflect the wishes of Falkirk and the NDDOT. The County granted approval of a zoning change on the lands on July 1, 2008. This action on the part of the County changes the land from an agricultural and industrial zone to a recreational zone for primitive recreational use,

which cannot be developed for private purposes. A copy of the Certificate of Zoning Change is provided in Section 1.1.5.

The agreement transferring the ownership of the lands from Falkirk to the NDDOT is presented in Section 1.1.5. ~~Falkirk understands that the agreement between the NDDOT and North Dakota Game and Fish Department (NDGFD) will grant the North Dakota Game and Fish Department (NDGFD) management of these lands primarily for recreational uses including wildlife production and compatible public uses. These lands will be assessed and valued the same as other lands for tax purposes, and the NDGFD will make full payment to the County. Falkirk is currently finalizing the transfer agreement documents which will be included in Revision 13 along with reclamation plans for Haulroad Section B and Coal Lake embankment, landowner preference statements, and NDGFD Management Plan.~~

The agreement includes a number of landowner preferences made by the NDDOT and NDGFD (State Agencies) with respect to reclamation of lands disturbed by mining within the transfer lands. ~~Falkirk has been requested by the NDDOT and NDGFD State Agencies to leave the requested that the earthen embankment across Coal Lake embankment in place that was used by Falkirk to facilitate coal haulage in the SE¼ of Section 26, T146N, R82W remain in place. The embankment will be modified during reclamation of the disturbed portions of the transfer lands to enhance and facilitate the recreational and management opportunities for the entire area and to provide an access point to the southern portion of the Lake. The embankment reclamation plan will include the following features: a) an access road to the embankment, b) removal of haulroad berms, c) final contouring of the embankment to facilitate drainage, d) topsoil respread on the top and upper side slopes to promote vegetation establishment, and e) installation of a small boat ramp located on the southeast corner of the embankment. There has been discussion of replacing the 24-inch diameter equalizer pipe-culvert in the embankment was replaced with a 12-inch HDPE dewatering gravity valve pipe and gate valve to allow the State Agencies to regulate the water elevation on the south side of the embankment. This work was done during the Fall of 2006 pursuant to a PSC approval letter dated September 13, 2006. Areas disturbed during the implementation of the embankment reclamation plan will be respread with topsoil and seeded to the pre-crop seed mixture presented in Section 4.1.5. The reclamation plan for the earthen embankment is presented in Sections 3.5.10 and 3.5.22. Further reclamation plans will be discussed in Revision 13.~~

The State Agencies requested that an access road be constructed along the Haulroad Section B corridor in the NE¼ of Section 35 to the earthen embankment described above in the SE¼ of Section 26. This access road will connect to the north-south section line road between Sections 35 and 36. A parking lot and boat ramp will be constructed on a portion of the embankment at the end of the access road. Areas disturbed by construction of the access road and other reclamation activities of Haulroad Section B will be seeded to the pre-crop seed mixture presented in Section 4.1.5. The reclamation plan for the access road and boat ramp is presented in Section 3.5.22.

The State Agencies requested that Sedimentation Ponds P-I25-04 and P-I35-01 located in the SW¼ of Section 25 and the NE¼ of Section 35, T146N, R82W, respectively, remain in place so that the ponds can continue to provide additional habitat for wildlife as developed water re-

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sources. Details of improving these sedimentation ponds to permanent impoundments are presented in Sections 3.6.59b and 3.6.50a, respectively. Areas disturbed during the implementation of the pond embankment and reclamation plan will be seeded to the native grassland seed mixture presented in Section 4.1.5. The State Agencies will manage the structures as is and will assume all liability of the structures, as noted in the transfer agreement in Section 1.1.5. The 1.93 acres of woodland vegetation (comprised of 1.53 acres of low shrub- and 0.40 acres of tall shrub-vegetation communities) that were disturbed during the construction of Sedimentation Pond P-125-04 will not be reclaimed, since the pond embankment and basin will remain in place. The features (i.e., pre-mine slopes and aspects) responsible for the growth of woody vegetation within portions of the draw where the pond was constructed have been eliminated as a result of the construction of the pond. Pond P-125-04 was one of several ponds built by Falkirk and subsequently connected by diversions to protect the vast majority of pre-mine woody vegetation associated with the draws (that drain the adjacent uplands above Coal Lake) during the mining and reclamation phases of the operations in this portion of the permit area. Therefore, the loss of a very small amount of woody vegetation is more than compensated by the remaining woodland vegetation and associated wildlife values that would have been severely limited if not for the efforts of The Falkirk Mining Company to protect and preserve the habitat associated with the transfer area.

The State Agencies requested that the perimeter of the transfer lands be enclosed by a three-strand barbed wire fence. Equipment and walk-through access gates have been installed at section lines. The fencing, gates, developed water resources, earthen embankment, access road and other features associated with the transfer lands are depicted on the map accompanying the agreement presented in Section 1.1.5.

Alternative post-mining land uses reflected in Sections 4.1.1 and 4.1.3 of the permit application comply with the criteria set forth under Section 69-05.2-23-03, NDAC. Professional engineers and environmental specialists employed by Falkirk have spent considerable time and effort developing post-mine land use plans that conform to all applicable standards for adequate land stability, drainage, vegetation cover, and esthetic design appropriate for the post-mining uses of the entire permit area. Falkirk believes, therefore, that there is a very reasonable likelihood that all the proposed post-mine land uses will be achieved as planned. Falkirk also believes that all the post-mine land uses, once achieved, will not present any actual or probable hazards to public health or safety or threat of water diminution or pollution. Falkirk further believes that their planning will result in post-mine land uses that are practical, consistent with applicable land use policies or plans of the region containing the permit area, can be implemented without reasonable delays, and will comply with all applicable Federal, State, and local laws.

Pursuant to NDCC Section 38-14.1-14(2)(b), the utility and capacity of the reclaimed land to support alternative uses has been examined. Because of the proposed gentle post-mining topography, the productive soils which will be salvaged and replaced, the climate, and the agricultural infrastructure already established in the area, these reclaimed lands will be ideally suited for agricultural uses. Fish and wildlife habitat is compatible with the predominantly agricultural land in the area. Wetlands are a permitted use as conservation areas within this agricultural district, as provided for in Section 4.3.2 of the McLean County Zoning Ordinance. Agricultural uses for which the reclaimed land will be suited include, but are not neces-

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sarily limited to, cropland, native grassland, tame pastureland, and hayland. As noted above, the permit contains a 428-acre land tract for which a zoning change from agricultural and industrial zone to recreational zone for primitive recreational use was granted to Falkirk by McLean County. The 428 acres is part of a larger parcel of land (approximately 730 acres) located adjacent to Coal Lake that was transferred to the NDDOT by Falkirk and GRE the to facilitate the mitigation of 1,217 acres of "No-Mow" acres within McLean County (County).

As previously noted, portions of the permit area have been designated in the industrial/commercial and residential land categories. However, these designations should not have any affect on other permit area land uses. Disturbed portions of the permit not reclaimed to an agricultural (cropland) land use could be reclaimed to commercial, industrial, or residential land uses if there was a market to support them. However, the permit area is located within an area of intensive agricultural activity. Therefore, agricultural land use is the most logical and practical choice.

Section 4.1.3 - Pre- and Post-Mining Land Use Acreage Comparisons

LAND USE	ACREAGE			FINAL BOND RELEASED	DELETED UNDISTURBED AREA
	PRE-MINING	POST-MINING	NET CHANGE		
<u>Cropland</u>					
Section 25	352.09	294.19	-57.90		
Section 26	0.00	0.00	0.00		
Section 30	516.11	544.55	28.44		
Section 31	567.61	567.61	0.00		
Section 34	0.00	0.00	0.00		
Section 35	394.84	367.04	-27.80		147.06
Section 36	442.38	445.59	3.21		
Subtotal	2273.03	2218.98	-54.05	0.00	147.06

<u>Native Grassland</u>					
Section 25	149.67	52.49	-97.18		
Section 26	26.80	0.00	-26.80		
Section 30	26.92	50.18	23.26		
Section 31	22.69	22.69	0.00		
Section 34	0.00	0.00	0.00		
Section 35	28.03	2.83	-25.20		
Section 36	0.00	0.00	0.00		
Subtotal	254.11	128.19	-125.92	0.00	0.00

<u>Cropland(Hayland)</u>					
Section 25	37.13	0.00	-37.13		
Section 26	0.00	0.00	0.00		
Section 30	23.26	0.00	-23.26		
Section 31	0.00	0.00	0.00		
Section 34	0.00	0.00	0.00		
Section 35	9.39	0.00	-9.39		
Section 36	0.00	0.00	0.00		
Subtotal	69.78	0.00	-69.78	0.00	0.00

<u>County Roads & Trails</u>					
Section 25	9.26	7.56	-1.70		
Section 26	1.71	0.00	-1.71		
Section 30	11.70	11.70	0.00		
Section 31	10.88	10.88	0.00		
Section 34	0.18	0.18	0.00		
Section 35	11.01	9.01	-2.00		3.89
Section 36	11.14	11.14	0.00		
Subtotal	55.88	50.47	-5.41	0.00	3.89

