Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

Dave Freudenthal, Governor

John Corra, Director

May 11, 2009
Mahesh Vidyasagar
ExxonMobil Environmental Services
12450 Greenspoint Drive
GSC-GP6-1004
Houston, TX 77060

RE: Permit 218C, 2006-2007 Annual Report review, Second Round Comments

Dear Mr. Vidyasagar,
Please find enclosed the Second Round Comments of the 2006-2007 Annual Report. More detailed comments to your responses are attached.

Please contact me should you have any questions or concerns regarding the Second Round Comments for the 2006-2007 Annual Report.

Sincerely,

Anna Krzyszowska-Waitkus
Soil Scientist
Land Quality Division

Attachment No. 1,2,3, and 4

Cc: Thomas McLaughlin, NRC

RE: 2007 Annual Report. Review of the operator responses to the LQD's First Round Comments sent 4/21/2008.

Comment 1.1. Response acceptable.

Attachment 5, Monitoring Well Water Quality Data. The following wells: 150, 151, 152, 173, 178, 179, 180, and 183 were sampled at the request of the US Nuclear Regulatory Commission (NRC). Future annual reports to WDEQ will include a map with only the required well location.

Comment 1.2. Response acceptable.

The concentration of U-Nat, Gross Alpha, and Ra226 were exceeding standards for underground Class III water in well No. 170 in water results until 2008. Water samples collected in 2008 do not exceed underground Class III water standards. (**Figure 1** of this review)

Comment 2.1. Response not acceptable.

The review of the comprehensive risk assessment including the potential impact of selenium on environmental receptors was completed in 2007 and submitted to WDEQ. After reviewing the assessment it is still not clear how the operator is going to prevent a risk to migratory birds as water selenium concentration above 0.02 mg/l is considered hazardous to health and long-term survival of fish and wildlife. Additionally, the letter from the Fish and Wildlife Service sent on 2/23/04 requested an ongoing monitoring of the pit lake water to include "the occurrence or absence of submerged aquatic vegetation and aquatic invertebrates in the pit lake which could serve as dietary pathways for selenium to migratory aquatic birds." (**Figure 2** of this review). Your response to this comment was not sufficient and you did not explain if such monitoring plan is going to be introduced.

Comment 2.2. Response conditionally accepted.

The 2006 results from the Pit Lake were attached. However, the concentration of U-Nat. at the 1/3 depth (sample No. 168) collected on 6/23/2006 is 319 m/l. Please verify if this is the typo error. The summary of the results is included in **Figure 3**.

Comment 3. Response not acceptable.
The requested table (**Figure 4**) was not attached to the 2007-2008 Annual Report. Please attach this table to the 2007-2008 Annual Report.

Figure 1. Groundwater, well No. 170

Date	U-Nat	Gross Alpha	Ra226+Ra228
2/24/2005	0.476	11.9	13
2/14/2006	0.554	9.8	10.1
8/11/2006	0.496	11.8	6.9
3/8/2007	0.517	10.1	7.2
8/17/2007		12.3	8.3
2/28/2008	0.555	10.3	2
7/28/2008	0.521	8.7	1.2

