

STATE OF CALIFORNIA  
STATE WATER RESOURCES CONTROL BOARD

In the Matter of the Petitions of )

SHEILA ANDRES and CLIFFORD and )  
MARION CAIN, ET AL., )

for Review of Orders Nos. 83-124 )  
and 83-125 of the California )  
Regional Water Quality Control )  
Board, Central Valley Region. Our )  
Files Nos. A-342 and A-342(a). )  
NPDES Permit No. CA 0081477. )

ORDER NO. WQ 84-2

BY THE BOARD:

On September 23, 1983, the California Regional Water Quality Control Board, Central Valley Region (Regional Board) adopted waste discharge requirements and an NPDES permit for McLaughlin Mine, a proposed gold mining operation by Homestake Mining Company in Napa, Lake and Yolo counties. On October 20 and 21, 1983, the State Board received petitions from Sheila Andres and Clifford and Marion Cain, et al., (petitioners) seeking review of several provisions of the Regional Board Orders. The petitions were consolidated for purposes of our review.

On November 25, 1983, in response to a request by petitioners Clifford and Marion Cain, et al., the State Board agreed to review on its own motion concerns raised by the petitioners regarding drainage from the mine pit. These concerns were raised subsequent to the initial petitions.

1. BACKGROUND

Homestake Mining Company proposes to develop a gold mine and mineral extraction facility (mill) to process about 4000 tons of ore per day. Parts of

the mine include: a mine pit, waste rock site, grinding and crushing area, mill, low grade ore storage, slurry line, tailings disposal facility, water supply reservoir, interconnecting roadways and electrical transmission corridor.

The mining process will begin at an open pit mine which will ultimately be one mile long, one-half mile wide and 400-feet deep. Higher grade ore bearing rock will be crushed, ground and piped through a 4-1/2 mile slurry pipeline to the mill site. Waste rock from the mine pit will be disposed of on 342 acres, some of which are public lands administered by the U. S. Bureau of Land Management. The pipeline slurry will undergo a cyanide leach process to extract gold at the 35-acre mill site.

Processed slurry will be discharged to the 546-acre tailings disposal facility. The tailings disposal facility is designed and will be constructed to accept, recycle and evaporate the liquids and permanently retain the residual solids. The tailings disposal facility design capacity will contain a mill production rate of 4000 tons per day for 24 years.

## II. IMPACT OF FACILITY ON PETITIONERS

Petitioner Andres owns an orchard in Capay Valley which is dependent on water from Cache Creek. The other petitioners apparently reside in the Capay area and are thus in the Cache Creek drainage area. There is little possibility that the mining operation or its associated features will have any impact on water quality in the Cache Creek watershed. The only part of the operation which flows to the Capay Valley through Cache Creek is the water supply reservoir which is not under consideration today. The rest of the operations are in the tributary watershed of Putah Creek, draining into Lake Berryessa.

Nonetheless, the petitioners raise substantial issues that are appropriate for our review and, to the extent to which the petitioners themselves are not aggrieved by the impacts of the project, we will review on our motion the issues which they have raised.

### III. ISSUES

a. Was the Regional Board's Decision Not to Require a Liner in the Tailings Pond Appropriate?

Petitioners are concerned that, unless the bottom of the tailings pond is lined with impermeable material, the pond will leak and the discharge of wastes to underlying groundwater will occur.

Our regulations presently do not contain permeability requirements specifically applicable to mining operations. However, we are currently considering the adoption of such regulations. While these regulations have not been adopted, we will consider them while reviewing these petitions. The proposed regulations list containment features, including liner requirements ranging from double liners, both  $1 \times 10^{-7}$  cm/sec permeability, to a single liner,  $1 \times 10^{-6}$  cm/sec permeability, depending on the nature of the wastes. However, the proposed regulations also provide for certain exemptions if underlying groundwater is of small quantity or there is no detectable vertical interconnection to good quality groundwater.

The tailings pond is located in a small valley on a tributary of Hunting Creek, which flows to Lake Berryessa. The bedrock underlying the area is composed of the Knoxville formation and associated serpentinite. The bedrock is overlain by alluvium which attains a maximum depth of 15 feet on the valley floor.

