SEQUOYAH FUELS
A GENERAL ATOMICS COMPANY

RE: **0752-N**

12/26/07

FedEx Trk#: 7988 3925 1084

U.S. Nuclear Regulatory Commission
ATTN: Mr. Allen Fetter, Project Manager
Environmental Review Section
Environmental and Performance Assessment Directorate
Division of Waste Management and Environmental Protection
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738

Subject: Sequoyah Fuels Corporation, Docket – 40-8027
Request for Additional Information For Environmental Review of Proposed Reclamation Plan

Dear Allen,

In a letter dated November 21, 2007, you requested additional information to respond to comments on the dEIS. The information you requested is enclosed with this letter.

A comment has been made on the dEIS that SFC cell construction would remove 2 acres of open field habitat that might be used by the American Burying Beetle (ABB), a federally list endangered species. While the cell location would not impinge upon any open field habitat, there will be clearing of several acres of wooded habitat in the clay borrow area that might be used by the ABB. Also, topsoil will be removed from the hay meadow in the southwest portion of the site to complete the disposal cell cover. This meadow may also be used by the ABB. SFC will engage in a Section 7 consultation with the Tulsa Ecological Services Field Office to ensure that any proposed work will not adversely affect the ABB.

If you have any questions, don't hesitate to call me at (918) 489-5511, ext. 225.

Sincerely,

Craig Harlin
Vice President

XC: Myron Fliegel
Rita Ware, EPA
Alvin Gutterman, MLB
Jeanine Hale, CN
Trevor Hammons, OAG

ENCLOSURE 1

Response to Request for Additional Information
Sequoyah Fuels Corporation
Docket No. 40-8027

The U.S. Nuclear Regulatory Commission (NRC) staff is continuing its environmental review of Sequoyah Fuels Corporation's (SFC's) proposed reclamation plan, and alternative to the proposed plan. Based on its review of comments received on the Draft Environmental Impact Statement (dEIS), and of previously submitted site-specific information, the NRC staff is requesting the following information to support its evaluation of the potential environmental impacts of SFC's proposed reclamation plan and the alternatives.

1. Provide the following information concerning characterization of the raffinate sludge:

   a. A copy of the latest raffinate sludge characterization summary.

   b. A table of the raffinate sludge uranium content based on composite samples from each storage cell.

   Response:

   The requested information is provided in Enclosure 2.

2. Provide the latest available information on the chemical characterization and uranium contents of the sediments from the Emergency Basin, North Ditch and Sanitary Lagoon.

   Response:

   The Emergency Basin, North Ditch, and Sanitary Lagoon were last characterized during the RCRA Facility Investigation (RFI), and the results were reported in Table 30 of the Final RFI dated October 14, 1996. That information is summarized and provided in Enclosure 2.

3. Provide the price quotes received on the transportation of the estimated 12,648 tons of raffinate sludges and sediments from the Emergency Basin, North Ditch and Sanitary Lagoon from the SFC Site to the White Mesa Mill in Blanding, Utah, as well as price quotes to ship this material to other appropriately licensed facilities.

   Response:

   A compilation of the most recent shipping and disposal costs are provided in Enclosure 2. Please note that we have not received any new proposal from the White Mesa Mill since the uranium price has increased. The value in the table has not been updated.

4. Provide the latest terms of negotiations between SFC and the White Mesa uranium mill on the processing of contaminated materials as alternate feedstock, specifically:

   a. Cost estimates for storing, handling and processing the raffinate sludges and sediments form the Emergency Basin, North Ditch and Sanitary Lagoon at the White Mesa Mill facility.

b. Any rebate (dollar amount or percentage) offered to SFC for uranium recovered through processing of the raffinate sludges and sediments from the Emergency Basin, North Ditch and Sanitary Lagoon.

Response:

SFC has not received any new proposal from the White Mesa Mill since the uranium price has increased. We continue to press for a new proposal from White Mesa with a credit for the uranium content but have not been successful to date. See response to RAI 3 above.

