M/035/009

State of Utah
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

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RECEIVED
JUN 13 1988
DIVISION OF
OIL, GAS & MINING

June 8, 1988

Mr. G. D. Schurtz
B.P. Minerals America
1515 Mineral Square
Salt Lake City, Utah 84112

Re: Barney's Canyon Project
Notice of Intent Comments

Dear Mr. Schurtz:

We have reviewed your response dated 29 April 1988 concerning the Notice of Intent document for the Barney's Canyon Project and have the following comments:

1. We have reviewed the information presented to document the adequacy of the sizing of the process ponds and have the following comments:

   a. To discharge storm runoff water from the lined area with no ore placed on it would require that the following concerns be addressed:

      I. A UPDES permit would be required.

      II. Monitoring of the discharged waters would be required.

      III. A proposal and details of the barriers which will separate the portion of the pad which is being leached from the portion of the pad which is not being leached must be presented. Also conceptual operational procedures which will be employed to insure the containment of all process fluids must be presented for review.

   b. Verification must be provided to insure that the process ponds will be empty for the winter shut down period considering that shut down procedures are initiated at the end of each November. A water balance would be an acceptable verification if based on the worst case precipitation for the months included.

   c. Conceptual operational procedures which will be utilized for discontinuing leaching operations on one section of the leach pad and commencing operations on another section must be submitted for review.

2. The information submitted with regard to this comment has been noted and will become part of the official review file.

3. Thank you for sending an updated map with test pits and borings.

4. The comments and information regarding the tuff derived clay layers is acceptable. The double-lined leaching system with positive head control is a favorable design, particularly with the reduction of the permeability of the secondary liner to less than 1 X 10^{-7} cm/sec.

   In the event of a natural disaster or accidental spill we feel that additional protection is warranted at heap leach sites. The logs you provided us describe the soils as consisting of gravel, yet it is indicated they have low permeability, because the gravel material is surrounded by silt and clay particles. We would like this demonstrated, by opening up some pits where we can examine the material in place This natural system must underlie all pads and ponds, or be provided, and will be the base for the leak detection system.

5. We agree that the west slope of the Oquirrh range is a recharge zone for the major aquifers in the Salt Lake Valley; that is the reason for our concern. A ground water model we made for the general Kennecott study includes part of the gold leaching operation site. The recharge rate obtained from the model is about 0.25 ft/yr or 3 inches. This is a fairly high rate, considering precipitation is about 16 inches.

6. We wish to inspect test pits, at all sites where ponds and pads will be constructed.

7. Reply accepted.

8. See our comment to #5.

9. We have reviewed the in-situ permeability data done by Sergent, Hauskins & Bechwith for the heap leach site. The fact that about 60 percent of the permeability tests show rates in the 10^{-4} centimeter per second range gives us concern. That is why we are requesting that test pits be opened so we can inspect the material in place, on which you wish to construct heap leach pads and process ponds.

10. Reply accepted.

11. Reply accepted.

12. This comment has been addressed by submission of permeability data and our conclusion is as stated in comment No. 9.

13. A monitoring well system proposal must be submitted to the Bureau of Water Pollution Control for review and approval. The proposal must contain justification for well location, depth of well, depth to sampling location and a presentation showing that the major paths of ground water contamination will be monitored. Geophysical logs may be necessary on several wells.

14. We are in agreement that natural impervious barriers should not be relied upon to control process solutions, and that a substantial liner system needs to be designed and constructed.

15. This comment will address our concerns about the leak detection system as recently proposed. This comment also will address all concerns expressed in comments 38, 42, and 46 of our previous letter.

    We appreciate the consideration given to our concerns which we feel justify a leak detection system for the heap leach pads. The concept of the proposed leak detection system is satisfactory from our perspective. We request that the following concerns be responded to so we may adequately define the system which will be finally approved.

    a. It is critical to the success of the leak detection system that the head required to convey leakage to the leak detection sump be minimal. We request that the maximum head required to move leakage to the sump be established and presented for review.

    b. The response time for leakage to flow to the leak detection sump under a worst case situation must be established and submitted for review.

    c. The leak detection sump must be adequately sized so containment of all leakage will be assured.

    d. The thickness of the leak detection sand must be adequate to provide a minimum uncontaminated sand layer of at least 3 inches, assuming that leakage can be transmitted at a minimum head.

    e. The quality of construction of the secondary clay liner must be established by design and construction quality control. Due to variations commonly found in naturally occurring materials an extensive testing program to verify gradation, thickness, densities and permeabilities will be required.

    f. The purpose of the compacted sub-grade beneath the leak detection layer is to establish and interface for leakage to be conveyed to the leak detection sump. Although this material is not a liner, the following must be verified to establish its integrity:

        I. The permeability of the material must be 10^{-6} centimeters per second or less. The minimum thickness will be determined after a field inspection.

        II. There must not be any pockets or lenses of more permeable material.

        III. The surface must uniformly slope to the collection pipes without any barriers to flow greater than ¼ inch.

    g. The permeability rate of the leak detection sand must be established at 1.0×10^{-3} or greater by regular field testing during construction.