The Knoxville formation is composed of mudstone and siltstone with minor amounts of sandstone and conglomerate. Regionally, the formation has

been extensively faulted and folded. Groundwater obtained from fractures and fissures indicates that both its occurrence and quality in the Knoxville formation is quite variable. Wells have been located in favorable fracture zones yielding up to 20 gpm. Electrical conductivity of groundwater within the disposal area varied from 1,900 to 15,000 umho/cm and was sulfate-chloride in character. This conductivity indicates a long retention time. The serpentinite is composed of a fine-grained suite of serpentine minerals, tectonic gouge and breccia with inclusions of metavolcanic breccia and graywacke. Geohydraulically, its characteristics are similar to the Knoxville formation; groundwater yields and quality are quite variable. The conductivity of the groundwater in the serpentinite is slightly lower than the Knoxville formation and is of a sodium-magnesium-bicarbonate character indicating little transference between the rock units.

The tailings pond disposal site will cover about 600 acres. Fifty-six permeability tests were conducted at various locations and depths. Permeability rates averaged  $2.3 \times 10^{-7}$  for serpentinite and  $6.6 \times 10^{-6}$  for the Knoxville formation. Based on a statistical analysis, the following permeability rates were also calculated for the site:

<u>Depth in Feet</u>	<u>Median Permeability cm/sec</u>
0 to 20	$7.5 \times 10^{-5}$
20 to 35	$8.5 \times 10^{-7}$
35 to 70	$1.7 \times 10^{-6}$
> 70	$1.2 \times 10^{-7}$ <sup>1</sup>

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<sup>1</sup> McLaughlin Project, Tailings Impoundment Final Design Report and Appendices, by Steffen Robertson & Kirsten, Appendix II, Figure II-4.

We find this level of permeability to be adequate to support the Regional Board's conclusion that a clay liner is not necessary for the tailings pond. Protection equivalent to the liner requirements contained in the proposed regulations is found approximately 70 feet below the tailings pond. This is acceptable since the Regional Board found that the groundwater underlying the tailings facility is of poor quality and has no designated beneficial uses.<sup>2</sup> We acknowledge that discharges to the tailings disposal facility will result in worsening the quality of that groundwater. However, given its poor quality, small amount and lack of hydraulic continuity with other waters of the State, we find its degradation to be acceptable.<sup>3</sup>

Our conclusion is further supported by the fact that lateral permeability will be cut off by artificial barriers, i.e., a cutoff trench, slurry trench or grouting, as required during construction. (See Regional Board Order No. 83-124, Waste Discharge Requirements for McLaughlin Mine, Finding No. 15.)

Petitioner Andres questions whether the number of core samples taken in the tailings disposal facility to verify impermeability were adequate. An estimated 81 borings, trenches and pits were drilled or dug to evaluate the

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2. For a comparison of the groundwater quality with water quality standards required for various beneficial uses, see McLaughlin Project, Tailings Impoundment Final Design Report and Appendices, by Steffen Robertson and Kirsten, p. 29, Table 4.5.

3. This conclusion is also consistent with our antidegradation policy, State Board Resolution No. 68-16.

site. Fifty-six permeability tests were conducted.<sup>4</sup> Given the consistency and positive findings of the tests, we find this to be an adequate number of core samples.

The permeability levels which we have discussed above vary due to fractures and fissures in the bedrock underlying the site. The hydrogeologic data presented in the Environmental Impact Report which was prepared for the project indicates that these fractures and fissures are not interconnected in the site area.<sup>5</sup> This lack of continuity ensures that water will not be seeping out of the site to convey wastes to nearby bodies of usable groundwater. However, we do share the concerns which were expressed in a memo from the Department of Health Services (DOHS) commenting upon the issues raised in the petition.<sup>6</sup> This concern relates to an inferred fault which has been identified as passing through the tailings pond area. DOHS wants Homestake to dig new trenches along the axis of the dam which is being constructed to act as a barrier to any seepage escaping the tailings pond. The trenches can be used to confirm the presence of a fault and to determine if it is active. If it is determined that an active fault does pass through the tailings pond or dam site, special conditions may be necessary such as use of selected dam materials, augmented thickness of the embankment, flattening of embankment

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<sup>4</sup> McLaughlin Project, Tailings Impoundment Final Design Report and Appendices by Steffen Robertson & Kirsten, Appendix II, in particular, Figures Nos. II-1 and II-5.