5. In the Reclamation Plan, Attachment A, Specs and Drawings, page 4 of the text states: "Water required by the Contractor for dust suppression or soil moisture conditioning shall be obtained from wells or surface water storage areas identified by the Owner." The State of Oklahoma Water Resources Board has indicated that the current Appropriation Water Rights Permit for SFC allows for an annual withdrawal rate of 1800 acre-f. If additional water will be needed during proposed reclamation for dust suppression or soil moisture conditioning, specify the volumes and how they will be acquired. Also, identify the sources of uncontaminated water and estimated annual volumes to be used by the contractor during proposed reclamation for dust suppression or soil moisture conditioning.

Response:

SFC estimates that the water required for dust suppression and soil moisture conditioning will be on the order of 75.9 million gallons over the approximately three year reclamation period (see Enclosure 2 for detailed calculations). SFC has a Water Right Permit from the Oklahoma Water Resources Board that allows an annual withdrawal 1800 acre-ft of water (586 million gallons per year or 1.76 billion gallons over the three year reclamation period) from Lake Tenkiller. As can be seen, the water requirement estimate is only about 4% of SFC's Water Right. The Tenkiller dam is about ten miles north of the facility. A 16-inch gravity fed pipeline line which can provide in excess of 1200 gallons per minute connects the SFC facility to Lake Tenkiller.

SFC estimates that about 4 miles of on-site roads with a nominal width of 20 feet will require dust suppression water application during dry days. A daily application of ½ inch per square foot is estimated to be required to control dust. This equates to approximately 132 thousand gallons per application day. Assuming reclamation activities to go on 5 days per week for three years, there will be a total of 780 working days. The site receives on average about 45 inches of rain a year which would replace the need for dust suppression for about 90 days per year or 270 days over three years. This leaves about 510 days when dust suppression watering would be needed, which equates to 67 million gallons of water.

Soil conditioning water would be required for the cell sub-base and the compacted clay base liner, compacted clay cover, and compacted clay perimeter berms. It is assumed that the clay would average around 12% by weight moisture as excavated for placement and would have to be conditioned to 18% moisture. Thus a 6% by weight addition of water is assumed. A total of 168,020 cy of these materials will be required for cell construction. At nominal soil density of 110 pounds per cubic foot, the water requirement is 3.6 million gallons.

The excavated soils that are placed in the cell will also be compacted and may require water addition. Likewise, the soil cover that will be placed over the cell may require water addition. These two groups of soil amount to an estimated 291,179 cy. Again assuming a soil density of 110 pounds per cubic foot and, in this case since the soils will be more sandy, an average water amendment of 5% by weight, the water requirement will be 5.2 million gallons.

ENCLOSURE 2

RAFFINATE SLUDGE CHARACTERIZATION

Background

Raffinate sludge was produced during operation of the SFC facility as a result of neutralizing the acidic raffinate stream from solvent extraction purification of yellowcake. Raising the pH caused radionuclides, metals and residual rock particles from the original uranium ore to precipitate and settle to the bottom of the raffinate ponds.

Sludge Characterization

The process used for production of UF_6 at the Sequoyah Facility utilized technology which has been proven by successful performance at various DOE facilities. The process employed at the Sequoyah Facility followed the DOE approach involving preparation of pure uranium trioxide from ore concentrate and dry chemistry conversion to uranium hexafluoride. The uranium ore concentrate was purified by solvent extraction and converted to UF_6 by successive treatments with heat, hydrogen (H_2), hydrogen fluoride (HF), and fluorine (F_2).

The production method used at the Sequoyah Facility Conversion Plant involved (a) feed preparation, (b) dissolution of the ore concentrate in nitric acid, (c) purification of the uranium solution by solvent extraction, (d) thermal denitration of the uranyl nitrate to prepare uranium trioxide, (e) hydrogen reduction of the uranium trioxide to uranium dioxide, (f) conversion of the uranium dioxide to uranium trtrafluoride by reaction with anhydrous hydrogen fluoride, and (g) formation of uranium hexafluoride by contacting the uranium tetrafluoride with elemental fluorine.