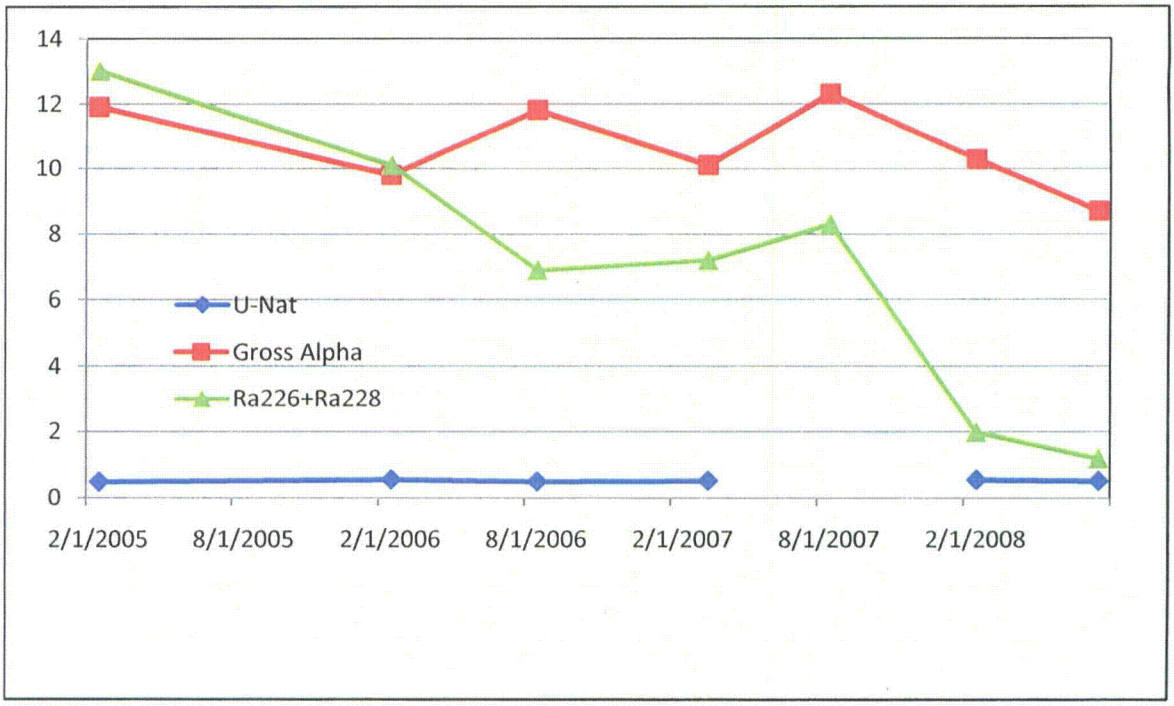


Figure 2

LDS
SI-3

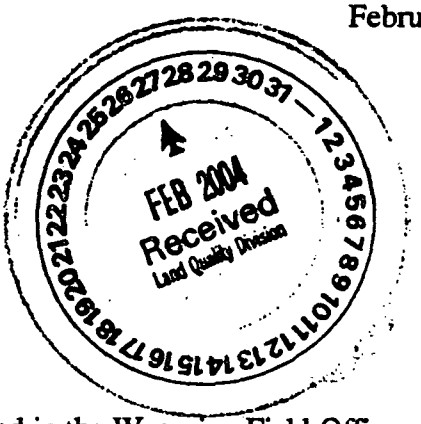
United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

In Reply Refer To:
ES-61411/MINES/WY7993

February 23, 2004



Lowell Spackman
State of Wyoming
Department of Environmental Quality
Land Quality Division
Herschler Bldg., 3rd Floor West
Cheyenne, Wyoming 82002

Dear Mr. Spackman:

Thank you for the notice of January 14, 2004, received in the Wyoming Field Office on January 14, 2004. In your notice you advised the U.S. Fish and Wildlife Service (Service) that the Exxon Mobil Corporation's (Permit 218-C), Annual Report for 2002-2003 is available for review pursuant to Wyoming Environmental Quality Act W.S. § 35-11-411. The Highland Reclamation Project (uranium) is located in Converse County, Wyoming.

The report states no mining activity is planned for the upcoming year and reclamation work consists of an ongoing monitoring and weed control program. The permittee should be advised that the permit and adjacent area may provide suitable habitat for the Preble's meadow jumping mouse and the Ute ladies'-tresses, species listed as threatened under the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 *et seq.* We encourage the permittee to take all necessary precautions to avoid impacts to these species as a result of reclamation activities.

The report states that selenium concentrations in the pit lake water ranged from 82.6 to 99 µg/L. We are concerned with the potential risk posed by these high selenium concentrations to migratory birds that are or may be using the pit lake. Elevated selenium can pose a risk to migratory birds as waterborne selenium concentrations $\geq$ 2 µg/L are considered hazardous to the health and long-term survival of fish and wildlife (Lemly 1996). Additionally, water with more than 20 µg/L is considered hazardous to aquatic birds (Skorupa and Ohlendorf 1991).

Wildlife use and the risk presented by inorganic contaminants in pit lakes is unknown. Riparian and aquatic communities may become established in some pit lakes; however, the nature of these communities is unknown. Pit lakes are typically deep with steep sides, thereby limiting riparian and shallow lentic habitat. However, benches and ramps in the mine pit, along with erosion of pit walls, may provide limited areas where shallow lentic or riparian communities can become established. Wildlife using pit lakes may be exposed to hazardous levels of environmental

