

**PUBLIC SERVICE COMMISSION**

**Reclamation Division**

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**Memorandum**

**TO:** NACC-1301 proposed permit file

**FROM:** Randy Kowalski, Environmental Scientist - Reclamation Division  
Bill Gunnerson, Environmental Scientist – Reclamation Division  
Bruce Beechie, Hydrologist – Reclamation Division

**DATE:** May 16, 2013

**SUBJECT:** Coyote Creek Mine Alluvial Valley Floor field investigation

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On April 30, 2013 the PSC personnel listed above conducted an alluvial valley floor (AVF) field investigation covering selected portions of an approximate 33,000-acre AVF Study Area that was submitted in anticipation of the proposed initial application of Permit NACC-1301 for the Coyote Creek Mine in Mercer County, North Dakota. Sarah Flath, Environmental Specialist of Coyote Creek Mining Company, L.L.C. and Dr. Dave Bickel, Bickel Consulting, LLC, participated in the field investigation.

As required by NDAC 69-05.2-08-13-1, before applying for a permit to conduct operations within a valley holding a stream, or in a location where the adjacent area includes any stream, the applicant shall either affirmatively demonstrate the presence of an alluvial valley floor, or submit the results of a field investigation of the permit and adjacent areas. On March 20, 2013 the Coyote Creek Mining Company submitted the *Alluvial Valley Floor Evaluation Report* that was prepared by Dr. Bickel in preparation of a proposed small permit application to be located in the E1/2 SE1/4 of Section 30 and E1/2 NE1/4 of Section 31, T143N, R88W. Permit application NACC-1301 will consist of approximately 84 acres and will be the location of the Coyote Creek Mine shop/office complex and dragline erection site. An additional permit application for a much larger mining area is expected to be submitted in the future and the AVF Evaluation Report study area encompasses the NACC-1301 permit area as well as the proposed future permit application area that is anticipated to incorporate approximately 10,000 acres. The AVF Evaluation Report study area includes portions of the major drainages to the Knife River consisting of Brush Creek, Coyote Creek, Mud Creek and other smaller tributary drainages to the Knife River within the evaluation area.

The purpose of the PSC field review was to evaluate stream characteristics, vegetation, evidence of subirrigation, flood irrigation and other land uses at stream valley sites contained within the Coyote Creek Alluvial Valley Floor Evaluation Report study area. As depicted on attached Figure 1, six stream valley sites within the Knife River drainage basin were investigated during the field review. These six sites were chosen for investigation because they contained unconsolidated stream laid deposits (alluvial flood plains/terraces) holding a stream or streams