The raffinate sludge was produced as a result of the purification of the uranium solution by solvent extraction.

Receiving and Sampling

Yellowcake was received at the Sequoyah Facility in 55-gallon drums and stored on stacked pallets on an outside storage pad. Each drum was weighed and then manually transferred to the full drum elevator feed conveyor.

The contents of the drum were dumped into the yellowcake receiving bin and a sample taken to constitute the basis for uranium accountability.

Primary Digestion

In Primary Digestion, sampled concentrate was reacted with preheated nitric acid in one of three digestion tanks to convert the uranium in the feed material, present in the form of oxides or diuranates, to uranyl nitrate solution. The reaction is accompanied by evolution of nitrogen oxides. The composition of the released gas is dependent on the type of uranium concentrate feed and the strength of the nitric acid used.

After acid flow was established to the digester tank, the tank agitator was started and the desired digestion temperature was set on a panel mounted indicating temperature controller. The controller operated two split range control valves, one in the steam line and the other in the cooling water line to the digester tank coils. The water and steam control valves were interlocked so that the steam valve was closed when the water valve was open and vice versa. The normal digestion temperature was within the range of 125° - 220°F.

The reaction of the concentrate with nitric acid is exothermic and the desired digestion temperature was automatically maintained by the water valve on the inlet to the digester coils. When digestion was complete, the digested slurry was transferred to one of the adjustment tanks. Pumps and piping were configured so that the digest slurry could be pumped to the adjustment tank or from digester to digester. Aluminum nitrate solution, phosphoric acid and other chemicals may have been required to either improve uranium recovery in the Solvent Extraction process or to prevent the loss of uranium as precipitated insoluble uranium compounds. The digester product normally contained 400-500 g. U/l in 1M-1.6M HNO_3. Slurry from the miscellaneous batch digester was blended with the primary digestion product. The adjustment tank vent lines were connected to the vapor inlet line to the digester fumes jet scrubber for venting and scrubbing any off-gas evolved in the adjustment tanks, the same as the digesters.

Solvent Extraction

Tributylphosphate (TBP), diluted with n-hexane, was used to extract uranium from the digester slurry. The system was designed for normal operation with high-uranium, low acid feed (digester slurry containing 280-600 g. U/L, in 1.0 – 1.6 M HNO_3). The normal concentration of TBP in n-hexane was 30 vol. %. Pumper decanters were used for extraction of the feed slurry. Pumper decanters are a type of mixer-settler in which the two phases are mixed externally in a centrifugal pump and allowed to separate in a decanter.

The TBP-hexane extraction was normally fed to pumper-decanter No. 1, where aqueous raffinate was withdrawn. Slurry feed normally entered at pumper-decanter No. 6, where the organic extract was withdrawn.

The aqueous product of the solvent extraction process was further processed in order to concentrate the uranium and ultimately convert it to uranium hexafluoride, the final product of the plant.

Raffinate Treatment

The raffinate stream from the solvent extraction process was transferred to the Clarifier A Basins where it was treated with ammonia and barium chloride to precipitate metals and radionuclides within these ponds. The treated ammonium nitrate solution was then transferred by a pipeline to the fertilizer ponds.

Raffinate sludge accumulated in the bottom of the clarifiers, and consisted of soil, rock particles, metals, and radionuclides removed from the uranium during the solvent extraction process.

Properties of Dewatered Sludge

Physical and chemical properties of the raffinate sludge have been determined at different times to support site characterization activities and treatability studies. The results of those determinations are described in the RCRA Facility Investigation Report (RFI, Reference 3) and the Site Characterization Report (SCR, Reference 4): information from these reports is summarized below. Assessment of the data provided in the RFI or the SCR is included in the respective report. Previously unpublished information regarding physical and chemical properties of the raffinate sludge developed in support of evaluating dewatering the sludge is also summarized here (Reference 5).

