Introduction

The Clean Water Act Section 404(b)(1) Guidelines (40 CFR 230 Subpart B) state that no discharge of fill material shall be permitted if there is a practicable alternative to the proposed discharge. A practicable alternative is an alternative that is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. The practicable alternative that would have less adverse impact on the aquatic ecosystem may be rejected if it would have other significant adverse environmental consequences (40 CFR 230.10(a)). The guidelines should be applied in reasonable, common sense manner based on the nature of the aquatic resource and the potential impacts of the activity in determining compliance with the alternative analysis.

The purpose of the proposed action is to accept 469 acres into trust in support of Mandan, Hidatsa and Arikara Nation's (MHA Nation) proposal to construct a clean fuels refinery within the Fort Berthold Reservation. The need is to facilitate tribal self determination and economic development. This site, identified as Site 8 in a Feasibility Study conducted by Triad Project Corporation in 2002 (finalized in January 2003), was selected to be purchased by the Tribe (Resolution 03-085 dated February 5, 2003). Following purchase the MHA Nation requested the Bureau of Indian Affairs to acquire the lands into trust for the benefit of the MHA Nation (Resolution 03-020 dated March 17, 2003). The MHA Nation had already contracted with Triad to design a refinery. Triad did a preliminary refinery design using for the site using the site to its maximum capabilities by minimizing the overall facility footprint; exploiting the natural topography to capture surface water runoff efficiently; and minimizing potential liabilities by providing adequate spacing between refinery units, moving the drainage, having a setback from edge of property, minimizing traffic in facility for loading/unloading, maintaining safety lines of sight for train traffic, and having no road/rail crossings. The engineers experience in refinery design was used to minimize liabilities that would translate into insurance cost savings for the MHA Nation.

Prior to submitting the request for acquisition of the land into trust to the United States (US), the MHA Nation searched for a potentially suitable site for constructing, operating, and maintaining a clean fuels refinery (Triad 2003). This search began with an evaluation of sites relative to the physical aspects required. One of the criteria for this evaluation was potential impact to surface water, as well as the following criteria:

- Ownership of the property (Tribal land versus privately owned land) with tribal land and land within the reservation being preferred,
- Suitable topography (topography contributes to the safety and economics of the refinery's operation and was one of the major factors in determining a site's suitability) with a relatively flat site preferred,
- Potential for effects to surface water, watershed, and wetlands with no impacts preferred.

- Potential for effects to communities (an adequate population base must be nearby to supply the work force, however, the refinery should not be located too close to communities) with no impacts preferred,

- Proximity to the existing pipeline was considered with points attributed for distance from the line,

- Proximity to an existing highway was considered with points attributed for distance from the highway,

- Proximity to an existing railroad was considered with points attributed for distance from railroad and switch yard;

- Proximity to oil industry facilities was considered with points attributed for distance from existing facilities,

- Value of the site as farmland or wetlands was considered with points attributed for soil type and existence of wetlands, and

- Visibility of the refinery from recreational areas, namely Lake Sakakawea, was considered with points attributed for visibility.

- The final evaluation of the three sites with the highest scores involved a cost and safety analysis that included the following criteria:

- Seller willing to sell at a reasonable price within the budget,

- Cost of infrastructure in relation to each site (cost for constructing rail service, roads, surface drainage, utilities and overall facility),

- Safety factors relative to highway and railway traffic and any ongoing liability, which can be reduced or eliminated by site selection, and

- Ability to have the land acquired into trust status.

There were two sites that were within the reservation boundaries. The Tribe chose to only consider those areas within the reservation boundary as there is less review for acquisition of land into trust status by the US for properties within the reservation boundaries than outside the boundaries. Properties outside established or former reservation boundaries are more likely to be challenged by local and state governments. In addition properties that are outside the boundaries of the reservation require review of the business plan and an analysis of distance outside the reservation boundary (25 CFR Part 151.11).

Of the two sites within the reservation boundaries, Site 6 and Site 8, there were differences in the availability of purchase (not available versus available), proximity to missile site (1800 feet versus 6900 feet), proximity to highway (adjacent versus ½ mile off the highway), safety aspects for road/railway crossings (none versus at least one) and

cost of construction. Personnel at the Minot Air Force base indicated that structures could not be constructed within 1500 feet from missile structures. There is also concern for cabling near these missile sites. Site 6 would be only 1800 feet from a missile site, it would also require ½ mile of road construction which can cost approximately $250,000 to complete according to BIA roads engineers. The additional cost to construct and maintain a roadway increased overall cost of construction on Site 6 as well as concerns for railway safety.