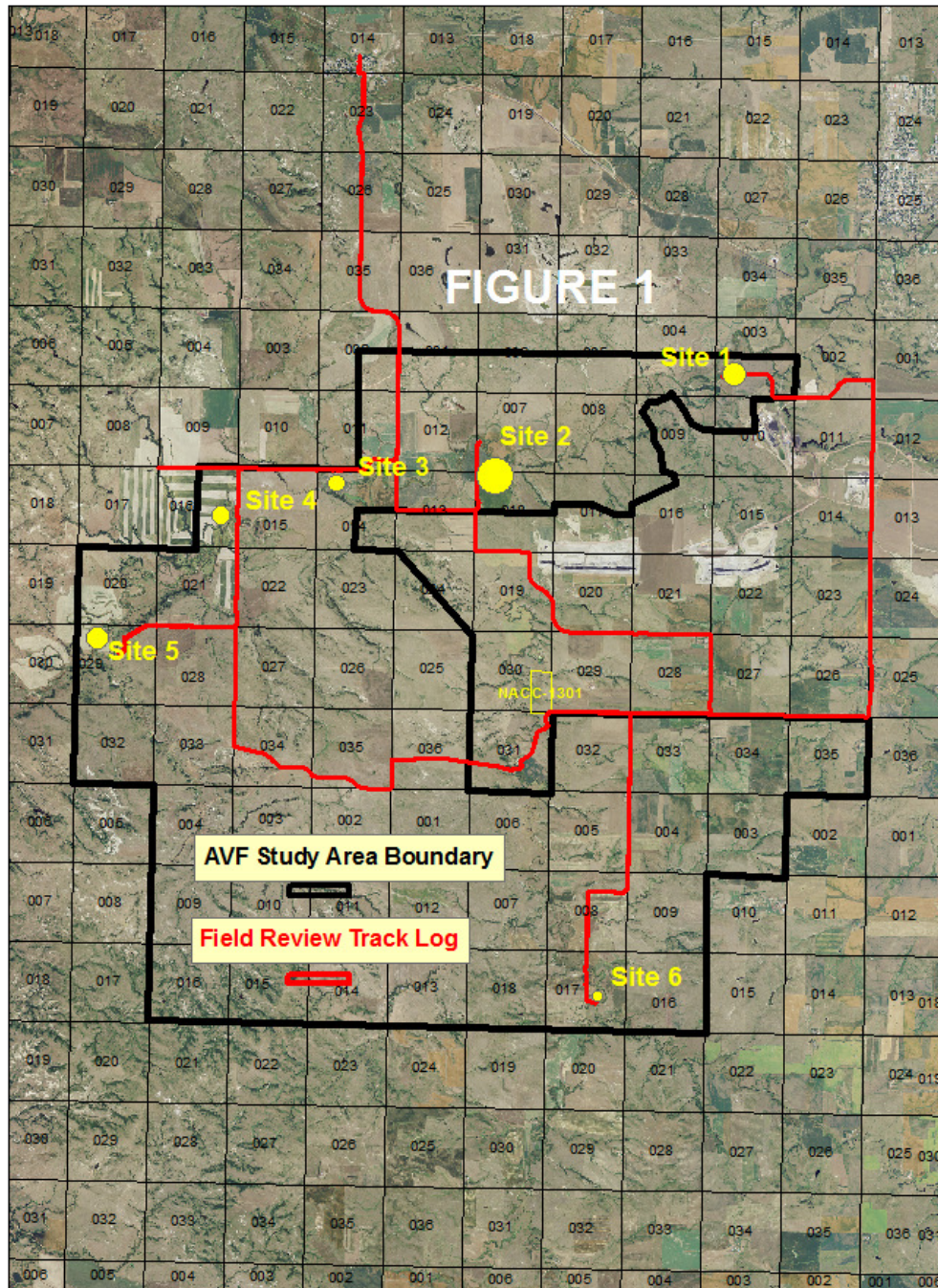
and/or contained adjacent tracts presently being used as cropland and/or hayland. Undeveloped rangeland adjacent to streams is not candidate as alluvial valley floors.

The Office of Surface Mining Reclamation and Enforcement (OSM) *Alluvial Valley Floor Identification and Study Guidelines*, as well as North Dakota Century Code Chapter 38-14.1-02(1) defines an alluvial valley floor as “the unconsolidated stream-laid deposits holding streams where water availability is sufficient for subirrigation or flood irrigation agricultural activities but does not include upland areas which are generally overlain by a thin veneer of colluvial deposits composed chiefly of sediment from sheet erosion, deposits by unconcentrated runoff or slope wash, together with talus, other mass movement accumulation, and windblown deposits.” As described in the OSM Guidelines, legislative, judicial, and administrative interpretation of alluvial valley floors indicate that the water availability criteria are met if: (a) water is available by surface-water irrigation or subirrigation and is being or has successfully been used to enhance production of agriculturally useful vegetation; or (b) surface water is available in sufficient quantities to support agricultural activities. The term “flood irrigation” means natural flood overflow or irrigation using surface water in the methods typical for a given region, and the term “subirrigation” is understood to mean the supply of water to plant roots from an underlying alluvial ground-water system such that the vegetation is more productive than in other areas and that the vegetation continues to grow during the moisture-stress portion of the growing season. The OSM Guidelines also notes that the water availability criterion excludes areas that could be developed for subirrigation; e.g., by establishing deep rooting alfalfa to tap ground water not presently used by native vegetation.

Figure 1 shows the AVF Study Area boundary comprising approximately 33,000 acres outlined in black. The April 30, 2013 GPS point track log of the field investigation route is shown in red. Sites 1-5 are all located near or adjacent to the Knife River and several of those sites are at locations where tributary drainages to the Knife River confluence. Site 6 is located at the southern end of the study area boundary and represents the confluence location of Beaver Creek and Coyote Creek. Photographs of the Sites and additional Site descriptions are described below. As depicted in the attached photographs, the perennial Knife River and all of the ephemeral and intermittent streams inspected that confluence with the Knife River within the AVF study area are substantially incised. Cut banks along the Knife River and its tributaries range from about 12-40 feet in height above the stream channels. No evidence of subirrigation was observed during the field investigation. However, the AVF Evaluation report sites two small tracts of rangeland having soils indicative of potential subirrigation located within dead loops of the Knife River in portions of the N1/2 of Section 14 and the NW1/4 of Section 21, T143N, R89W.