Four samples were collected in March 1994 from Pond 4 for the purpose of determining concentrations of metals and radionuclides in the raffinate sludge; the average of analytical results of these samples are presented in Table 1 as *Raw Sludge*. A composite sample was developed from these samples for the purpose of collecting a leachate; the analytical results of the leachate are presented in Table 1 as *Raw Sludge Leachate*. Table 1 and the RFI results demonstrate that the raffinate sludge is not hazardous waste by characteristics (TCLP, pH, etc.), and is not hazardous waste due to the presence of listed wastes (organics).

The raffinate sludge in Pond 4 was transferred to Clarifier A between 1993 and 1995. A single sample of raffinate sludge was collected from Basin 1 of Clarifier A in January 1995 to determine the concentration of volatile and semivolatile organic compounds, and total mercury. The sample results included 41 volatile organic compounds and 115 semivolatile organic compounds; the analytical results of this sample that are greater than respective method detection limit are presented in Table 2. The results presented in Table 2 are for sludge that had not been subjected to dewatering.

Raffinate sludge was collected in May 2003 from Basin 1 of Clarifier A for the purpose of testing feasibility of dewatering the sludge using a pressurized plate filter press. After dewatering by the filter press, three samples were developed and analyzed for metals and radionuclides. The three samples included the dewatered sludge, the water expelled from the sludge as a result of dewatering (filtrate), and a leachate derived from the dewatered sludge. The analytical results of these samples are presented in Table 1 as *Dewatered Sludge*, *Dewatering Filtrate*, and *Dewatered Sludge Leachate*, respectively.

Physical characteristics of the raffinate sludge are provided in Tables 3 and 4. These results represent the raffinate sludge before and after dewatering by pressurized plate filter press, respectively. The dewatered sludge passes the paint filter test for free liquids (EPA Method 9095A

References

1. Sequoyah Fuels Corporation Reclamation Plan, January 2003.
2. NUREG-75/007, Final Environmental Statement related to the Sequoyah Uranium Hexafluoride Plant, February 1975.
3. RCRA Facility Investigation Report,
4. Site Characterization Report,

Table 1 Metals and radiochemical characteristics of raffinate sludge.