The safety aspect for railway construction pertains to the movement of cars on relatively flat grade and ability to maintain a clear line of sight. Site 6 would require a cut of 15 to 20 feet in a relatively short distance. Site 8 would only require fill. A railway on a fill is safer than one on a cut as it gives the road and rail traffic a clear view of the train traffic which helps prevent accidents. It is also imperative to have the train movements as visible as possible to workers on the refinery site to promote a safe work environment. The positioning of the railway is important to the overall site design because of the need maintain appropriate clearances, restricted use areas. This analysis was conducted by the engineers at Triad who have more than 30 years experience in railway and refinery design.

Of most importance in the selection of a site to meet the Tribes needs is that Site 8 was available for purchase while Site 6 was not. The Tribes instructed their consultants to select and purchase a site for the purposes of constructing and operating a clean fuels refinery.

Both Site 6 and Site 8 had wetlands identified on the National Wetland Inventory (NWI) Maps that are impacted by agricultural practices (Figure 1). There would be approximately 2.36 acres potentially impacted on Site 6 and 5.04 acres on Site 8 according to the NWI maps. Some of these wetlands may be isolated wetlands not considered jurisdictional by the Corps of Engineers for application of CWA 404 regulations. A ground determination of wetlands was not conducted on Site 6 as this site was not pursued by the Tribe for consideration. The wetlands delineated on Site 8 are not similar to those indicated on the NWI maps as the wetlands indicated on the NWI are remotely estimated and require ground verification. There are two wetlands within Site 8 that may be impacted by construction of the refinery (PEMF#2 and PEM/ABF#3). The remaining wetlands on Section 19 and those on Section 20 would continue to be impacted by agricultural activities.

Basic considerations in Refinery Design

There are a number of safety considerations in the design of this type of facility. These considerations are for clearance around components of the refinery that have been developed using insurance company assessments and refinery technology over time (Figure 2). These include maintaining a safety buffer of 300 feet between the tank farm and processing area, the main components of the facility being at least 300 feet from the edge of property, the main components of the facility and railcars being at least 300 feet from existing railroad, and minimization of vehicle traffic within the facility. Compromise of these safety considerations translates into greater liabilities which would

translate into higher insurance costs. Compromise of these safety buffers could increase the potential for accidents that could pose significant environmental consequences (i.e. unplanned air release or unprotected release to soils).

It is also good engineering practices to construct a refinery on virgin material instead of fill. Settling of process units could cause disruptions or integrity failures which could have considerable safety ramifications. The weight and height of the columns in a refinery require a stable foundation and virgin material is typically more stable than standard compacted fill. Structure of this type may require additional fortification of fill such as steel pilings which equate to additional construction costs.

When designing a facility it is always good engineering practice to plan for expansion. Technological and/or regulatory changes may require additional process units or other modifications in the future.

Design "J"

Design "J" proposes impacts to the drainage swale into PEMF#2 to maintain the integrity of surface water capture within the facility and to PEM/ABF#3 for construction of the railway spur (Figure 3). The surface water is designed to be captured for testing prior to use by the facility or release in compliance with applicable permits by relying on gravity.

Design "J" would impact the existing drainage swale by the placement of fill of the existing swale (0.5 acres) and construction of a new drainage. There would be short-term impacts to the receiving wetland while the new drainage's vegetation is established. This would reestablish the water flow and, based upon design, may increase water quality to the receiving wetland, PEMF#2, as revegetation would be able to occur without continued impact from agricultural activities. There would also be a fill of approximately 0.3 acres of a non-jurisdictional wetland, PEM/ABF#3.

This design was proposed to have cost about $150 million to construct in 2003. The wastewater management portion of this design would cost about $750,000 for excavation of less than 200,000 cubic yards. Due to the increases in steel and concrete in the last few years, the present cost is estimated at more than $200 million; however, the excavation costs have not changed significantly.

Alternatives to Design "J"

In order to avoid impacts to isolated wetlands that are not regulated under Section 404 and to avoid road and railroad crossings, any reconfiguration of the facility to avoid filling the drainage swale would need to be confined to the property in Section 19.

A final detailed design has not been developed for the project or these alternatives. Therefore, only estimates for construction costs are presented with a number of unknowns such as actual construction needs based upon detailed analysis of soils.

Alternative to completely avoid drainage swale with pumping

This alternative would shift of the facility to the east and slightly south using Alternative A design (Figure 4). There would be no fill of the drainage swale into PEMF#2 and 0.3 acres of fill for PEM/ABF#3. This alternative would encroach upon the safety zones for the edge of property, railroad, and existing homestead. It would require additional excavation to achieve acceptable surface water drainage and capture. To minimize excavation and disposal costs, the drainage would not be all in one direction so a pumping system would need to be installed to move captured water to the treatment facility from at least two areas. At least four pumps would be required for the two different drainages and two independent surface water collections (areas with potentially oily water and outside areas).