LAND USE	ACREAGE			FINAL BOND RELEASED	DELETED UNDISTURBED AREA
	PRE-MINING	POST-MINING	NET CHANGE		
HWY. 200A					
Section 25	0.00	0.00	0.00		
Section 26	0.00	0.00	0.00		
Section 30	12.00	12.00	0.00		
Section 31	11.98	11.98	0.00		
Section 34	0.00	0.00	0.00		
Section 35	0.00	0.00	0.00		
Section 36	0.00	0.00	0.00		
Subtotal	23.98	23.98	0.00	0.00	0.00
Woodland					
Section 25	50.98	4.58	-46.40		
Section 26	13.67	0.00	-13.67		
Section 30	0.00	0.00	0.00		
Section 31	0.00	0.00	0.00		
Section 34	0.00	0.00	0.00		
Section 35	5.00	0.00	-5.00		
Section 36	0.00	0.00	0.00		
Subtotal	69.65	4.58	-65.07	0.00	0.00
Developed Water Resource					
Section 25	0.20	0.00	-0.20		
Section 26	0.00	0.00	0.00		
Section 30	0.00	0.00	0.00		
Section 31	0.00	0.00	0.00		
Section 34	0.00	0.00	0.00		
Section 35	0.00	0.00	0.00		
Section 36	0.00	0.00	0.00		
Subtotal	0.20	0.00	-0.20	0.00	0.00
Shelterbelt					
Section 25	1.86	1.86	0.00		
Section 26	0.00	0.00	0.00		
Section 30	3.02	3.02	0.00		
Section 31	3.20	3.20	0.00		
Section 34	0.00	0.00	0.00		
Section 35	5.80	5.80	0.00		1.34
Section 36	1.73	1.42	-0.31		
Subtotal	15.61	15.30	-0.31	0.00	1.34

LAND USE	ACREAGE			FINAL BOND RELEASED	DELETED UNDISTURBED AREA
	PRE-MINING	POST-MINING	NET CHANGE		
<u>Fish and Wildlife Habitat</u> ^{1,2}					
<u>(Wetlands)</u>					
Section 25	2.29	0.00	-2.29		
Section 26	0.00	0.00	0.00		
Section 30	15.85	15.85	0.00		
Section 31	13.95	13.95	0.00		
Section 34	0.00	0.00	0.00		
Section 35	14.21	14.21	0.00		6.65
Section 36	22.13	22.13	0.00		
Subtotal	68.43	66.14	-2.29	0.00	6.65
<u>Fish and Wildlife Habitat</u>					
<u>(Coal Lake)</u>					
Section 25	4.20	0.00	-4.20		
Section 26	51.27	0.00	-51.27		
Section 30	0.00	0.00	0.00		
Section 31	0.00	0.00	0.00		
Section 34	0.00	0.00	0.00		
Section 35	10.59	0.00	-10.59		
Section 36	0.00	0.00	0.00		
Subtotal	66.06	0.00	-66.06	0.00	0.00
<u>Recreational</u>					
Section 25	0.00	254.60	254.60		
Section 26	0.00	93.50	93.50		
Section 30	0.00	0.00	0.00		
Section 31	0.00	0.00	0.00		
Section 34	0.00	0.00	0.00		
Section 35	0.00	80.00	80.00		
Section 36	0.00	0.00	0.00		
Subtotal	0.00	428.10	428.10	0.00	0.00
<u>Residential</u>					
<u>(Farmstead)</u>					
Section 25	7.67	0.00	-7.67		
Section 26	0.00	0.00	0.00		
Section 30	2.11	0.00	-2.11		
Section 31	6.03	6.03	0.00		
Section 34	0.00	0.00	0.00		
Section 35	1.53	1.53	0.00		1.33
Section 36	4.21	1.31	-2.90		
Subtotal	21.55	8.87	-12.68	0.00	1.33

LAND USE	ACREAGE			FINAL BOND RELEASED	DELETED UNDISTURBED AREA
	PRE-MINING	POST-MINING	NET CHANGE		
Industrial/ Commercial (Abandoned Mine Land)					
Section 25	0.00	0.00	0.00		
Section 26	0.00	0.00	0.00		
Section 30	26.33	0.00	-26.33		
Section 31	0.00	0.00	0.00		
Section 34	0.00	0.00	0.00		
Section 35	0.00	0.00	0.00		
Section 36	0.00	0.00	0.00		
Subtotal	26.33	0.00	-26.33	0.00	0.00
Total	2944.61	2944.61	0.00	0.00	160.27

¹ The wetland acreages include all classes of basins (i.e., temporary and seasonal) identified within the permit area using the methodology described in Section 5.1.1. The acreage breakdown for each class of pre-mine wetland is provided by landowner within the permit area in Appendix II of Section 2.7.3. Please note that from a land use perspective, even though the acreage of temporary wetlands is included under the land use category, fish and wildlife habitat(wetlands), that these basins are routinely cropped through as discussed in the pre-mining land use narrative presented in Section 2.7.1. Falkirk assumes that the post-mining temporary (lentic) wetlands situated in cropland will be managed in a similar manner.

Section 4.1.5 - Revegetation Procedures and Establishment

Introduction

Chapter 69-05.2-22 of the North Dakota Administrative Code (NDAC) calls for a diverse, effective, and permanent vegetative cover to be established on disturbed lands that will support the planned post-mining land uses. As required by NDAC 69-05.2-09-11(6), revegetation plans have been included. Seed mixtures and revegetation procedures are designed to meet the requirements of the aforementioned regulations. Revegetation plans for post-mine cropland, native grassland, shelterbelts, woodland, and industrial/commercial (abandoned mine land) will be addressed in this section, whereas wetlands revegetation is addressed in Section 5.2.

General revegetation and management plans which apply to all lands disturbed, either directly or indirectly by mining activities within the permit area (regardless of post-mining land use), will be addressed initially. The general plans will address such topics as seedbed preparation, seeding techniques, mulching, fertilizing, use of cover crops, weed and pest control, litter reduction techniques on established stands, interseeding, reseeding, etc. A discussion of specific revegetation and management plans as they apply to each post-mining land use will then follow. This discussion will address the seed mixtures which essentially differentiate the various land use categories. Temporary reclamation areas will be addressed as well in this discussion.

General Revegetation Techniques

A suitable seedbed will be prepared following topsoil and subsoil replacement. One or more of the following techniques will be used to prepare the seedbed, depending on whether the site will be broadcast or drill seeded: chisel plowing or discing to initially break up clods and work the topsoil, rock picking if necessary, and final light discing or harrowing (or use of a drag). A culti-packer, to firmly pack the final seedbed, may also be used. Other tillage equipment may be used, when applicable, that would result in a final seedbed having characteristics most favorable for the type of seeding technique to be used. If the site is to be broadcast seeded, then the seedbed should be prepared such that a loose, moderately rough condition results (DePuit et al. 1980). Conversely, if drill seeding techniques will be used, then the seedbed should be prepared such that it is very firm and relatively rock-free (USDA-SCS-North Dakota 1981).

Seeding dates utilized on the reclaimed areas addressed by this permit application will be dependent on the dates associated with the replacement of suitable plant growth material. Seeding will occur either in the spring or fall following preparation of the seedbed outlined above. As a general guide, spring seeding will be conducted prior to mid-June, whereas fall seeding will occur after mid-August. Fall seedings intended to result in germination and stand establishment will occur from mid-August to the end of September, depending on soil moisture conditions. Dormant fall seedings will be conducted after mid-October.

Seeding will be performed along the contour by the use of a drill, except where it is unsafe or infeasible to do so, such as on steep slopes. In those circumstances, where the use of a

drill seeder proves either unsafe or infeasible, broadcast seeding techniques will be utilized, instead. The seeding rate will be increased by 50 to 100 percent above the drill seeding rate presented in the seeding mixtures below, depending on the condition of the site. Poorer sites require more seed than favorable sites (Cook et al. 1974). The site will be harrowed, hand-raked, or culti-packed following broadcast seeding to ensure adequate seed coverage. Drill seeding will occur at depths of ¼ to ½ inch.

Falkirk believes that the seed mixtures presented below are capable of attaining their proposed purposes based on the most current information obtained to date. Carefully selected varieties of each species have been included with the seed mixtures to further ensure that the species are all adapted to local site conditions and possess the specific growth characteristics necessary to achieve their intended use. However, Falkirk would also like to retain some flexibility regarding modifications to these mixtures (e.g., species, varieties, and seeding rates used), in the event new information, availability or economics indicates that such changes are warranted. Changes in species composition, or seeding rate changes greater than two pounds (PLS) per acre, will be submitted for approval by the PSC prior to implementation. Any changes in varieties will be made using only northern-origin, or North Dakota adapted cultivars or ecotypes.

In accordance with Section 69-05.2-15-05, NDAC, nutrients and soil amendments (in the amounts determined by soil tests) will be applied to the redistributed surface soil layer, when necessary, so that it supports the approved post-mining land use and meets revegetation requirements. All soil tests will be performed by a qualified laboratory using standard methods.

After topsoil respread, Falkirk will begin seedbed preparation and erosion controlling activities as soon as feasible, except where winter respread of SPGM from stockpiles is occurring. Under frozen conditions in mid-to-late winter, the bladed, frozen topsoil is not subject to erosion until after it completely thaws, at which time seedbed preparation and erosion control measures will be started as outlined below.

Erosion control measures to stabilize newly respread topsoil will vary according to the soil conditions, land use, and season of respread. Listed below, by land uses, are the erosion control and seeding options used by Falkirk for newly respread topsoil areas, according to the date of respread.

