

September 5, 2002

Mr. Mark E. Hoffman, Project Manager
ExxonMobil
Refining and Supply Company
3225 Gallows Road
Fairfax, Virginia 22037-0001

SUBJECT: HIGHLAND RECLAMATION PROJECT - NORTH DIVERSION CHANNEL
HYDRAULIC EVALUATION REPORT (TAC NOS. L52435 and L52436)

Dear Mr. Hoffman:

The NRC staff has reviewed your May 28, 2002, report, "Highland Reclamation Project - North Diversion Channel Hydraulic Evaluation." Based on this review, the staff concludes that the current design is acceptable with regard to sediment accumulation in the diversion channel at the site. A technical evaluation report, documenting the adequacy of the channel, is attached.

Additionally, we have reviewed your June 25, 2002, report, "As-Built and Construction Quality Assurance Report for the Uranium Tailings Basin at The Highland Reclamation Project." Based on this review, we conclude that the report adequately documents the construction and placement of erosion protection. A technical evaluation report, documenting the adequacy of the construction, is attached.

Although the report provides considerable information regarding the placement of fill and repairs to settlement that have occurred at the site, we understand that additional settlement monitoring will be performed prior to terminating the license. Based on discussions between you and Ted Johnson, NRC project manager, additional settlement data and information will be provided in the near future to document the adequacy of the placement of fill. When that material is submitted, the NRC staff will review the geotechnical and settlement information as one complete package.

These actions close TAC L52435 and TAC L52436. If you have any questions, please contact Ted Johnson, NRC project manager, at (301) 415-6658.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the

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Sincerely,

/RA/

Daniel M. Gillen, Chief
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket No. 40-8102
License No. SUA-1139

Enclosure 1: Technical Evaluation of Exxon Sediment Analysis
Enclosure 2: Technical Evaluation of Exxon As Built Construction

September 5, 2002

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Distribution: **(CLOSES TACS L52435 and L52436)**
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NAME	TJohnson*		JMuszkiewicz*		GJanosko*		DGillen	
DATE	9 /5/02		9 /4/02		9 /5/02		9 /5/02	

*see previous concurrence

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TECHNICAL EVALUATION OF EXXON SEDIMENT ANALYSES

DATE: August 27, 2002
FACILITY: Exxon Mobil Highland
PROJECT MANAGER: T. Johnson
TECHNICAL REVIEWER: T. Johnson

SUMMARY AND CONCLUSIONS

Following discussions and staff reviews of sediment analyses, ExxonMobil Corporation (Exxon) has resolved staff concerns regarding sediment buildup in the North Diversion Channel (NDC) at the Exxon Highland site. In a submittal dated May 28, 2002, Exxon provided additional analysis to justify that sediment would not be a problem. Based on review of these analyses, the staff concludes that the design and construction of the NDC meets the requirements of 10 CFR Part 40, Appendix A. The staff concludes that the design will provide tailings stability for a period of 1000 years, to the extent reasonably achievable, but in any case for 200 years.

BACKGROUND

The reclamation plan for the Exxon Highland site was approved by the NRC staff in 1988, and construction activities were substantially completed by the licensee in 1991. During inspections of the site in 1996, 1997, and 2001, NRC staff members observed that a substantial amount of sediment had accumulated in the NDC during the occurrence of several storms. In addition, a prairie fire in 1996 caused damage to the vegetation and exacerbated the sediment problem in several areas along the length of the NDC.

On June 14, 1995, the Commission issued its decision regarding the review status of previously-approved reclamation plans. In that decision, the Commission determined that previously-approved reclamation plans would not be revisited or receive additional attention, unless: (1) the staff identifies a significant health, safety, or environmental concern; (2) the staff determines that there is a need to reevaluate the seismic aspects of a design; or (3) a licensee requests that the ongoing review proceed. Consistent with that direction, the staff determined that, prior to transfer to the long-term custodian, it would simply confirm that construction was performed in accordance with the approved plan. However, if a site had experienced degradation, licensees would be required to make repairs to degraded design features and to show that the design meets the long-term stability requirements of 10 CFR Part 40, Appendix A, in light of the observed degradation.