The rough estimate for the facility construction would increase by approximately $2,000,000 as there would be additional infrastructure required (about $1,180,000 - four pumps for two drainage areas), more excavation to achieve an acceptable surface water drainage (about 200,000 cubic yards for $800,000), and captured surface water pumping to the water treatment unit. There would also be increased operational costs for the facility from the pump maintenance.

Alternative to completely avoid drainage swale without pumping

This alternative would shift of the facility to the east and slightly south. There would be no fill of the drainage swale into PEMF#2 and 0.3 acres of fill for PEM/ABF#3. As with the previous alterative, it would encroach upon the safety zones for the edge of property, railroad, and existing homestead. In order to have gravity capture of the surface water without the need for pumping, there would be a need to excavate more than 30 feet on the south side of the property to drop the elevation from 2095 to 2065 at a minimum plus grading throughout the process area. This translates into more than 2,000,000 cubic yards of material would need to be excavated at a cost of $4 a cubic yard for $8,000,000. This cost does not include any retaining walls to protect slopes from erosion which would need to be addressed in the final detailed design. It also does not address the cost for removing excess fill material. Placing the fill material on other portions of the site would impact non-jurisdictional wetlands and would not be in keeping with the other purpose to provide hay for tribal use.

Alternative to minimize impact to drainage swale with ponds on the east

This alternative would reduce the fill of the drainage swale by 100 feet by moving the water treatment unit and ponds to the east of the drainage swale. There would be 0.4 acres of fill in the drainage swale into PEMF#2 and 0.3 acres of fill for PEM/ABF#3. It would encroach upon the safety setbacks for the tank farm (240 foot separation) and property line (200 foot separation) (Figure 5). To minimize excavation and disposal costs, the drainage would not be all in one direction so a pumping system would need to be installed to move captured water to the treatment facility. This alteration would cost approximately $930,000 more to construct than the proposed alternative as two high

capacity trash pumps with pump houses and associated piping would be needed ($588,700), as well as 80,000 cubic yards of additional excavation ($340,000).

Alternative to minimize impact to drainage swale with ponds remaining on the west (Design "K")

This alternative would involve moving components of the process area out of the drainage swale. There would be less than 0.1 acres of fill of the drainage swale into PEMF#2 and 0.3 acres of fill of PEM/ABF#3. The overall drainage pattern would be the same except the surface water would be captured on the east side of the drainage swale and piped across to holding tank/pond as appropriate (Figure 6). The cost would be essentially the same as design "J", $200,000,000, because the increased cost of piping would be countered with the decreased excavation and fill costs.

Discussion

All of the alternatives moving the ponds to the east of the drainage swale considered for avoiding or minimizing the fill of the drainage swale will increase costs because of the need for additional excavation and may require pumping of captured surface water to treatment units. These costs need to be considered in light of the overall project. This project is proposed for the economic development of a sovereign nation with an unemployment rate of almost 71% and more than half of the tribal members living below the poverty level (BIA 2001), any increase in construction or operating costs would be impact the tribal goals for economic development by increasing the potential payback period. The Tribes have not conducted a comparative analysis on the payback period yet because of the payback period is based on market variables which are highly volatile for petroleum products and they are reluctant to speculate on this prior to imminent construction. It is intuitive that adding operational costs such as maintaining pumps will prolong the payback.

This is an oil refinery with potential for contamination of soils, ground water and surface water. Refinery designs have evolved over time to address this potential and minimize impacts. One of the basics is that the refinery design needs to capture all surface water falling within the foot print and treat it accordingly. The ideal situation is to use gravity for capture of surface water as this is a simple system with few outside variables for complications. Reliance on pumps to move surface water presents a number of variables for complications such as outright failure of pump(s), maintenance irregularities, or leakage during use at or in piping. This should be considered as increasing the potential for adverse environmental consequences in order to avoid 0.5 acres of impact to an agricultural drainage that has developed wetland characteristics which can be moved.

Leaving the drainage swale open within the refinery facility will expose a potential environmental hazard by having a conduit for hazardous material to flow offsite untreated if drainage systems fail or should a truck slip off a road removing material from the west side of the drainage during the winter. These systems could fail due to compromise in integrity or an unplanned event (i.e. multiple storm events greater than 100 year or

catastrophic explosion). These scenarios and similar ones could present significant adverse environmental consequences to the tributary of the East Fork of Shell Creek

Another consideration for selecting an alternative now to avoid impact to the drainage into PEMF#2 would be that if the design has been such that the expansion of the refinery due to new market initiatives, technological advances, and/or regulatory changes. The Tribes may in the future request fill of the drainage for expansion of the processing area. According to the engineers experienced in refinery design expansion of the processing area is common due to new technologies and regulatory requirement changes. Therefore, this is a reasonably foreseeable if not distinctly identifiable development.