contaminants in pit lakes. In an extreme case (Berkeley Pit near Butte, Montana), a large-scale avian die-off has been attributed to poor quality pit lake water. In this incident, the death of 342 snow geese was attributed to acute metal toxicosis and sulfuric acid exposure resulting from exposure to, and consumption of poor quality pit water. Under less extreme conditions, exposure to inorganic contaminants may occur through exposure to water and consumption of contaminated foods from the pit lake. In the latter, bioaccumulation and biomagnification become important factors affecting contaminant uptake. If submerged aquatic vegetation is present in pit lakes with high waterborne selenium concentrations, extremely high dietary levels of this contaminant can be available to aquatic migratory birds. Ramirez and Rogers (2000) documented selenium concentrations ranging from 434 to 508 µg/g in pondweed (*Potamogeton vaginatus*) collected from a uranium mine wastewater storage reservoir that had waterborne selenium concentrations ranging from 260 to 350 µg/L.

Ongoing monitoring of the pit lake should include the following:

- the occurrence or absence of submerged aquatic vegetation and aquatic invertebrates in the pit lake which could serve as dietary pathways for selenium to migratory aquatic birds; and

- if selenium pathways are established in the pit lake, aquatic bird surveys should be conducted to determine the amount of use.

The above monitoring will be useful in estimating the risk posed by selenium to aquatic migratory birds and, if necessary, developing interim and long-term measures to protect migratory birds from selenium bioaccumulation. The monitoring could also provide data useful in the remediation of selenium concentrations in the pit lake.

We appreciate your efforts to ensure the conservation of threatened and endangered species, wetlands, and migratory birds in Wyoming. If you have any questions regarding this letter or your responsibilities under the Act, please contact Andrea Gray or Pedro 'Pete' Ramirez of my staff at the letterhead address or phone (307) 772-2374.

Sincerely,

Brian T. Kelly
Field Supervisor
Wyoming Field Office

cc: WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (T. Collins)
WGFD, Nongame Coordinator, Lander, WY (B. Oakleaf)

References

Lemly, A.D. 1996. Selenium in aquatic organisms. Pages 427-445 *in* W.N. Beyer, G.H. Heinz, and A.W. Redmon-Norwood (eds.). Environmental contaminants in wildlife: Interpreting tissue concentrations. Lewis Publishers, Boca Raton, Florida.

Ramirez, P. and B. Rogers. 2000. Selenium in a Wyoming grassland community receiving wastewater from an in situ uranium mine. U.S. Fish and Wildlife Service Contaminant Report # R6/715C/00. Cheyenne, WY. Sept. 31.

Skorupa, J.P., and H.M. Ohlendorf. 1991. Contaminants in drainage water and avian risk thresholds. Pages 345-368 *in* A. Dinar and D. Zilberman (eds.). The economics and management of water and drainage in agriculture. Kluwer Academic Publishers.