As noted below, Site 3 depicts a cropland tract in which spreader dikes have been constructed to divert surface water flow from two unnamed (assumed ephemeral) tributaries to the Knife River. This site represents two stream channels that do not appear to be unconsolidated stream laid deposits holding a stream. The streams however, do appear to border alluvial deposits of the Knife River and that area of floodplain/terrace has been developed for artificial flood irrigation by construction of a spreader dike system. The unnamed ephemeral streams providing the surface water for the spreader dike system cannot by definition be classified as AVF. At the conclusion of the field review, it was the general consensus of the PSC inspectors that the stream valleys at Sites 1 through 6 located within the AVF Evaluation Report study area do not meet the criteria of an AVF for flood irrigation and subirrigation defined by NDAC 69-05.2-08-13-2(b). The two small tracts of possible subirrigation depicted in the report and the 43-acre spreader dike flood operation described would not represent “productive lands that form the backbone of the agricultural and cattle ranching economy of the area” (OSM Study Guidelines, page II-7).

# FIGURE 1



Site 1 is generally located at the northeastern corner of the study area and represents a 160-acre tract of cropland at the west end of the tract and hayland at the east end of the tract adjacent to, and on the south side of the Knife River where the Knife River leaves the AVF study area. This particular site is located within the S1/2 of Section 3, T143N, R88W approximately 1 mile down-gradient of the confluence of Brush Creek and Knife River.

**View of Knife River looking northwest from Site 1**



**View of Coyote Station looking south across Site 1**



Site 2 represents two cropland tracts that are irrigated with separate center pivot sprinkler irrigation systems, each tract encompassing approximately 80-90 acres. The southern-most irrigated field is located wholly within the NW1/4 of Section 18, T143N, R88W and the northern-most irrigated field is located within the SW1/4 of Section 7 and NW1/4 of Section 18, T143N, R88W, and within the SE1/4 of Section 12 and NE1/4 of Section 13, T143N, R89W. Both irrigation systems are supplied by alluvial ground water from the Knife River Aquifer and the well is located north of the tracts about 250 feet from the Knife River in the SW1/4 of Section 7, T143N, R88W.

**View of Knife River looking north (upstream) near Site 2**



**View to north of irrigated cropland (corn) within Site 2**



Site 3 depicts a an approximate 40-acre cropland tract that has been developed into a spreader dike system and is situated between two unnamed tributaries to the Knife River in the NW1/4 of Section 14, T143N, R89W. Within the 40-acre tract there appeared to be approximately a half-dozen spreader dikes constructed within the tract to divert surface water runoff from the two unnamed tributaries for artificial flood irrigation. The cropland tract appeared to be located on a floodplain within an abandoned oxbow/meander loop of the Knife River.

**Culvert gate valves and stops within stream channel of north tributary at Site 3**



**View to south of spreader dikes at Site 3**



Site 4 is a series of cropland tracts located along the west side of a bridge crossing of the Knife River along 69<sup>th</sup> Ave. SW within the W1/2 of Section 15, T143N, R89W. Approximately 1400 acres of cropland tracts are located adjacent to, and to the north and west of Site 4.

**View of Knife River from bridge crossing looking upstream to northwest of Site 4**



**View to northwest of cropland adjacent to Knife River at Site 4**



Site 5 depicts cropland tracts north and west of the confluence of Mud Creek and the Knife River within the NW1/4 of Section 29, T143N, R89W.

**Confluence of Mud Creek and Knife River at Site 5  
View is toward the west (Mud Creek at bottom center of photo)**



**View to the northwest of cropland in background**



Site 6 depicts cropland at the confluence of Beaver Creek and Coyote Creek at the furthest southeastern portion of the AVF study area in the E1/2 and portions of the W1/2 of Section 17, T142N, R88W.

**Confluence of Beaver Creek and Coyote Creek at Site 6  
View is toward the southwest (upstream of Coyote Creek)**



**Cropland to the north of Beaver Creek/Coyote Creek confluence at Site 6**