16. Thank you for the information. It is interesting that volcanic rocks have a fairly good permeability and are capable of conducting ground water.

17. The schedule for monitoring the Copperton water Supply wells will be established in the construction permit.

18. Comment accepted.

19. We have reviewed the material submitted to evaluate the toxicity of the waste rock and have concerns that the acid forming potential is -4T/1000T when the Division of Oil, Gas and Mining's definition of acid forming potential material begins at -5T/1000T or less. However we understand that by mixing the sulfide waste rock with the other waste rock and by isolating the sulfide waste rock from oxygen that this acid forming potential can be eliminated. We therefore request that the procedures and measures which will be utilized to eliminate this acid forming potential be submitted for review.

    The EP toxicity test information indicates that the metals in the waste rock will not become mobile when exposed to the environment.

    Metals and other constituents of the waste rock which may become mobile under conditions other than those found in the EP toxicity test should be evaluated, commented on, and presented for review.

20. As expressed in comment No.1, we have concerns that the process solution ponds can be emptied when it is proposed to initiate shut down procedures at the end of each November.

    We also question the successful outcome of pumping excess fluids from the process ponds onto the heap leach pad utilizing a system which has been shut down to prevent damage due to freezing.

21. The water which is expected to be encountered in the Barney's Canyon pit should have its projected quality established. A proposal for the disposition of the quantity of water expected shall be submitted for review.

22. This comment is covered by our comment No. 1 response.

23. This comment has been adequately addressed.

24. This comment has been adequately addressed.

25. This comment has been adequately addressed.

26. This comment is covered by our comment No. 1 response.

27. This comment is covered by our comment No. 1 response.

28. We understand that the leak detection system for the process ponds will consist of a geomembrane liner, a drainnet/geofabric leak detection system and (1) one foot of quality control constructed clay with a permeability rate of 1.0×10^{-7} centimeter per second or less.

    This proposal is acceptable on the following conditions:

    1. The maximum head which will develope on the secondary clay liner must be established.

2. The following leak detection monitoring and notification schedule is adhered to:

   a. 0-5 gallons per day (gpd) - Record volumes in log book and report to the Bureau of Water Pollution Control (BWPC) by phone within 24 hours, if leakage is detected.

   b. 5-50 gpd - Record volumes and sample for pH, gold and total and free cyanide (CN^-), and copper. Report findings to the BWPC by phone within 24 hours and in writing within seven (7) days.

   c. 50-500 gpd - Reduce application rates. Report to the BWPC by phone within 24 hours and in writing within seven (7) days. Daily monitoring of leakage will be required with a monthly report being submitted to the BWPC. Continue to sample for constituents required in 2.b.

   d. Greater than 500 gpd - Discontinue use of that portion of the pad and provide to BWPC within seven (7) days a description of the portion of the pad not being leached. Continue to sample for constituents required in 2.b.

29. The operational requirement for repairing any leak in the geomembrane liner must be in accordance with the monitoring and notification schedule outlined in comment No. 28.

30. The comment response and explanation is appreciated and noted.

31. This comment is covered by our comment No. 1 response.

32. This comment has been adequately addressed.

33. This comment has been adequately addressed.

34. The domestic wastewater system must be approved by the Salt Lake County Health Department prior to the issuance of a construction permit.

35. This comment has been adequately addressed. A detail of the proposal for plugging the existing culverts under the railroad grade must be included in the approved plans.

36. This comment has been adequately addressed.

37. No additional communications are required on this comment.

39. It is suggested that the extreme caution which will be used to place the protective blanket on the geomembrane liner be defined, and included in the approved contract specifications.

The ability of a geomembrane liner to withstand settlement of 12 inches without compromising its integrity or reducing its capacity to provide the designed barrier to leakage must be submitted to this office in writing by a professional engineer with demonstratable experience in the design and construction of geomembrane liners. We have concerns about the stiff nature of HDPE liner material as opposed to the flexible properties of other geomembrane materials.

40. This comment has been adequately addressed.

41. This comment has been adequately addressed.

43. This comment has been adequately addressed.

44. and 45.
Because Utah soils are high in montmorillonite and $CaCO_3$, they absorb little CN^-, nor do they have great ability to lower the pH. The initial fluids are probably affected but the long term ability has not been tested. That is why we do not wish to depend upon natural material beneath a pad site, but wish to depend on a well designed liner system, including a leak detection system. The natural system is needed as a backup in the event of a major catastrophe or to absorb what the leak detection system looses.

47. We understand that all process piping will be either routed within a liner area of the pads or ponds or will be contained within a lined ditch.

48. This comment is deleted.

49. Based on the information presented the neutralization criteria for the heap leach pad pH is modified from a range of 6.5 to 7.5 to a range of 6.5 to 8.0. The other comments presented in your 20 April 1988 letter are being evaluated and will be responded to shortly.