Cropland

Spring (March-June)

1. Direct seed to land use mix, then mulch drainage ways or any other erosion-prone areas, such as long or steep slopes, or respread edges along the down-drainage side of the re-spread area.
2. Seed to cereal grain (such as oats, wheat and rye) or to sudan grass, then to land use mix after harvest or the following year.
3. Seed to land use mix, then mulch entire area if moisture and/or erosion potential necessitates.

Summer (Late June-July-mid-August)

1. Seed cereal grain crop or sudan grass. Land use mix to be seeded after harvest or the following year.
2. Direct seed the land use mix if weather and moisture regime are favorable.
3. Mulch erosion-prone areas and seed land use mix later in the fall.

Early Fall (mid-August to end of September)

1. Direct seed to land use mix and mulch erosion-prone areas.
2. Seed to cereal grain (such as oats, winter wheat and rye) and seed land use mix in late fall or following spring.

Late Fall - Dormant Seeding (after freezing weather has stopped growth)

1. Seed land use mix, then mulch for winter.
2. Apply mulch and seed the following spring.

Areas seeded to cereal grains or sudan grass will be allowed to grow to maturity and harvested or will be mowed periodically until freezing weather kills them. The land use mix will then be planted in the fall after freezing weather as a dormant seeding, or the next spring. The land use mix will be seeded directly into the standing stubble, or a minimum tillage done to facilitate seedbed preparation, if necessary, incorporating the stubble.

Temporary Seed Mix Areas

Areas being seeded to the temporary seed mix, such as ditches, embankments, and stockpiles, will be seeded as soon as feasible after disturbance. This seed mix will be used throughout the frost-free season, and late in the fall as soon as the area requiring seeding is prepared by light discing, chiseling, or blading. Ditches will generally be mulched after seeding. Embankments and subsoil stockpiles will be mulched after seeding, if soil conditions and slope necessitate it to prevent erosion. Falkirk's experience to date is that topsoil stockpiles generally revegetated quickly enough to not require mulch as an erosion control. Subsoil stockpiles require mulch to prevent erosion only if they are composed of very dry material and are steeply sloped. Falkirk may use mulch alone or a cover crop of cereal grain to stabilize stockpiles if they are to be respread within one year of placement. Seeding of stockpiles will be completed during the first normal period for favorable planting conditions after placement.

Native Grassland

Seeding of the native grassland seed mix will be done by either one of two seeding methods: 1) The complete mix of warm- and cool-season grasses will be seeded into standing stubble, or into lightly incorporated (by tillage) stubble or mulch; seeding will occur in mid-to-late June after soil temperatures have warmed to nearly 60° F. This seeding will be late for the cool season grasses, to counteract their competitiveness and allow the warm season grasses a better chance to establish. 2) A split seeding method may be used. In this method, the warm-season grasses will be seeded into standing stubble or into lightly incorporated stubble or mulch in June, as soil temperatures warm. The cool season grasses will be seeded separately late in fall, as a dormant seeding, to emerge the following spring.

In either case, if standing stubble or previously applied mulch is not on the area to be vegetated, the area will be mulched with either straw or native prairie hay after seeding. Native prairie hay, cut from selected areas inspected by Falkirk's Environmental Specialists, will be mulched over seeded native grassland areas as available during its establishment to introduce as much diversity as possible into the community. Special care will be taken when selecting the native hay to exclude any undesirable weedy species.

In general, reclaimed areas with slopes ranging from zero to ten percent will be mulched at a minimum application rate of one ton per acre. Areas with slopes greater than ten percent will be mulched at a minimum application rate of two tons per acre. Seeding will generally precede mulching activities, except in those situations where seeding is not possible, as noted below. Mulch will be anchored to the soil surface with a crimping or treading operation.

Seeding and/or mulching will follow within 45 days of topsoil respreading activities on a given reclaimed area unless some unforeseen circumstance such as adverse weather or soil conditions prevents Falkirk from meeting its proposed deadline. Other procedures, such as mulching, etc., will be utilized within the 45-day time frame, in the event seeding is not feasible on areas respread to topsoil.

General Management Practices

Falkirk will conduct all management and normal husbandry practices necessary to achieve and maintain an adequate vegetation cover which will both stabilize the soil and support the post-mining land uses. These management practices will be applied whenever necessary to achieve the revegetation goals. These practices include, but are not limited to, the following: weed and pest control, litter reduction, interseeding, reseeding, fertilization, and remulching.

Weed control will be conducted, when necessary, according to the following plan. Control of weedy annual forbs will be accomplished by the use of post-emergent herbicides such as 2,4-D on those stands which do not contain seeded forb species. Annual weed infestations in stands comprised of seeded forb species will be controlled by mowing. Infestations of noxious weed species will be controlled through the use of non-selective herbicides such as Glyphosate. Pests will also be controlled through the use of pesticides, if they pose a severe enough threat to the developing stands of vegetation. All weed and pest control activities will be conducted in coordination with, and following the recommendations of, the local Cooperative Extension Service and/or Soil Conservation District offices in Washburn and Turtle Lake, North Dakota, respectively. No pest control spraying on reclaimed land will be done without the specific recommendations of one of these two agencies.

Sparsely vegetated areas discovered during vegetation monitoring activities will be treated accordingly. These treatments may include the application of soil amendments (if necessary), interseeding or reseeding. Areas requiring reseeding will be prepared, seeded, and mulched using the techniques described above for initial vegetation establishment.

According to Duebbert et al. (1981), seeded grasslands composed of introduced cool-season grasses and legumes or native grasses must be periodically rejuvenated to maintain their optimal density, height, and vigor. Rejuvenation of the seeded stands is required to alleviate the condition commonly referred to as "sod-bound", which is caused by a nitrogen deficiency in the soils of the seeded stands. A number of methods used to rejuvenate seeded stands of vegetation are at Falkirk's disposal and can be categorized as natural, chemical, or mechanical.

Burning is an example of a natural method of rejuvenation and may be used to reduce or eliminate excessive accumulations of litter in the seeded stands. Haying, a mechanical method of rejuvenation, may be implemented as an alternative to the above method of litter reduction and/or elimination in the seeded stands. Other methods of mechanical rejuvenation, such as spiking or harrowing, may also be implemented on the seeded stands to break up the sod. Chemical fertilizers such as nitrogen and phosphorous may be applied to the seeded stands to stimulate growth.

Operations conducted to rejuvenate the seeded stands of vegetation will incorporate the recommendations and suggestions regarding the use of the various methods described above made by appropriate State and Federal wildlife and land agencies. These recommendations and suggestions will be obtained from available literature information and/or personal communication.

Specific Revegetation and Management Plans

Native Grassland. Areas reclaimed to native grassland will be seeded to a diverse mixture of warm- and cool-season native species that will support the post-mining land uses of grazing or haying. In general, the species will be seeded at a rate or ratio favoring warm-season species, since it is widely understood that warm-season species are less competitive than cool-season species. The ratio of warm- to cool-season species will vary from 3:1 to 1:1 (in terms of seeds per square foot), depending on the absence or presence of the optional cool-season species, prairie junegrass, Sandberg bluegrass, and needle-and-thread. Needle-and-thread, Sandberg bluegrass, and prairie junegrass have been included as optional species because, although they are believed to be excellent additions to the mixture, they may not be available on a consistent enough basis to be included as permanent species, at the present time. The addition of these cool-season species will lower the ratio of warm- to cool-season species, but they are not considered to be as competitively aggressive as other cool-season species such as western wheatgrass, and should not have an adverse impact on the ultimate establishment of the warm-season grasses.

Indian grass and little bluestem may be added as optional warm-season species in any given year depending on their availability and post-mine topography. Seeding rate will be determined on a year-by-year basis and should not affect the overall 3:1 ratio as described above. Both species prefer well-drained, drier soils (sand) which are not readily found within Falkirk's permitted areas.

A number of management tools to control litter, encourage seasonal diversity, and control non-native invaders like *Bromus* will be utilized on the reclaimed native grasslands during the liability period. Controlled haying will be a common element in this plan. Grazing and very selective herbicide use may also be employed. When they are, grazing and herbicide plans will be developed and discussed with the PSC for their approval. Falkirk will utilize NRCS, Extension Service, and University expertise from NDSU in developing these plans on a case-by- case basis.

Native Grassland Seed Mixture

<u>Species</u>	<u>Pounds (PLS)/Acre</u>
<u>Cool-season Grasses¹</u>	
Western wheatgrass 'Rodan' or 'Rosana' (<u>Agropyron smithii</u>)	2
Green needlegrass 'Lodorm' (<u>Stipa viridula</u>)	3
<u>Warm-season Grasses³</u>	
Blue grama ² (<u>Bouteloua gracilis</u>)	1
Sideoats grama 'Killdeer' or 'Pierre' (<u>Bouteloua curtipendula</u>)	4
Switchgrass 'NDG-965-98' or 'Nebraska 28' (<u>Panicum virgatum</u>)	2
Big bluestem 'ND-64' (<u>Andropogon gerardi</u>)	3
Total	15

¹ The species needle-and-thread (Stipa comata), Sandberg bluegrass (Poa sandbergii) or prairie junegrass (Koeleria cristata) are optional and will be included based on availability. If included, they will be seeded at a rate of four, 0.50, and 0.25 pounds (PLS) per acre, respectively.