During routine inspections of completed activities at the site, the staff identified several areas where degradation had occurred, including sedimentation in the NDC. During various

inspections and several telephone conversations with the licensee, the staff discussed the specific degradation concerns and acceptable methods of resolution. In a submittal dated May 28, 2002, "Highland Reclamation Project - North Diversion Channel Hydraulic Evaluation," the licensee provided information to address these concerns.

During the staff inspection in 2001, the staff noted that the licensee had removed the sediment from the NDC. The staff also noted that vegetation growth appeared to be generally acceptable in the repaired areas.

DESCRIPTION OF LICENSEE PROPOSAL

Exxon intends to resolve staff concerns by providing analyses to show that sediment accumulation can occur in the NDC without any adverse effects. Exxon intends to show that even if the channel is completely blocked with sediment, overflow from the channel onto the tailings pile top slope will not result in erosion of the cover or the tailings.

TECHNICAL EVALUATION

1. Problems with Sediment Accumulation

Sediment deposition is a problem in the NDC at the site, primarily because the bottom slopes of the channel are less than the slope of the natural ground where flows enter the channels. For this site, a considerable amount of sediment from the upland drainage areas can be expected to enter the diversion channels, for the following reasons:

- a. The upland drainage areas have relatively steep slopes, whereas the NDC has been designed with relatively flat slopes. Flow velocities in the channel are not as high as those occurring on the natural ground. Therefore, sediments are transported to the channel and are not easily flushed by the lower velocities in the channel.
- b. The potential for gully development (and resulting high flow velocities) in the upland drainage area and subsequent transport of sediment into the diversion channel is high. Gullies, rills, and areas of flow concentration are evident on upstream hillslopes and on the side slopes of the diversion channel. Flows moving toward the diversion channel will tend to concentrate in these areas, increasing the potential for further gully incision and transport of large quantities of sediment.

If sediment accumulates in the channel, the capacity of the channels may be diminished to the extent that the berm separating the channel from the tailings area will be overtopped. Such overtopping will cause flood runoff to be transported directly over the reclaimed tailings pile. Overland flow across the tailings pile could cause erosion and offsite transport of contaminated tailings.

The observations made during site inspections and site visits indicated that significant sediment had accumulated at several locations where natural gullies enter the NDC; this sediment had accumulated following completion of construction of the channel.

2. Evaluation of Licensee Hydraulic Analyses

In response to NRC concerns, Exxon developed hydraulic analyses to evaluate the erosional stability of the cover surface, assuming a worst-case scenario of complete blockage of the NDC by sediment. In this assumption, flows that are normally conveyed by the NDC are assumed to overflow the channel and berm and are routed directly over the tailings cover surface.

Exxon used the Probable Maximum Precipitation (PMP) and Probable Maximum Flood (PMF) in the hydraulic analyses. These values had been previously approved by the NRC staff in 1984. In this evaluation, the PMF estimates were re-checked to determine their reasonableness. The PMF for the NDC was estimated by Exxon to be about 6400 cfs at the downstream end of the NDC. The staff compared this estimate to other historic flood peaks in the United States and also checked the calculations of drainage area, time of concentration, and rainfall intensity. Based on these analyses, the staff continues to conclude that the PMF estimates are acceptable.

The U. S. Army Corps of Engineers HEC-RAS model (ACE, 2001) was used to estimate water surface profiles, flow depths, and velocities under the estimated discharge conditions in the channels. This model is commonly accepted as a state-of-the-art calculation method.

The results of the analyses indicate that erosional velocities during PMF overflow conditions are less than a generally-accepted permissible velocity of 3.5 feet per second for grass-lined channels. Based on staff review of the model input parameters, the staff concludes that the analyses are acceptable and that erosion of the cover should not occur.