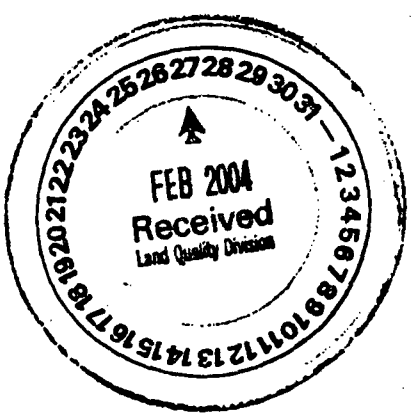
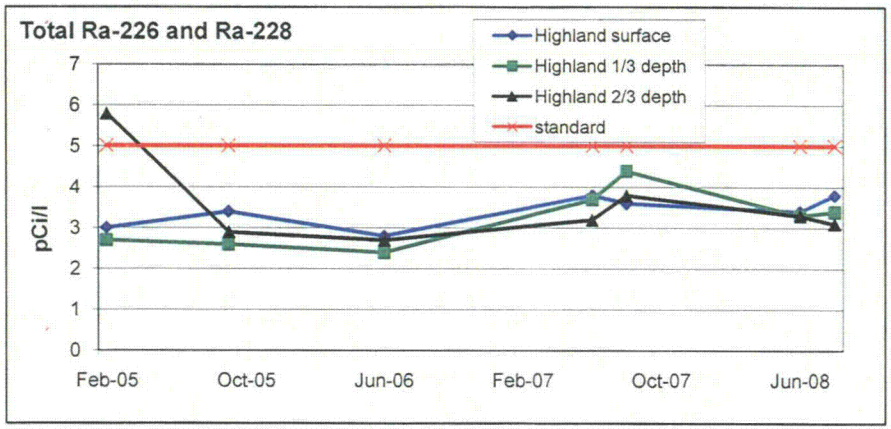
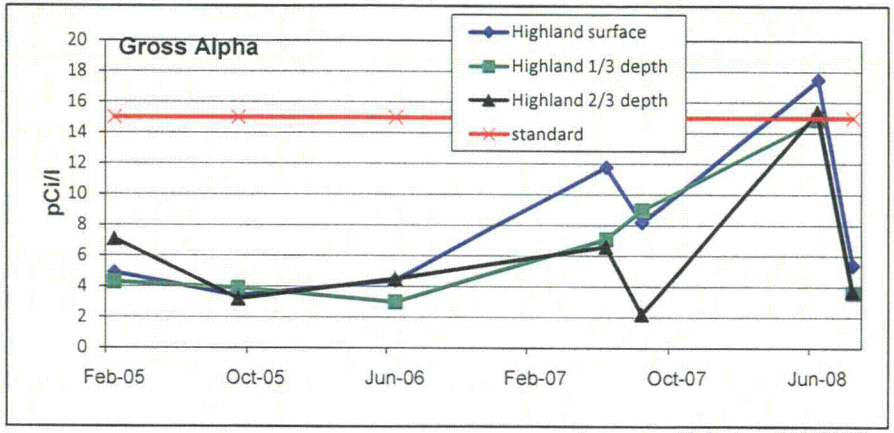
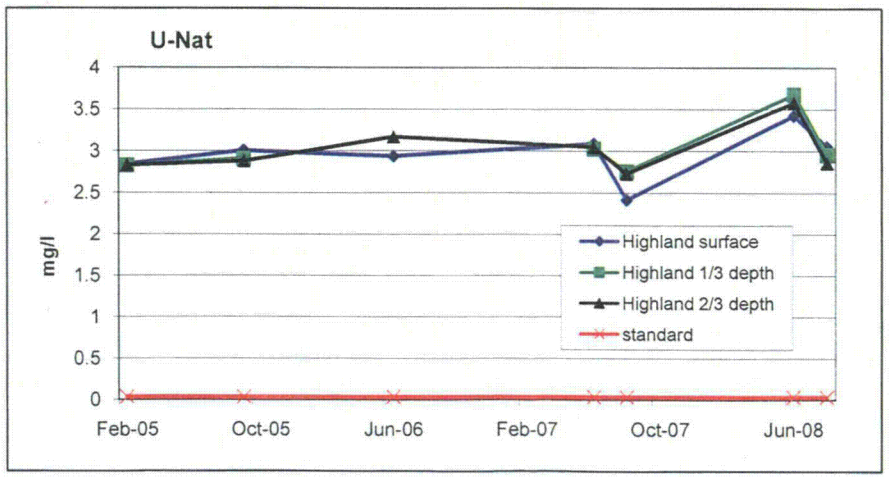


Figure 3. Highland Pit Lake Water Quality Data

Ra-226 and Ra-228, 60 pCi/l							
Site	2/23/2005	9/7/2005	6/23/2006	6/5/2007	8/28/2007	6/10/2008	8/19/2008
Highland surface	3	3.4	2.8	3.8	3.6	3.4	3.8
Highland 1/3 depth	2.7	2.6	2.4	3.7	4.4	3.3	3.4
Highland 2/3 depth	5.8	2.9	2.7	3.2	3.8	3.3	3.1
standard	5	5	5	5	5	5	5
U-Nat, 5 mg/l							
Site	2/23/2005	9/7/2005	6/23/2006	6/5/2007	8/28/2007	6/10/2008	8/19/2008
Highland surface	2.84	3.01	2.94	3.09	2.42	**3.43**	3.06
Highland 1/3 depth	2.83	2.91		3.03	2.76	**3.68**	2.96
Highland 2/3 depth	2.83	2.88	3.17	3.05	2.73	**3.58**	2.86
standard	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Gross Alpha pCi/l							
Site	2/23/2005	9/7/2005	6/23/2006	6/5/2007	8/28/2007	6/10/2008	8/19/2008
Highland surface	4.9	3.4	4.4	11.8	8.2	**17.5**	5.4
Highland 1/3 depth	4.3	3.9	3	7.1	9	**14.9**	3.6
Highland 2/3 depth	7.1	3.2	4.5	6.6	2.2	**15.4**	3.7
standard	15	15	15	15	15	**15**	15
Selenium, mg/l, std 0.05 mg/l							
Site	2/23/2005	9/7/2005	6/23/2006	6/5/2007	8/28/2007	6/10/2008	8/19/2008
Highland surface	0.0911	0.105	0.0948	0.09	0.0915	0.0877	0.0757
Highland 1/3 depth	0.094	0.102	0.102	0.0858	0.0889	0.09	0.0748
Highland 2/3 depth	0.0894	0.104	0.0922	0.0027	0.09	0.0859	0.0737
standard	0.05	0.05	0.05	0.05	0.05	0.05	0.05