50. We agree that no impervious cap will be required on the neutralized heap leach ore bodies. However we are concerned that precipitation falling on the reclaimed heap leach piles will penetrate the spent ore and be discharged to surface and groundwater systems. This concern must be evaluated and the quantity, quality and disposition of these waters be presented for review.

    We feel that adequate fencing of the facilities is essential to protect the liner during construction and to provide adequate security during the operation of the facility. The fencing surrounding the pad must be maintained for 4 years after closure.Our concern for retaining the fence after reclamation is to minimize exposure of animals and humans to gases which may be released from the pad. Any documentation which could be provided to establish the risk of exposure would be helpful in evaluating the necessity for this requirement.

51. The reference on page 75 of the Notice of Intent document indicates that "the sludges in the ponds after drying will be sampled for metals and EP toxicity characteristics. All solid wastes will be properly disposed of taking into account analytical characteristics." Prior to the issuance of a construction permit the procedures, timing, and criteria for catagorizing the sludge and its proper disposal must be established.

52. This comment has been adequately addressed except that we have concerns about the ability of HDPE geomembrane material to provide uniform protection in this application due to its stiff nature. Considerable comparative documentation exists which indicates that a more flexible liner material has advantages in an application where differential settlement and stretching of the liner material occurs.

53. The destructive and non-destructive test procedures in specifications appear adequate for the type of liner material specified.

54. a. The percent passing the U.S. standard #200 sieve to classify a material as clay or a silt must be defined.

    b. We have concerns that the material specification for sand backfill in section 6.6 will not serve adequately as a leak detection material. The maximum allowable amount of material passing the No. 200 sieve for a drain material must be 3 per cent or less to drain freely.

    c. The maximum particle size for the material which will be used to construct the secondary clay liner must be less than ½ inch in diameter or what is recommended by the synthetic liner manufacturer.

    d. The maximum allowable permeability rate for any clay secondary liner material must be 1.0×10^{-7} centimeters per second or less.

    e. All secondary clay liners which require the addition of bentonite must conform with the following. If bentonite addition or other additives is required the amount needed to achieve the 1.0×10^{-7} cm/sec permeability must be based on the most coarse soil from the site to obtain the upper bound clay requirement. The following information for constructing the clay secondary liner with the addition of Bentonite shall be submitted for review:

        I. the amount of bentonite required
        II. proposed mixing procedure (agricultural disk, rototiller or pug mill)
        III. moisture content and the density at which the lowest permeability occurs.

        Construction Quality Assurance program for each lift of the secondary liner and the secondary liner foundation must be submitted for review. This Quality Assurance program must include the frequency of testing for density, plasticity index, thickness and permeability for each lift of the secondary clay liner. The results of these tests must be submitted for review and approval by the Bureau of Water Pollution Control before the next portion of the liner system must be constructed upon it.

    f. All foundations under pads and ponds must be certified by qualified registered professional engineers to be stable under the loading which will be imposed. This certification must also relate to the maximum settlement which the liner system can endure without compromising its integrity.

g. The finished grade of the secondary clay liner upon which a flexible membrane will be placed must be free from irregularities and objects which could compromise the integrity of the flexible membrane liner.

h. Each lift of all secondary clay liners constructed in pad and pond liner systems must be tested to verify construction quality according to the following:

   I. moisture/density tests on a 50 ft by 50 ft grid system.
   II. Gradation tests on a 200 ft by 200 ft grid system.
   III. Thickness verification on a 50 ft by 50 ft grid system.
   IV. Permeability tests on a 200 ft by 200 ft grid system.

i. All secondary clay liners must be constructed in at least two (2) lifts. The quality of construction of each lift must be demonstrated to the Bureau of Water Pollution Control before the construction of the next lift may commence.

55. The field seam footage testing specified appears adequate for the type of liner material specified.

56. We request that a written certification be provided by your consultant which will establish the stability of the proposed liner system on the slopes proposed for this project.

After our next field inspection to the test pits, we will want to discuss the thickness of the secondary clay liner, and the composition of the material beneath the leak detection system.

It must be understood that a construction permit authorizes the construction of the facilities described in the construction permit letter and approved specifications and shown in the approved plans. To qualify under this permit the facilities must be under substantial continuous construction within one year of the date of the construction permit letter. It is understood that there are certain periods of the year where construction may not take place due to weather conditions.

We appreciate the cooperation shown by BP Minerals on this complicated issue and will be happy to meet with you to discuss this as needed. Please call Mr. Mack Croft or Mr. Charlie Dietz at 538-6146 if there are any questions.

Sincerely,
Utah Water Pollution Control Committee

for Don A. Ostler, P.E.
Executive Secretary

cc: Mr. Greg Boyce, Utah Copper
Mr. Kent Miner, Salt Lake City/County Health Department
Mr. Brian Buck, JBR Consultants
Mr. Lowell Braxton, Oil, Gas and Mining
Mr. Ross Pino, 310 East State Highway, Copperton 84006
Mr. Steve Harris, Magna Area Elected Council, P.O. Box 456, Magna

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