² Origin of seed harvest will be limited to North Dakota, South Dakota, eastern Montana, eastern Wyoming, or northern Nebraska.

³ The species Indian grass (Surghastrum avenaceum) and little bluestem (Andropogon scoparins) are optional warm-season species and may be included based on availability and post-mine topography.

Cropland. Areas reclaimed to this post-mining land use will be directly cropped following topsoil respread or seeded initially to a mixture of perennial grass and leguminous forb species prior to rotation into small grain crop production. The pre-cropland seed mix and subsequent vegetation cover is being proposed as an aid in restoring organic matter, structure, tilth, and erosional stability to the newly respread mine soils. The pre-cropland vegetation may be left

throughout the responsibility period to serve as a hay crop or broken in some locations for small grain crop production for the purposes of revegetation success determination.

Pre-Cropland Seed Mixture

<u>Species</u>	<u>Pounds (PLS)/Acre</u>
Russian wildrye 'Vinall', ¹ 'Sawki' or 'Mayak' (<u>Elymus junceus</u>)	4
Intermediate wheatgrass 'Oahe' ² 'Greenar' or 'Chief' (<u>Agropyron intermedium</u>)	7
Pubescent wheatgrass 'Mandan 759' ² (<u>Agropyron trichophorum</u>)	7
Alfalfa 'Travois' or 'Ladak' (<u>Medicago sativa</u>)	<u>3</u>
Total	21

¹ Altai wildrye (Elymus angustus) will function as a substitute, depending on availability and price of both species.

² Falkirk is aware that Pubescent Wheatgrass is genetically identical to Intermediate Wheatgrass. However, Falkirk elects to continue to treat Pubescent and Intermediate Wheatgrass as separate and distinct species for the purpose of purchasing seed only and not for any measurements needed for bond release

On areas used for small grain production, grassed waterways, contour planting, minimum tillage, field windbreaks, and other conservation techniques will be used to control erosion, where necessary. Grassed waterways will be maintained in the main drainages of all reclaimed cropland that is tilled during the liability period. In general, the waterways will be established simply by leaving areas of established pre-cropland vegetation intact. The pre-cropland seed mixture meets the criteria of the critical area planting guidelines for grassed waterways developed by the SCS. Buffer zones of pre-cropland vegetation will also be left around reclaimed wetland basins as discussed in Section 5.2.3 to minimize sediment influx into the basins from tilled portions of the adjacent cropland.

Shelterbelts. As discussed in Section 4.1.1 of the permit application, of the 15.61 acres of pre-mine shelterbelts within the permit area, 2.17 acres will be disturbed either directly or indirectly by mining. Of the 2.17 acres to be disturbed by mining, 1.86 acres, consisting of two

five-row plantings located in the N½NE¼ of Section 25, will be reclaimed following disturbance. The two shelterbelts will be reclaimed with the same number of rows, configuration and areal extent, and in the same approximate locations as their pre-mine counterparts.

The planting designs for the five-row post-mining windbreaks were developed based on technical advice from the South McLean Soil Conservation District and the standards and specifications presented in Technical Guide Notice ND-39, entitled "Field Windbreak" developed by the USDA Soil Conservation Service for the State of North Dakota. The plantings were designed utilizing the recommendations from these individuals and the referenced technical guide for multi-row high density windbreaks designed to provide wildlife food and cover and to improve the landscape.

The five-row plantings will consist of native shrub species with Hanson hedgerose and silver buffaloberry arranged alternately in the first two wind-facing or westernmost rows and silver buffaloberry and common chokecherry arranged alternately in the third and fourth rows. The shrub species will be spaced four feet apart in the first two rows and six feet apart in the third and fourth rows. The distance between the four rows will be six feet. The fifth row consisting entirely of native tree species will be added to the lee-ward side of the planting. The fifth row will be planted 12 feet from the fourth row of shrubs, with in-row tree spacings of 8 to 10 feet depending on the species selected. The tree species comprising the fifth row will be selected just prior to planting of the five-row shelterbelts so that the most up-to-date information is available to Falkirk at the time of selection to ensure that the most suitable, disease resistant species and varieties are utilized.

Efforts regarding the establishment of the plantings will be coordinated with the South McLean County Soil Conservation District located in Turtle Lake, North Dakota. Conservation-type nursery stock from the Lincoln Oaks nursery in Bismarck, North Dakota will be utilized. All of the planting stock from this nursery are derived from northern seed sources and range in height from 12 to 18 inches. If locally grown stock is not available, stock will be chosen that is from an area with climatic and soil conditions as close as possible to those conditions within the permit area. Changes in the varieties or species recommended above may be made at the time of actual planting in the event new information or experience indicates that such changes are warranted. Falkirk expects that some of the woody planting stock will not survive following initial planting and will replace these with live transplants as necessary.

Growth of competitive vegetation both within and between the rows of shrubs and trees will be controlled by the use of specially designed fabric which will be installed shortly after the shelterbelts are planted in the spring. The fabric is 6 feet wide and possesses a slit down its center along its long axis which is placed over the shrub and tree seedlings to allow them to grow. Fabric will be placed over each of the rows of the plantings. The fabric is designed such that the growth of competing vegetation will be prevented without adversely affecting the planted shrub or tree seedlings.

~~Woodlands. As discussed in Section 4.1.1 of the permit application, the vast majority of the native woodland vegetation within the permit area will not be affected by mining. Of the 69.85 acres of woodlands, only 2.77 acres will be disturbed, all of which occurs in the SW¼ of~~

~~Section 25. The 2.77 acres of woodlands to be affected by mining is comprised of 1.53 acres of low shrub vegetation communities and 1.24 acres of tall shrub communities.~~

~~———— The following woodland reclamation plan is based on pre mine woodland baseline data collected within the permit area, the results of which are presented in Sections 2.7.1, 2.7.2, and 2.7.3. The plan also incorporates successful woodland reclamation techniques developed and implemented at similar lignite mining operations situated in the “Missouri Breaks” in west central North Dakota (Nielsen, 1989).~~

~~———— The post mining woodland vegetation communities will be reclaimed in their approximate original locations and areal extent. Care will be taken at the time of planting to establish the communities on post mine slope and aspect positions most conducive to their growth and survival. The best planting sites will be the same as those existing prior to mining, i.e., concave landscape positions with north and east facing slopes, and drainage bottoms where snow and run-on water accumulates and enhances soil moisture conditions. Many of these favorable planting sites are already incorporated in the post mining topography where the communities will be established as depicted on the map in Section 4.1.2. However, some fine tuning of the topography may take place in the field during the final regrading process to create concave or bowl shaped sites in drainage bottoms and north and east facing slopes.~~

~~———— The low and tall shrub planting mixtures are presented on Table 1. Falkirk will use these mixtures to re-establish the acreages of low and tall shrub communities comprising the portion of the native woodland to be affected during the life of mine as discussed above. The mixtures will be established in the same manner as that described for post mine shelterbelts. Bare root stock will be installed by personnel from the South McLean County Soil Conservation District using a conventional tree planter. The shrub mixtures will be planted on four foot centers for a total planting density of 2,700 plants per acre as shown on Table 1. Care will be taken to plant the tall shrub mixture in the most mesic landscape positions discussed above and depicted on the map in Section 4.1.1. Some field fitting of the tall shrub mixtures may also be necessary to ensure that they are planted in the best landscape positions. All shrub species will be planted as soon as soil conditions allow in early to mid spring into seedbeds prepared using the techniques described at the beginning of this section.~~

~~———— All of the sites will be mulched immediately following shrub planting with cereal grain straw or slough hay at a rate of five tons per acre to control soil erosion and undesirable plant growth and to reduce soil moisture losses. The mulch will be evenly distributed to depths averaging approximately three inches.~~

~~———— Management practices within the established shrub communities will largely be concerned with the reduction and/or elimination of undesirable plant growth. Competition from undesirable plant growth will be controlled with non-selective herbicide applications using glyphosphate or dichlobenil or by mechanical means (e.g., mowing, cutting, etc.). The sites will be monitored during the second and third growing seasons to determine shrub survival rates. If it appears that the minimum number of individuals of each planted species is deficient, then additional plants will be installed as appropriate to achieve the initial plant densities. The sites may be irrigated during extended periods of drought if warranted and if feasible.~~

Table 1

Native Woodland Planting Mixtures for
Southeast Island Permit Area

Species	Shrub Communities			
	Tall Shrub		Low Shrub	
	Plants/Ac.	% Comp.	Plants/Ac.	% Comp.
<u>Tall Shrub</u>				
Native plum	540	20	—	—
Silver buffaloberry	540	20	—	—
Serviceberry	135	5	—	—
Chokecherry	810	30	—	—
Round-leaved hawthorn	135	5	—	—
TOTAL TALL SHRUB	2,160	80		
<u>Low Shrub</u>				
Silverberry	—	—	810	30
Woods rose	270	10	810	30
Snowberry	270	10	1,080	40
TOTAL LOW SHRUB	540	20	2,700	100
TOTAL SPECIES DENSITY	2,700	100	2,700	100

Industrial/Commercial (Abandoned Mine Land). As discussed in Section 2.7.1, the permit area contains 26.33 acres of land designated as Industrial/Commercial (Abandoned Mine Land). The 26.33 acres, which is located in the S½ of Section 30, is underlain by underground coal operations that were abandoned in the 1940s (refer to Section 2.1.1 for more information regarding these operations which are designated as Cultural Resource Sites No. 32ML882 and 32ML883). The tracts of land associated with these abandoned, underground coal mining operations contain numerous mine sinks which have precluded agricultural activities, including grazing and cropping during the period following termination of mining. As shown on the Pit Layout and Facilities Map in Section 3.1.5, portions of these tracts may be redisturbed either directly or indirectly by mining.