CONCLUSIONS

Staff review of the licensee's sediment analyses indicate that the current NDC design is acceptable with regard to sediment accumulation. The construction of the channel is such that flood overflows due to blockage by sediment will have no effect on the stability of the tailings. The staff concludes that the overall channel design and construction meets the requirements of 10 CFR Part 40 Appendix A.

REFERENCES

U. S. Army Corps of Engineers (ACE), "HEC-RAS River Analysis System," Hydrologic Engineering Center, Davis, California, 2001.

U. S. Army Corps of Engineers (ACE), Flood Hydrograph Package, HEC-1," Hydrologic Engineering Center, continuously updated and revised.

TECHNICAL EVALUATION OF EXXON AS-BUILT CONSTRUCTION

DATE: August 27, 2002
FACILITY: Exxon Mobil Highland
PROJECT MANAGER: T. Johnson
TECHNICAL REVIEWER: T. Johnson

SUMMARY AND CONCLUSIONS

Following discussions and several construction inspections, ExxonMobil Corporation (Exxon) has resolved staff concerns regarding construction of erosion protection at the Exxon Highland site. In a submittal dated June 25, 2002, Exxon provided additional information related to the construction and verification of erosion protection size and layer thickness. Based on a review of this information, the staff concludes that the design and construction of the erosion protection meets the requirements of 10 CFR Part 40, Appendix A. The staff concludes that the design will provide tailings stability for a period of 1000 years, to the extent reasonably achievable, but in any case for 200 years.

BACKGROUND

The reclamation plan for the Exxon Highland site was approved by the NRC staff in 1988, and construction activities were substantially completed by the licensee in 1991. During inspections of the site in 1996, 1997, and 2001, NRC staff members determined that the erosion protection had been covered with sediment and that the thickness and size of the riprap could not be verified by direct observations. The licensee performed additional verification checks of the rock and submitted the results for NRC staff review. In addition, some settlement had occurred and the licensee had placed additional fill in the settled areas. Additional settlement information was provided in this report.

During various inspections and several telephone conversations with the licensee, the staff discussed the specific concerns and acceptable methods of resolution. In a submittal dated June 25, 2002, "As-Built and Construction Quality Assurance Report for the Uranium Tailings Basin at the Highland Reclamation Project," the licensee provided information to address these concerns.

DESCRIPTION OF LICENSEE PROPOSAL

Exxon intends to resolve staff concerns by providing data that show that the riprap has been constructed in accordance with approved plans and specifications.

TECHNICAL EVALUATION

NRC staff reviewed the surface water hydrology and erosion protection aspects of remedial actions at the Exxon Highland site to ensure that they were constructed in accordance with the applicable construction specifications. The review focused on erosion protection that was placed in several specific areas, including: (1) embankment crest; (2) western limb (west end area) of the tailings basin; and (3) low-flow channel.

The NRC staff reviewed each of these features and determined that testing, placement, and riprap configurations complied with specifications. The review was based on NRC staff observations during the 2001 inspection, as well as assessment of the verification results presented in this report.

During the review, the NRC staff noted the following:

1. Tests (gradation and durability) and inspections were performed by the licensee to ensure that erosion protection materials were properly selected. The review of the documentation indicated that placement of materials was inspected to ensure that the rock size and gradation specifications were met. Likewise, the thickness of the rock layers were verified periodically to ensure compliance with the specifications for the particular type of material.
2. Laboratory and field testing was conducted in accordance with specified test procedures.
3. Testing and inspection frequencies for materials used at the site for erosion protection were documented and complied with the frequencies specified.

CONCLUSIONS

Staff review of the licensee's construction data indicates that construction of the erosion protection has been performed in accordance with approved plans and specifications. The staff concludes that the overall design and construction meets the requirements of 10 CFR Part 40 Appendix A.