Parameter[a]	Raw Sludge[b]	Raw Sludge Leachate[c]	Dewatered Sludge[d]	Dewatering Filtrate[e]	Dewatered Sludge Leachate[f]
Ag	476 µg/g	0.011 mg/l	<90.8 mg/kg	<0.007 mg/l	<0.320 mg/l
Al	3 µg/g	461 mg/l	160000 mg/kg	10.3 mg/l	28.8 mg/l
As	65650 µg/g	0.177 mg/l	3030 mg/kg	0.686 mg/l	0.461 mg/l
Ba	26000 µg/g	0.129 mg/l	4150 mg/kg	0.671 mg/l	<0.100 mg/l
Be	2 µg/g	0.018 mg/l	18.7 mg/kg	<0.002 mg/l	<0.100 mg/l
Ca	30000 µg/g	5.48 mg/l	114000 mg/kg	1260 mg/l	925 mg/l
Cd	11 µg/g	0.042 mg/l	<267 mg/kg	0.141 mg/l	<0.100 mg/l
Co	28 µg/g	0.541 mg/l	133 mg/kg	0.464 mg/l	0.711 mg/l
Cr	217 µg/g	0.129 mg/l	605 mg/kg	<0.010 mg/l	<0.240 mg/l
Cu	561 µg/g	11.2 mg/l	2360 mg/kg	0.326 mg/l	0.745 mg/l
Fe	50700 µg/g	0.149 mg/l	164000 mg/kg	3.57 mg/l	<0.140 mg/l
Hg	No analysis	No analysis	1.41 mg/kg	<0.0004 mg/l	<0.0002 mg/l
K	2785 µg/g	9.98 mg/l	7740 mg/kg	3740 mg/l	203 mg/l
Li	31 µg/g	1.06 mg/l	<2.67 mg/kg	0.820 mg/l	0.464 mg/l
Mg	3015 µg/g	55.9 mg/l	7190 mg/kg	265 mg/l	152 mg/l
Mn	621 µg/g	23.9 mg/l	1930 mg/kg	50.6 mg/l	66.2 mg/l
Mo	5145 µg/g	2.44 mg/l	10700 mg/kg	42.0 mg/l	13.3 mg/l
Na	8565 µg/g	523 mg/l	7480 mg/kg	1260 mg/l	346 mg/l
Ni	473 µg/g	10.3 mg/l	1660 mg/kg	2.69 mg/l	8.86 mg/l
P	553 µg/g	11.5 mg/l	19600 mg/kg	0.20 mg/l	<0.54 mg/l
Pb	411 µg/g	0.449 mg/l	1010 mg/kg	<0.008 mg/l	<1.36 mg/l
Sb	36 µg/g	<0.06 mg/l	78.4 mg/kg	<0.008 mg/l	<0.220 mg/l
Se	<16 µg/g	0.214 mg/l	348 mg/kg	0.182 mg/l	<0.200 mg/l
Sr	644 µg/g	4.83 mg/l	1210 mg/kg	2.63 mg/l	2.81 mg/l
Tl	32 µg/g	0.258 mg/l	5860 mg/kg	0.030 mg/l	0.418 mg/l
V	3305 µg/g	0.374 mg/l	<1.60 mg/kg	1.00 mg/l	0.320 mg/l
Zn	297 µg/g	6.94 mg/l	<751 mg/kg	4.5 mg/l	2.92 mg/l
F	23118 µg/g	No analysis	No analysis	No analysis	No analysis
NO_3(N)	42400 µg/g	No analysis	No analysis	3060 mg/l	No analysis
NH_3(N)	No analysis	No analysis	No analysis	2880 mg/l	No analysis
U-total	7050 µg/g	No analysis	19400 µg/g	774 µg/l	4.67 µg/l
Th-230	No result	No analysis	16200 pCi/g	1520 pCi/l	80.1 pCi/l
Ra-226	189 pCi/g	No analysis	219 pCi/g	50.0 pCi/l	7.06 pCi/l

[a] Metals by EPA Method 6010

[b] Sample ID SD001-SD004, March 1994; results are average of SD001- SD004 [Chain-of-Custody (CoC) E-0278-94]

[c] Sample ID SD005, March 1994; 40 CFR 261 Appendix II "Method 1311 Toxicity Characteristic Leaching Procedure" [CoC E-0278-94]

[d] Sample ID MISC raff-filter press only, May 2003 [CoC SF03-278]

[e] Sample ID MISC (Raffinate Filtrate), May 2003 [CoC SF03-129]

[f] Sample ID MISC raff-filter press only leachate, May 2003; 30 Texas Administrative Code Chapter 335 Subchapter R Appendix 4 "7-day Distilled Water Leachate Test Procedure" [CoC SF03-278]

Table 2 Summary of Organic and Mercury analyses of raffinate sludge[a].

Parameter	Value	Comment
Mercury (total) [b]	0.34 mg/kg	Practical quantitation limit 0.01 mg/kg.
Volatile [c]	2-Butanone, 0.3 mg/kg 2-Hexanone, 0.08 mg/kg	Practical quantitation limit 0.1 mg/kg. Practical quantitation limit 0.05 mg/kg.
Semivolatile [d]	None.	Not applicable.

[a] Sample ID SD014, January 1995 [Chain-of-Custody E-0131-95]
[b] EPA Method SW7471
[c] EPA Method SW8240.
[d] EPA Method SW8270.

Table 3 Physical characteristics of raffinate sludge

Parameter	Value	Comment
Density	1.17 g/cm^3	One measurement made on site May 2003.
% solids	18%	A calculated value from data collected May 2003.

Table 4 Physical characteristics of raffinate sludge after dewatered using the filter press.