As discussed in Section 4.1.1 of the permit application, this land will be converted to cropland following mining and reclamation. To achieve reclamation on these tracts, topsoil from all of the Falkirk-owned lands in Section 30 (i.e., the W½ and S½SE¼) will be averaged after salvaging (excluding the abandoned mine land and wetlands) and respread to a depth of ten (10) inches. Topsoil salvage on the abandoned mine land tracts themselves is not feasible due to

safety considerations (refer to Section 4.2.1 of the permit for more information regarding topsoil salvage and replacement plans in Section 30 of the permit area).

Please refer to detailed revegetation techniques and management of post-mining land use in this section.

Temporary Areas. The temporary seed mixture outlined below will be used to stabilize ancillary mining features or facilities such as topsoil and subsoil stockpiles, haul road and diversion ditches, sedimentation pond embankments, etc. The mixture was designed to provide a quick stabilizing cover, but also has the ability to reduce or eliminate erosion on facilities in place for several years.

Temporary Seed Mixture

<u>Species</u>	<u>Pounds (PLS)/Acre</u>
Slender wheatgrass 'Revenue' or 'Primar' (<u>Agropyron caninum</u>)	10
Western wheatgrass 'Rodan' or 'Rosanna' (<u>Agropyron smithii</u>)	3
Pubescent wheatgrass 'Mandan 759' ¹ (<u>Agropyron trichophorum</u>)	<u>7</u>
Total	20

¹ Falkirk is aware that Pubescent Wheatgrass is genetically identical to Intermediate Wheatgrass. However, Falkirk elects to continue to treat Pubescent and Intermediate Wheatgrass as separate and distinct species for the purpose of purchasing seed only and not for any measurements needed for bond release.

Recreational Land Use. Land uses classified as Recreational within the Coal Lake Wildlife Management Area will be revegetated and managed to their subcategories as shown on the Post-Mining Land Use Map, Section 4.1.2. The revegetation procedures and establishment will be the same as the original land uses described throughout this section. However, the cropland in the Coal Lake Wildlife Management Area will be seeded to Falkirk's approved pre-cropland seed mixture and managed as cropland (hayland) in order to meet a cover standard of perennial species as described in the NDPSC policy document (latest addition) entitled Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments.

Section 4.1.6 - Sampling Methods and Success Standards

Introduction

Success of revegetation will be determined for all the land uses to be affected either directly or indirectly by mining and reclaimed within the permit area as described in the narrative and on the map in Sections 4.1.1 and 4.1.2, respectively, in accordance with the procedures and performance standards outlined in Section 69-05.2-22-07, NDAC; and NDPSC policy document (latest addition) entitled Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments; and State Policy Memorandum No. 10. Success standards for post-mining native grassland, cropland, tame pastureland, shelterbelts, wetlands and woodlands are described below.

Native Grassland

Sampling of post-mine native grassland will be conducted to determine production, seasonality, cover, diversity and permanence utilizing procedures and methods in accordance with the latest version of NDPSC policy document entitled "Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessment".

Pre-mine native grassland is generally sampled by range site. A range site represents a distinctive kind of native grassland which has the potential to support a native plant community typified by an association of species different from that of other sites. This differentiation is based upon significant differences in kind or proportion of species, or total productivity. Native grassland vegetation is closely related to soil characteristics. For this reason, the United States Department of Agriculture - Soil Conservation Service (USDA-SCS, 1975) has identified a specific range site for each soil mapping unit identified. A particular range site may be found on several different soil mapping units, but each mapping unit has only one range site, unless they are mapped as a complex of different soils.

Sampling occurred on locations within the pre-mine native grassland tracts that were considered representative of the range sites found throughout the permit area in 1995 (refer to Sections 2.7.1 and 2.7.3 for details regarding the pre-mine native grasslands of the permit area including management, sampling locations, vegetation, soils, etc.). All data was collected from randomly located 0.25m² circular quadrats located within each representative pre-mine range site sampling area of the permit area. At each quadrat, total cover was measured with a 10-pin point frame. For cover, one sample was considered 50 points, consisting of five quadrats pooled together. Cover was recorded by species and included litter produced naturally on site. "First-hit cover" was measured; i.e., whatever the falling pin hits first was recorded as cover.

Production was measured by clipping and weighing all vegetation in each quadrat. For each range site sampling area, a field weight to oven-dry weight conversion factor, or ratio, was developed, by oven-drying at least three samples. The average ratio of oven-dry weight/field weight was applied to all other field weighed samples, in that sample site location only, to determine estimated oven-dry weight. Data was then reported as grams oven-dry weight per

0.25m², and pounds oven dry weight forage per acre. Prior to clipping, percent species composition, by weight, was estimated. Sampling technicians were trained to estimate this parameter, which is then a complement to percent species composition by cover. Five quadrats out of every 15 sampled (#1, #3, #5, #9, and #13) were clipped and weighed by species as a means of checking those quadrats for which percent species composition by weight were estimated.

Means and variances were calculated for both total cover and production within each pre-mine range site sampling area. A minimum of 15 quadrats for production, and 15 samples for cover (of 10 points each) were taken. Sampling continued until the ratio standard error of the mean/mean was equal to or less than six percent, using the following formula:

$$SEM = \frac{s}{\sqrt{n}} = 0.06 \bar{x} \text{ or } n = \frac{s^2}{(0.06\bar{x})^2}$$

Where: SEM = standard error of the mean
0.06 \bar{x} = 6% of the mean
 s^2 = variance of the mean
n = number of samples required
 \bar{x} = mean value

Range condition for each pre-mine range site sampling location was also estimated, using the 1975 SCS Range Site Guide. Other qualitative notes were made, regarding the site, and were used to provide a general description of the vegetation of the area.

As noted below, reference areas will be used, to a large degree, to determine revegetation success on post-mine native grasslands of the permit area. As noted in Section 2.7.3 (Appendix V), these are undisturbed native grassland range sites located outside existing or proposed permit areas and were established to represent range sites to be disturbed within a given permit area in terms of cover, production, and range condition. Five such reference areas have been established to represent the pre-mine range sites within existing or proposed permit areas associated with the Falkirk Mine. The reference areas as well as their approximate sizes are as follows: overflow (2.45 acres), silty (2.70 acres), thin upland (1.90 acres), shallow (2.10 acres), and saline lowland/claypan (1.30 acres). The locations of the reference areas are delineated on maps in Sections 2.7.2b and 2.7.2c of the permit application.

Ocular and quantitative surveys of the reference areas were conducted (including a review by PSC personnel on May 15, 1985) to determine their suitability as representatives of their respective pre-mine range site counterparts within the proposed or existing permit areas associated with the Falkirk Mine. Comparisons of cover, production and range condition data between the various range site sampling areas within the permit area and their respective reference areas are also provided in Appendix V of Section 2.7.3. The comparisons were made to demonstrate that the reference areas adequately characterize the pre-mine range sites of the permit area. Falkirk continues to collect ocular and quantitative data from the reference areas on an annual basis. Information collected is reviewed/consolidated and presented to PSC staff via Falkirk's annual grazing plan or during field inspection of the sites. These areas are being maintained in acceptable ecological condition by Falkirk through timely grazing.

Success of revegetation on native grasslands will be evaluated using standards contained in Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, NDPSC, latest edition. For final bond releases, separate standards will be developed based on disturbed native grassland within the entire permit area, provided the land ownership is the same. If the land ownership is split between two or more persons, separate standards will be developed for each ownership. The same set of standards will be used for all bond release tracts within each ownership area. The standards will be achieved for any two years after year six of the responsibility period.~~The standards will be achieved in each of the last two consecutive years or any three years starting no sooner than the sixth year and with one year being the last year of the responsibility period.~~ The specific methods contained in "Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments" to be used are:

Production

Native grassland productivity standard, i.e., SCS production values (USDA-SCS, 1987b), in conjunction with the production from the appropriate range site reference area(s) to correct for climatic variation, described above.

Cover

Cover standard, i.e., basal cover data measured from appropriate range site reference areas, described above, in conjunction with ARS data (Hofmann et. al., 1983).

Diversity/Seasonality

Relative live basal cover or production data will be used to evaluate these parameters in accordance with methods contained in Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments (latest version).

Permanence

Permanence standard, i.e., meeting all requirements for ground cover, productivity, diversity and seasonality.