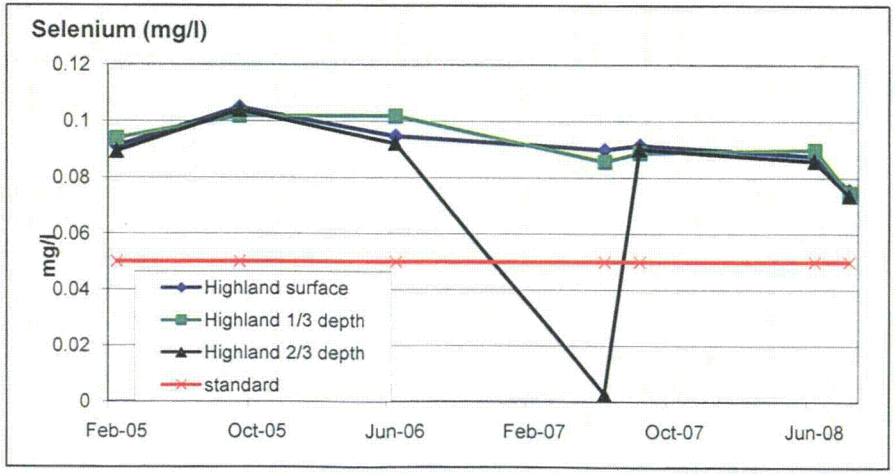


Figure 4

Table 1 WDEQ Water Sampling Locations, Parameters and Sampling Frequency

WELL DOMAIN	TDSS[1]	OBSS[2]
Upgradient Wells	131 (west of pit) 132 (west of pit) 133 (west of pit) 134 (south of pit) 172 (north of pit)	136 (south of pit) 141 (west of pit) 142 (west of pit) 144 (west of pit) 047 (northeast of pit)
Pit 1 & 2 Backfill	170 (near E side of Pit 3) 171 (mid-backfill)	
Pit Lake	167 (surface) 168 (1/3 depth) 169 (2/3 depth)	

PARAMETERS & FREQUENCY	
Semi-Annual	**1 year Semi-Annual Parameters (re-evaluate for future)**
Field: pH, Elec. Conductivity, Temperature, Water Level Lab: TDS, Ca, Na, Mg, K, Cl, SO_4, CO_3, HCO_3, Se, Gross Alpha, Ra-226, Ra-228, U_{nat}	Lab: Cd, Cr, Co, Hg, V

[1] TDSS = Tailings Dam Sandstone unit; [2]OBSS = Ore Body Sandstone unit

[2] Several parameters (Al, As, B, Cu, Pb, Sr-90, Zn) are not proposed because historical pit lake and groundwater quality for these constituents has been demonstrated to be consistently below WY Class III Standards or because they are not an appropriate parameter. Semi-annual sampling of Cd, Cr, Co, Hg, and V for one year is proposed at the identified reporting limit. Necessity of continued sampling for these five parameters will be determined with WDEQ based on these sampling results.

Table 2 Summary of Proposed Analytes, Standards and Reporting Limits

Parameters	WDEQ Class III Standard	Reporting Limit	Units
Ca	--	0.01	mg/L
Cd	0.05	0.01	mg/L
Cl	2000	1	mg/L
Co	--	0.01	mg/L
CO_3	--	0.1	mg/L
Cr (total)	0.05	0.01	mg/L
Gross alpha	15	1	pCi/L
HCO_3	--	0.1	mg/L
Hg	0.00005	0.0001	mg/L
K	--	0.01	mg/L
Mg	--	0.1	mg/L
Na	--	0.1	mg/L
Ra-226 + 288	5	1.2	pCi/L
Se	0.05	0.01	mg/L
SO_4	3000	10	mg/L
TDS	--	10	mg/L
U_{nat}	5	0.01	mg/L
V	0.1	0.05	mg/L
Field Parameters			
Electrical Conductance	--	10	µmho/cm
pH	--	0.1	S.U.
Water Level	--	0.01	Feet
Water Temperature	--	1	°C