Parameter	Value	Comment
Density	1.36 g/cm^3	Average of six measurements made on site May 2003.
% solids	45%	Average of four measurements made on site May 2003.
% weight reduction	46%	Average of four measurements made on site May 2003.
Load bearing	41.7 lb/in^2	Unconfined compressive strength with penetrometer May 2003.
Weight per package	2200 lbs	An assumed value based filling the package to rated weight capacity. The package is presumed to be 3'x3'x4' polypropylene sack.

Raffinate Sludge Uranium Content
Based on Composite Samples from Each Storage Cell

Weights in pounds

CELL	# BAGS	GROSS WEIGHT	% SOLIDS	DRY WEIGHT	U ugm/gm	Ra 226 pCi/gm	Th 230 pCi/gm	TOTAL AS U	TOTAL AS U3O8
A-CELL	1318	2,500,403.00	45.1	1,127,681.75	10,100.00	135.00	48,100.00	11,389.59	13,439.71
B-CELL	1381	2,595,535.00	45.1	1,170,586.29	10,400.00	248.00	56,600.00	12,174.10	14,365.43
C-CELL	1420	2,741,121.00	45.1	1,236,245.57	8,090.00	176.00	43,900.00	10,001.23	11,801.45
D-CELL	1441	2,684,050.00	45.1	1,210,506.55	8,750.00	332.00	70,100.00	10,591.93	12,498.48
E-CELL	1368	2,604,423.00	45.1	1,174,594.77	7,080.00	266.00	44,500.00	8,316.13	9,813.03
F-CELL	1432	2,666,824.00	45.1	1,202,737.62	7,730.00	367.00	61,800.00	9,297.16	10,970.65
G-CELL	1281	2,405,934.00	45.1	1,085,076.23	8,070.00	180.00	74,400.00	8,756.57	10,332.75
H-CELL	1227	2,320,411.00	45.1	1,046,505.36	8,060.00	166.00	46,200.00	8,434.83	9,953.10
I-CELL	236	452,850.00	45.1	204,235.35	8,535.00	233.75	55,700.00	1,743.15	2,056.92
TOTAL CURIES									
TOTAL WEIGHT		20,971,551.00		9,458,169.50				80,704.68	95,231.52
				65% Recovery				52,458.04	61,900.49

Chemical Characterization Data
All Results Reported in μg/g

Metal	North Ditch 1-Feb-95	Emergency Basin 1-Feb-95	Sanitary Lagoon 1-Feb-95
Ag	1.0	65.5	185
Al	26700	12300	2430
As	39.3	97.5	440
Ba	282	282	611
Be	0.42	0.14	2.84
Ca	40900	20600	23100
Cd	< 0.7	< 0.7	< 0.7
Co	9.0	6.2	76.6
Cr	53.0	38.2	42.2
Cu	204	90.2	973
Fe	27500	21000	17700
Hg	0.13	0.14	0.29
K	996	399	255
Li	23.5	7.32	< 1
Mg	2180	1120	1560
Mn	689	407	465
Mo	15.7	259	16.7
Na	1900	310	1090
Ni	96.0	43.8	423
P	2670	3010	14400
Pb	86.1	49.5	555
Sb	< 10	117	4.4
Se	< 10	30.4	29.8
Sr	53.9	45.9	123
Tl	< 10	< 10	< 10
V	54.8	199	356
Zn	568	280	980

Source: Final RCRA Facility Investigation Report, October 14, 1996, Table 30.

Note: Samples from the Emergency Basin, Sanitary Lagoon and North Ditch were obtained by pushing a two inch diameter PVC pipe through the depth of the sludge, capping the top of the pipe, creating a vacuum effect, and subsequently withdrawing the pipe. Access to each sample location in the Emergency Basin and North Ditch was gained by use of hip waders. Access to sample locations in the Sanitary Lagoon was gained by use of a basket extended over the unit with a crane. Samples were collected from three sections of each unit from the full depth of sludge and placed into a container. The material was stirred briefly to assure the mixture was homogeneous and a portion of the mixture placed into an appropriate container. The sample was analyzed for the comprehensive list of metals described in Section 1.5.4 of the approved RFI Workplan.