Cropland

Success of revegetation on cropland will be evaluated using productivity standards contained in Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, NDPSC, (latest edition). Cropland productivity standard No. 2, i.e., NRCS productivity indexes (USDA-NRCS, 2000) will be used, with climatic correction method No. 1 (annual county yield data published by the North Dakota Agricultural Statistics (NDAS) in conjunction with the county average yield from SCS County Soil Sur-

~~veys), or climatic correction method No. 3 (regression equation based on NDAS data in conjunction with precipitation data. The decision regarding whether to use climatic correction method No. 1 or 3 will be based on the speed at which the results of a given revegetation success determination are needed. The annual county yield data necessary to calculate method No. 1 is not published until the year following the fall of harvest within a given county; whereas, the precipitation data necessary to calculate method No. 3 is available at the time of harvest on a given cropland tract. Climatic Correction Method No. 4 (county-wide average correction) may also be used as an alternative correction method.~~

For final bond releases, separate standards will be developed based on disturbed cropland within the entire permit area, provided the land ownership is the same. If the land ownership is split between two or more persons, separate standards will be developed for each ownership. Also, pre-mining soil mapping units that occurred within the boundaries of other land use tracts that have been converted to post-mine cropland within each section will be included in the development of these standards (the locations of these tracts are described in detail in Section 4.1.1). The same set of standards will be used for all bond release tracts within each ownership area. Unadjusted cropland yield standards were calculated for post-mining cropland/cropland hayland land uses within NAFK-9601 by quarter section, in accordance with Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments (North Dakota Vegetation Document), NDPSC (latest edition). The yield standards are included in Section 4.1.6a, Revegetation Success Standards. The standards will be achieved for any two years after year six of the responsibility period, in each of the last two consecutive growing years or any three years starting no sooner than the sixth year and with one year being the last year of the liability period. ~~For prime farmland, the standards will be achieved for a minimum of three years, not necessarily consecutive.~~

For prime farmland, vegetation will be considered successfully established when the annual production of the reclaimed tract is equal to or greater than the standard (described above in the previous paragraph), with 90% statistical confidence for a minimum of three years, not necessarily consecutive. In the case in which a tract contains non-prime and prime farmland, the Commission may approve a single yield standard for the entire tract based on soil types that occurred on the prime and non-prime areas prior to mining. The single yield standard will be achieved for a minimum of three crop years with at least two years being after year six, in any three years starting no sooner than the sixth year and with one year being the last year of the responsibility period. ~~Falkirk has calculated an unadjusted combined prime and non-prime cropland yield standard for the 2.8 acres of prime farmland located in SE¼, Section 36, please see Section 4.1.6a, Revegetation Success Standards. The prime farmland tract falls within the Falkirk/Falkirk-like soils series with 0-3% slope. The non-prime area adjacent to the prime farmland is also within the Falkirk/Falkirk-like soil series with 0-6% slopes. As expected and shown within Section 4.1.6a, the unadjusted yield calculations between the prime and non-prime areas were 32.8 bu/acre and 32.0 bu/acre, respectively. As a result, Falkirk proposes to use the combined unadjusted standard for the SE¼ of Section 36.~~

The post-mine cropland tracts will either be directly farmed following topsoil respread or seeded to a pre-cropland seed mixture consisting of introduced grass and legume species. The pre-cropland vegetation will be broken in some locations for small grain crop production for the

purposes of revegetation success determination, in accordance with PSC Policy Memorandum No. 10. Post-mine productivity measurements for prime and nonprime farmland tracts will be collected immediately on direct cropping parcels and will begin after pre-cropland vegetation is broken and cropping begins on pre-cropland tracts. If the entire reclaimed tract (field) will not be used for proving small grain production, a minimum of three representative strips that total at least 10% of the entire field will be established and harvested yearly. These strips will be representative of the entire field in accordance with methods described in the latest version of NDPSC policy document entitled "Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessment".

The only exception to this general rule is on cropland areas where the post-mining land use is managed for perennial hay, yields of hay crops will be used to determine revegetation success during the years that yield measurements are taken for final bond release. Success of revegetation on hayland will be evaluated using the tame pastureland productivity standards contained in Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, (latest version). These standards will apply only to areas specifically approved as perennial hayland in the post-mining reclamation plan.

Recreational

Success of revegetation on recreational land uses will be evaluated using standards contained in Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, NDPSC, (latest version). The success of reclamation will be evaluated and achieved at the time of fourth-stage (final) bond release using the criteria and evaluation methodology for "Other Land Uses".

Shelterbelts

Success of revegetation on post-mine shelterbelts will be evaluated using standards contained in Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, NDPSC, (latest version). The success of reclamation will be evaluated and achieved in the last ~~year~~ ~~two years or any years, starting no sooner than the sixth year, with one year being the last year~~ of the responsibility period using the criteria and evaluation methodology for shelterbelt plantings.

Wetlands

Success of revegetation on post-mining wetlands will be evaluated using the standards and assessment techniques contained in Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, NDPSC, (latest version).

Reclamation success, for most land uses, is generally based on an assessment of vegetation production and cover. When areas meet an "equal-to-or-better-than" production and cover standard, they may be released from bond. Wetlands, however, are important as wildlife habitat and for water retention. Therefore, forage production and cover are not applicable parameters.

A wetland may produce a tremendous amount of forage but lack the diversity necessary to satisfy its utility as good wildlife habitat. Cover, as a measure of erosion control, is not applicable, as erosion occurs into wetlands, not away from them. Therefore, it is proposed that the success standards be comprised of an assessment of water quality and quantity, vegetation community patterns indicating levels of diversity, and wildlife use patterns.

~~For vegetation and wildlife, data will be collected on an annual basis during mining and reclamation.~~ Methods of data collection and reporting are outlined below. The actual parameters to be studied (including the methods most applicable to data collection on those parameters), as well as standards to be used to judge wetland reclamation success, have been determined by the PSC in cooperation with the Wetland Advisory Committee. The Committee consists of selected personnel from the following four agencies:

1. North Dakota Game and Fish Department
2. U.S. Fish and Wildlife Service
3. North Dakota State University
4. University of North Dakota

Upon Falkirk's proposal for bond release, the Committee will meet to review the data compiled on the reclaimed wetlands. This review will include a field inspection of the wetlands. The Committee will analyze how closely the data conform to the approved success standards, and issue an advisory opinion stating its perceptions in that regard to the PSC and to Falkirk. The PSC will make a bond release decision based on the available information, compliance with the approved standards, and compliance with other applicable laws and regulations regarding reclamation of all lands.

Administratively, the method proposed is simple and reflects a common sense approach to wetlands reclamation. The standards fulfill all legal requirements included in current reclamation laws and regulations. Through scientific data collection and expert review, the standards fulfill all technical requirements on a professional level.

Data Collection Methods

I. Water

Water Quality. Water quality in the reclaimed wetlands will be monitored the last three years of the bond liability period (or as set forth by the Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, NDPSC) for the following parameters: total iron, pH, specific conductance, total suspended and dissolved solids, calcium, magnesium, sodium, potassium, sulfate, chloride, alkalinity, and any other requested parameters.

A composite sample of three grabs will be collected annually from each Class III wetland in early spring. Multiple samples consisting of three randomly located samples will be collected twice each year at high and low water from each reclaimed Class IV (or higher) wetland.

Water Quantity. ~~Reclaimed wetland elevations will be determined by survey at the time water samples are collected. Data on quality, quantity, and dates of any water pumped into the wetland basin will also be collected.~~

II. Vegetation

The vegetation of each reclaimed wetland will be mapped during the last three years of the responsibility period (or as set forth by the Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, NDPSC) ~~annually~~ to show that the basin exhibits vegetation characteristics of the wetland class it was designed to become. Mapping will be conducted in the field by trained personnel, with the aid of low altitude, oblique photographs taken from fixed-wing aircraft. All identifiable vegetation zones within the basin will be delineated on the maps. A complete species list of each vegetation zone which ranks the occurrence of each species will be compiled. Mapping and species list compilation will occur in the fall ~~of each year to coincide with the peak growth period of most wetland species. Annual checks of old maps are made at this time to determine shifts in community dominance, changes in water level, etc.~~

III. Wildlife

Data on the wildlife use of Falkirk wetlands have been recorded in various forms (waterfowl brood and pair counts, shorebird use, etc.) by Falkirk consultants and Falkirk Environmental Specialists since 1979. Recent efforts by Falkirk Environmental Specialists to standardize the wildlife data collected, by employing the most recent biological techniques, has resulted in the development of a wetland-wildlife study plan. This plan was developed after extensive consultation with research biologists at the Northern Prairie Wildlife Research Station, U.S. Fish and Wildlife Service, and the waterfowl biologist with the North Dakota Game and Fish Department.

The overall objective of this plan is to characterize the wildlife use on the reclaimed wetlands at Falkirk, and to compare that use with use on naturally occurring wetlands in a similar complex of the same class.

Waterfowl use of wetlands is considered by many biologists to be one of the most important values of prairie wetlands. Weekly observations will continue to be made during seasons of waterfowl use to record data on the species use, and type of use, of these wetlands by waterfowl and shorebirds. These data will characterize seasonal use by migrants, as well as breeding resident waterfowl and shorebirds.

In addition, waterfowl pair counts will be made to characterize breeding use of the wetlands by various species of ducks during the spring and early summer. These data can be used to characterize duck breeding efforts and nesting success on a local scale around the Falkirk wetlands by comparing the numbers of pairs and lone drakes through a breeding season. However, the numbers of breeding pairs and their evident nesting success is dependent on a number of regional factors. These factors include the regional weather patterns in a given year and season (unusually wet or dry, cold or warm, etc.), the regional duck population, and the area predator

population. For these reasons, similar data from comparable areas will be taken to provide some insight into what factors may be regional, and what factors may be specific to the Falkirk area.