Cost for Shipment and Disposal
Raffinate Sludge, and North Ditch, Emergency Basin and Santiary Lagoon Sediments
12/12/07

Destination	Round Trip Distance (miles) (kilometers)	Base Rate ($ per mile)	Fuel Surchg ($ per mile[1])	Cost (per load) (per ton)	Total Shipping Cost[2]	Disposal Fee (estimated) ($ per ton)	Total Cost
Quivera	1566	$1.60	$ 0.36	$3,069.36	$1,603,979	$ 2,351,600	$3,955,579
(Grants NM + 20)	1260			$136.42		$ 200.00	
Energy Solutions	2728	$1.60	$ 0.36	$5,346.88	$2,794,161	$ 2,691,078	$5,485,239
(Clive UT)	2195			$237.64		$ 228.87	
WCS	1247	$1.60	$ 0.36	$2,444.12	$1,277,243	$ 3,174,660	$4,451,903
(Eunice NM - 5)	1003			$108.63		$ 270.00	
White Mesa Mill[3]	2062	$1.60	$ 0.36	$4,041.52	$2,112,009	$ 1,269,864.00	$3,381,873
(Blanding UT + 90)	1659			$179.62		$ 108.00	

[1] Based on fuel @ $2.85 per gallon

[2] Based on 11,758 tons and 22.5 tons per load

[3] Disposal fee used here is out of date; no recent proposal available

Water Usage Estimate

Clay Base and Cover Moisture Amendment

Phase I Base:	18,750	yds	
Phase I Subgrade:	5,200	yds	
Phase II Base:	20,600	yds	
Phase II Subgrade:	16,000	yds	
Phase III Base:	14,000	yds	
Phase III Subgrade:	25,000	yds	
Perimeter Berms:	3,800	yds	
Clay Cover:	64,670	yds	
Total Compacted Clay:	168,020	yds	
Weight of Base @ 110 lb/ft^3:	499,019,400	pounds	
Estimated Moisture Content:	12	%	
Optimum Moisture Content:	18	%	
Makeup Moisture Required:	6	%	
Makeup Water Required:	29,941,164	pounds	
Makup Water Required (Base):	3,591,359	gallons	(3.6 x 10^6 gallons)
Soil Cover on Cell:	205,642	yds	
Excavated Contaminated Soil:	85,537	yds	
Total Cover Soil:	291,179	yds	
Weight of Cover @ 110 lb/ft^3:	864,801,630	pounds	
5% by Wt. Water Added:	43,240,082	pounds	
Makeup Water Required (Cover):	5,186,528	gallons	(5.2 x 10^6 gallons)
Total Makeup Water Required:	8,777,887	gallons	(8.8 x 10^6 gallons)

Water Usage Estimate - Max. Case

Project Duration:	6	years	
(52 wks/yr x 5 days/wk x 3 yrs):	780	days	
Water Usage - Max.:	78,000,000	gallons	(100,000 GPD x 780 days)

Water Available from Lake Tenkiller

Available Water:	5400	acre-feet	1800 acre-feet/yr x 3 yrs
Cubic Feet of Water:	235,224,000	cubic feet	
Total Water Available:	1,759,475,520	gallons	(1.8 x 10^9 gallons)

Water Usage Estimate (Con't)

Water Usage on Roads for Dust Control

Surface Area of Roads:	422,400	square ft	(4 miles long x 20 feet wide)
Estimated Water Applied/day:	0.5	inches	(Two 1/4 inch applications per day)
Volume Applied/day:	17,600	cubic ft	
Water Applied:	131,648	gal/day	
Planned Number Work Days:	780	days	(52 wks/yr x 5 days/wk x 3 years)
Rain Days - Application Not Rqr'd:	270	days	(Assume 45" rain/yr ~ 90 days/yr)
Water Application Days Rqr'd:	510	days	
Water Usage Required:	67,140,480	gallons	(67.1 x 10^6 gallons)
Total Water Required for Project:	75,918,367	gallons	(75.9 x 10^6 gallons)

(Soil Makeup Water plus Road Usage)