The general avian community using a wetland is indicative of its habitat quality and diversity, as well as the class of wetland. To compare reclaimed wetlands with naturally occurring wetlands, the avian community of each of the reclaimed wetlands will be carefully censused during the breeding season, and compared with census data collected the same year on natural wetlands of similar class, water quality, and size. These data will be collected yearly to document the successional development of Falkirk's reclaimed wetlands and the year-to-year variations in wildlife use attributable to various local or regional influences. Since mammal and herpetological diversity on wetlands in the Northern Great Plains is relatively low, with few species being present (as compared to birds), these species will be noted when observed, but no special techniques are proposed to sample them.

Industrial/Commercial (Abandoned Mine Land)

The pre-mining permit area contains 26.33 acres of land disturbed by underground coal mining operations in the S½ of Section 30. The underground mines were in operation until the early 1940s many years prior to the enactment of North Dakota's first reclamation law in 1969.

As discussed in Section 4.1.1, the pre-mining land use of the tracts affected by underground mining in the S½ of Section 30, designated as Industrial/Commercial (Abandoned Mine Land) on the Pre-Mining Land Use Map in Section 2.7.2 of the permit, will be reclaimed as cropland. To achieve reclamation on these tracts, topsoil from all of the Falkirk owned lands in Section 30 will be averaged (excluding the abandoned mine land tracts and wetlands) and re-spread to a depth of ten inches. Pursuant to a meeting held with NDPSC Reclamation Division personnel on February 26, 1998, the 26.33 acres of land designated as Industrial/Commercial (Abandoned Mine Land) on the Pre-Mining Land Use Map in Section 2.7.1) will be assigned a non-rated soil productivity indice of 20 percent for the purposes of development of the SCS cropland technical standard during fourth-stage bond releases of cropland containing these tracts of abandoned mine land prior to mining in the S½ of Section 30 of the permit area. Refer to the discussion pertaining to evaluation of cropland revegetation success contained in this section of the permit for more information regarding the development of the cropland technical standard.

The cover of living plants associated with the seeded perennial grass mixture will meet or exceed the ground cover existing on the abandoned mine land prior to redisturbance, in accordance with Section 69-05.2-22-07(4i), NDAC. The actual success standard will be developed by Falkirk prior to bond release request by sampling the ground cover occurring on portions of the abandoned mine land (AML) that have not been redisturbed and which exhibit vegetation cover similar to portions of the AML that will be subjected to redisturbance. Data will not be collected from the sampling site(s) until they have been approved by the Commission following a field review of the proposed sample locations. The cover data will be collected and analyzed using the procedures presented in Part III of Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, NDPSC, latest version.

Native Woodlands

Success of reclamation for woodlands will be evaluated during the last two years or any three years, starting no sooner than the sixth year, with one year being the last year of the responsibility period. Demonstration of success will be determined by reaching pre-designated woody plant density, diversity, seasonal variety, and time-in-place requirements for the woody plant mixtures installed initially as described in Section 4.1.5 and by attaining the herbaceous cover standard contained in the NDPSC policy document (latest version) entitled "Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre and Post Mining Vegetation Assessments".

The initial planting density for each replacement woodland community type will be 2,700 plants per acre. The low shrub species comprising the woodland plant mixtures are expected to quadruple in number by the end of the responsibility period, whereas the tall shrub species are expected to triple in number during this same period.

Table 1 presents the data necessary to develop the density, diversity, and regenerative capacity requirements for the low and tall shrub community types. At the end of the responsibility period, half of the number of plants of each species installed will be present with no shrubs in place for less than two growing seasons being counted when determining stocking adequacy. Additionally, 60 percent of the shrub species (tall and low) planted in each community type will contribute 10 percent of the density standard. The actual calculations are shown on Table 1 below:

Table 1
Density and Diversity Standards for the Low and Tall Shrub Communities
of the Southeast Island Permit Area

Life Form	Low Shrub Community			Tall Shrub Community		
	Initial Density	Species No.	Density [†] Standard	Initial Density	Species No.	Density [†] Standard
Low Shrub	2,700	3	10,800	54	2	1,620
Tall Shrub				2,160	5	6,480
Total	2,700	3	10,800	2,700	7	8,100

[†] Regenerative Capacity Calculations for Low and Tall Shrub Communities:

Tall Shrub Community:

Low Shrub Component: 2 species planted x 0.60 = 1.2 species, each contributing 10% of total density standard (8,640 shrubs x 0.10 = 864 stalks).

~~_____ Tall Shrub Component: 5 species planted x 0.60 = 3 species, each contributing 10% of total density standard (8,100 shrubs x 0.10 = 810 stalks).~~

~~_____ Low Shrub Community:
_____ 3 species planted x 0.60 = 2 species, each contributing 10% of total density standard (10,800 shrubs x 0.10 = 1,080 stalks).~~

~~_____ Verification that the planted shrub species have met the time in place requirements will be assessed using permanent quadrats established in each woodland community. The total number of plants in year one will be provided using this methodology. In year four, or in the year that 60 percent of the liability period falls after, 80 percent of the total number planted must be present to verify that the success is based on the survival and reproduction of the majority of shrubs in the initial planting. This requirement will be deemed satisfied if the operator demonstrates that no replanting was done in the last six years or the responsibility period. Data from quadrats within a community will be averaged to obtain a value for the entire community. Documentation will also be provided verifying that not more than 20 percent of the numbers present in year four have been replanted. Documentation will be in the form of worksheets that will be kept for each community type which list the annual replantings of each species. Receipts or appropriate records from nurseries or persons hired to do the replanting will also be retained for verification.~~

~~_____ The herbaceous ground cover, together with the canopy cover of woody vegetation, must provide adequate protection from erosion. Ground cover may be determined by sampling either total ground cover, a combination of herbaceous and woody vegetation, or herbaceous understory only. Total ground cover (i.e., live herbaceous, litter, and canopy from woody vegetation) must be at least 83%. If only herbaceous understory is measured, the live herbaceous cover and litter must constitute at least 66% total basal cover [90% of a 73% standard on Ries and Hofmann (1985)] or 75% first hit cover [90% of a 83% standard on Ries and Hofmann (1984)]. The cover data will be collected and analyzed using the procedures presented in Part III of Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, NDPSC, (latest version). The herbaceous cover will be comprised of desirable species not detrimental to the growth of woody vegetation.~~

Tame Pastureland

Success of revegetation on tame pastureland will be evaluated using productivity and cover standards contained in Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, NDPSC, (latest version). The tame pastureland productivity standard, i.e., SCS median yields for pasture/hayland suitability groups in Land Resource Area 53 (USDA-SCS, 1988), will be used with Climatic Correction Method No. 1 (annual county yield data published by the North Dakota Agricultural Statistics (NDAS) in conjunction with the county average yield from SCS County Soil Surveys), or Climatic Correction Method No. 2 (regression equation based on NDAS data in conjunction with precipitation data). The decision regarding whether to use Climatic Correction Method No. 1 or 2 will be based on the speed at which the results of a given revegetation success determination are needed. The annual county yield data necessary to calculate Method No. 1 is not published

until the year following the fall of harvest within a given county, whereas the precipitation data necessary to calculate Method No. 2 is available at the time of harvest on a given cropland tract. Tame pastureland cover standard based on perennial species not detrimental to land use and ARS data (Hofmann et.al., 1983) will be used, i.e., 83 percent total cover (live + litter) based on first hit cover data or 73 percent total cover (live + litter) based on basal hit cover data measured on the reclaimed tract.

For final bond releases, separate standards will be developed based on disturbed tame pastureland within the entire permit area, provided the land ownership is the same. If the land ownership is split between two or more persons, separate standards will be developed for each ownership. The same set of standards will be used for all bond release tracts within each ownership area. The standards will be achieved for any two years after year six of the responsibility period. ~~The standards will be achieved in each of the last two years or any three years starting no sooner than the sixth year and with one year being the last year of the responsibility period.~~ Currently there are no planned reclaimed tame pastureland tracts within the permitted area.

Procedures for Sampling, Measurement, and Statistical Analysis of Vegetation Parameters

Procedures for sampling, measuring, and statistical analysis of vegetation parameters to be used on post-mining native grassland, cropland, industrial/commercial, and woodlands will be those contained in the Standards for Evaluation of Revegetation Success and Recommended Procedures for Pre- and Post-Mining Vegetation Assessments, (latest version).

**Section 25
Unadjusted Cropland Yield Standard**

Pre-mine Soil Unit ¹	Soil Unit Name	Slope Group	Total Acres ¹	Productivity Index Value ²	Yield (bu/ac)	Pre-mine Soil Unit Acres	Weighted Yield (bu)
2	Tonka silt loam	A	4.1	60%	24.6	4.1	100.9
9	Roseglen	A	12.8	100%	41.0	12.8	524.8
35E	Cabba-Amor loam 9-25% Cabba - 55% Amor - 45%	D-F	0.3	17% 33%	7.0 13.5	0.2 0.1	1.2 1.8
36	Williams loam	A	57.1	90%	36.9	57.1	2107.0
36B	Williams loam 3-6%	B	71.4	85%	34.9	71.4	2488.3
38C	Williams-Zahl 6-9% Williams - 60% Zahl - 40%	C	16.4	68% 46%	27.9 18.9	9.8 6.6	274.3 123.7
102	Bowbells 1-3%	A	4.8	100%	41.0	4.8	196.8
193	Falkirk-like loam 1-3%	A	101.9	80%	32.8	101.9	3342.3
193B	Falkirk-like loam 3-6%	B	16.5	75%	30.8	16.5	507.4
Totals			285.3				9668.5

Unadjusted Combined Standard = 33.9 bu/acre

¹The premine soils map located in permit Section 2.8.2a and soils descriptions located in 2.8.2 were used to calculate the unadjusted combined standard above.

²Falkirk used the map unit descriptions located in 2.8.2 Appendix 1 to obtain the productivity rating for Falkirk-like loam (193,193B).

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**NW 1/4, SW 1/4, & the SE 1/4 of Section 30
Unadjusted Cropland Yield Standard**

Pre-mine Soil Unit ²	Soil Unit Name	Slope Group	Total Acres ²	Productivity Index Value ³	Yield (bu/ac)	Pre-mine Soil Unit Acres	Weighted Yield (bu)
2	Tonka silt loam	A	5.7	60%	24.6	5.7	140.2
9	Roseglen	A	3.2	100%	41.0	3.2	131.2
10	Bowdle loam	A	0.4	60%	24.6	0.4	9.8
36	Williams loam	A	168.1	90%	36.9	168.1	6202.9
36B	Williams loam 3-6%	B	119.5	85%	34.9	119.5	4164.6
38C	Williams-Zahl 6-9% Williams - 60% Zahl - 40%	C	11	68% 46%	27.9 18.9	6.6 4.4	184.0 83.0
136B	Williams loam - mine sink	B	28.7	20%	8.2	28.7	235.3
102	Bowbells 1-3%	A	44.2	100%	41.0	44.2	1812.2
193	Falkirk-like loam 1-3%	A	23.3	80%	32.8	23.3	764.2
193B	Falkirk-like loam 3-6%	B	0.3	75%	30.8	0.3	9.2
Totals			404.4				13736.7

Unadjusted Combined Standard = 34.0 bu/acre

¹ In order to aid in the farming and monitoring of the field, Falkirk included disturbed and undisturbed acres to square the field.

² The premine soils map located in permit Section 2.8.2a and soils descriptions located in 2.8.2 were used to calculate the unadjusted combined standard above.

³ Falkirk used the map unit descriptions located in 2.8.2 Appendix 1 to obtain the productivity rating for Falkirk-like loam (193,193B).

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**S 1/2 of the NE 1/4 of Section 30
Unadjusted Cropland Yield Standard¹**

Pre-mine Soil Unit ²	Soil Unit Name	Slope Group	Total Acres ²	Productivity Index Value ³	Yield (bu/ac)	Pre-mine Soil Unit Acres	Weighted Yield (bu)
2	Tonka silt loam	A	0.8	60%	24.6	0.8	19.7
9	Roseglen	A	5.0	100%	41.0	5.0	205.0
36	Williams loam	A	9.0	90%	36.9	9.0	332.1
36B	Williams loam 3-6%	B	40.7	85%	34.9	40.7	1418.4
38C	Williams-Zahl 6-9% Williams - 60% Zahl - 40%	C	2.5	68% 46%	27.9 18.9	1.5 1.0	41.8 18.9
102	Bowbells 1-3%	A	9.6	100%	41.0	9.6	393.6
Totals			67.6				2429.5

Unadjusted Combined Standard = 35.9 bu/acre

¹ In order to aid in the farming and monitoring of the field, Falkirk included disturbed and undisturbed acres to square the field.

² The premine soils map located in permit Section 2.8.2a and soils descriptions located in 2.8.2 were used to calculate the unadjusted combined standard above.

³ Falkirk used the map unit descriptions located in 2.8.2 Appendix 1 to obtain the productivity rating for Falkirk-like loam (193,193B).

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**Section 31
Unadjusted Cropland Yield Standard¹**

Pre-mine Soil Unit ²	Soil Unit Name	Slope Group	Total Acres ²	Productivity Index Value ³	Yield (bu/ac)	Pre-mine Soil Unit Acres	Weighted Yield (bu)
2	Tonka silt loam	A	10.7	60%	24.6	10.7	263.2
9	Roseglen	A	32.9	100%	41.0	32.9	1348.9
36	Williams loam	A	36.1	90%	36.9	36.1	1332.1
36B	Williams loam 3-6%	B	78.2	85%	34.9	78.2	2725.3
38C	Williams-Zahl 6-9% Williams - 60% Zahl - 40%	C	39.2	68% 46%	27.9 18.9	23.5 15.7	655.7 295.7
93	Falkirk	A	67.5	90%	36.9	67.5	2490.8
93B	Falkirk	B	15.5	85%	34.9	15.5	540.2
193	Falkirk-like loam 1-3%	A	214.3	80%	32.8	214.3	7029.0
193B	Falkirk-like loam 3-6%	B	43.9	75%	30.8	43.9	1349.9
Totals			538.3				18030.8

Unadjusted Combined Standard = 33.5 bu/acre

¹ In order to aid in the farming and monitoring of the field, Falkirk included disturbed and undisturbed acres to square the field.
² The premine soils map located in permit Section 2.8.2a and soils descriptions located in 2.8.2 were used to calculate the unadjusted combined standard above.
³ Falkirk used the map unit descriptions located in 2.8.2 Appendix 1 to obtain the productivity rating for Falkirk-like loam (193,193B).

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**S 1/2 of the NE 1/4 of Section 35
Unadjusted Cropland Yield Standard**

Pre-mine Soil Unit ¹	Soil Unit Name	Slope Group	Total Acres ¹	Productivity Index Value	Yield (bu/ac)	Pre-mine Soil Unit Acres	Weighted Yield (bu)
2	Tonka silt loam	A	2.9	60%	24.6	2.9	71.3
36	Williams loam	A	8.1	90%	36.9	8.1	298.9
36B	Williams loam 3-6%	B	22.9	85%	34.9	22.9	798.1
38C	Williams-Zahl 6-9% Williams - 60% Zahl - 40%	C	3.5	68% 46%	27.9 18.9	2.1 1.4	58.5 26.4
102	Bowbells 1-3%	A	4.3	100%	41.0	4.3	176.3
106	Hamerly 0-3%	A	0.2	85%	34.9	0.2	7.0
Totals			41.9				1436.5

Unadjusted Combined Standard = 34.3 bu/acre

¹The premine soils map located in permit Section 2.8.2a and soils descriptions located in 2.8.2 were used to calculate the unadjusted combined standard above.

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**N 1/2 of the SW 1/4 of Section 35
Unadjusted Cropland Yield Standard**

Pre-mine Soil Unit ¹	Soil Unit Name	Slope Group	Total Acres ¹	Productivity Index Value	Yield (bu/ac)	Pre-mine Soil Unit Acres	Weighted Yield (bu)
35B	Amor loam 3-6%	B	6.3	76%	31.2	6.3	196.3
36B	Williams loam 3-6%	B	4.1	85%	34.9	4.1	142.9
38C	Williams-Zahl 6-9% Williams - 60% Zahl - 40%	C	15.3	68% 46%	27.9 18.9	9.2 6.1	255.9 115.4
44	Arnegard loam 1-3%	A	1.7	100%	41.0	1.7	69.7
Totals			27.4				780.3

Unadjusted Combined Standard = 28.5 bu/acre

¹The premine soils map located in permit Section 2.8.2a and soils descriptions located in 2.8.2 were used to calculate the unadjusted combined standard above.

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**Section 36
Unadjusted Combined (prime and non-prime) Cropland Yield Standard**

Pre-mine Soil Unit ¹	Soil Unit Name	Slope Group	Total Acres ¹	Productivity Index Value ²	Yield (bu/ac)	Pre-mine Soil Unit Acres	Weighted Yield (bu)
2	Tonka silt loam	A	8.5	60%	24.6	8.5	209.1
9	Roseglen	A	58.1	100%	41.0	58.1	2382.1
10	Bowdle loam, 1-3%	A	12.6	60%	24.6	12.6	310.0
36	Williams loam	A	19.9	90%	36.9	19.9	734.3
36B	Williams loam 3-6%	B	58.9	85%	34.9	58.9	2052.7
38C	Williams-Zahl 6-9%	C	12.0	68%	27.9	7.2	200.7
	Williams - 60%			46%	18.9	4.8	90.5
	Zahl - 40%						
93	Falkirk	A	33.0	90%	36.9	33.0	1217.7
102	Bowbells 1-3%	A	16.7	100%	41.0	16.7	684.7
193	Falkirk-like loam 1-3%	A	152.8	80%	32.8	152.8	5011.8
193B	Falkirk-like loam 3-6%	B	73.0	75%	30.8	73.0	2244.8
Totals			445.5				15138.4

Unadjusted Combined Standard = 34.0 bu/acre

**Section 36
Unadjusted Cropland Yield Standard for Prime Tract
(Calculated for comparison with combined standard).**

Pre-mine Soil Unit ¹	Soil Unit Name	Slope Group	Total Acres ¹	Productivity Index Value ²	Yield (bu/ac)	Pre-mine Soil Unit Acres	Weighted Yield (bu)
193	Falkirk-like loam 1-3%	A	3.1	80%	32.8	3.1	101.7
Totals			3.1				101.7

Unadjusted Prime Cropland Standard = 32.8 bu/acre

¹The premine soils map located in permit Section 2.8.2a and soils descriptions located in 2.8.2 were used to calculate the unadjusted combined standard above.

²Falkirk used the map unit descriptions located in 2.8.2 Appendix 1 to obtain the productivity rating for Falkirk-like loam (193,193B).

Based on the results of the above calculated standards, Falkirk proposes to use the unadjusted combined standard for Section 36.

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January, 2010