<sup>5</sup> Id.; See also McLaughlin Project Environmental Report, D'Appolonia, Vol. 1, pp. 5-1 et seq.

<sup>6</sup> Memo from James T. Allen, Ph.D., Chief, Northern California Section, Toxic Substances Control Division to Craig M. Wilson, State Water Resources Control Board, dated December 5, 1983.

slopes, special grouting of the dam foundation area or partial lining of the pond site in the area of the fault. We agree with this conclusion and by this order will revise the waste discharge requirements to require additional trenching to bedrock along the axis of the dam. If an active fault is found, the Regional Board must revise the waste discharge requirements to require appropriate design modifications.

DOHS also felt that the proposed 35-foot deep cutoff trench under the dam should be excavated to a solid relatively impermeable base, regardless of depth. We agree and by this order will revise the waste discharge requirements to require that an impervious barrier be keyed into sound bedrock and the impervious core of the dam to provide an effective barrier in the mouth of the canyon.

b. Is the Monitoring Program Around the Tailings Disposal Site Adequate?

The Regional Board's monitoring program requires a minimum of 10 monitoring wells to measure up and down gradient groundwater quality in the area of the tailings disposal facility. Additional monitoring wells may be required to determine groundwater hydraulic conditions. The well locations, plans and specifications must be submitted to the Regional Board staff for approval prior to construction.

We find the types of constituents that must be sampled for and the sampling frequency to be appropriate. However, we cannot comment on the adequacy of the location and number of wells to be sampled until this has been established by the Regional Board staff. If the petitioners continue to have some specific concerns which are not satisfied by the monitoring program approved by the Regional Board staff, they should seek Regional Board review of the matter. If still dissatisfied, they should file a timely appeal seeking our review of their concerns.

The petitioners request that the Regional Board require the discharger to automatically install a clay liner in the tailings disposal facility if any contamination shows up in the monitoring wells. We note that it may in fact be possible to place a liner over the tailings that are already in place if the monitoring wells detect a problem. This, of course, would not resolve the issue of seepage from the tailings that had already been placed on site. More importantly, however, there may be other alternatives such as the construction of a barrier to prevent seepage that would be equally effective. This is an issue that is best dealt with at the time a problem is detected. It would be premature for us to mandate a specific solution as being the most appropriate at this time.

c. Are Changes Necessary in the Waste Discharge Requirements to Adequately Protect the Groundwater in Morgan Valley from Heavy Metals That Could Leach From the Waste Rock Site Into Hunting Creek?

The waste rock disposal site is located well down stream from Morgan Valley, therefore any seepage from the site would not flow into the valley. In any event, the site will have several containment features including diversion ditches, an underdrain system and a catchment basin designed to contain a 10-year, 24-hour storm. As in the case of the tailings pond, if a problem is detected by the monitoring program, several solutions such as the construction of a barrier are available as corrective actions which can be taken.

The Regional Board's monitoring program provides for a minimum of five monitoring wells to measure up and down gradient groundwater quality in the waste rock disposal area. We cannot comment on the location and number of wells to be sampled until this has been established by the Regional Board staff. As with the monitoring in the tailings pond area, the petitioners



should seek Regional Board review if they are unsatisfied with the monitoring approved by the Regional Board staff. If still dissatisfied, they should file a timely appeal seeking our review of their concerns.

d. Is There Adequate Assurance That Seepage From the Mine Pit Will Not End Up in Ground or Surface Waters, Especially After the Pit Is No Longer In Use?

During the time that mining is taking place at the site, the groundwater collected in the mine pit will be pumped out of the pit and used as a water supply for the slurry pipeline. The groundwater will be drawn down to a lower level than it is at the present time and will flow toward the pit rather than into the tributary drainages of Lake Berryessa as presently occurs. Therefore, there does not appear to be cause for concern that there will be seepage while the pit is actually in use.

It is anticipated that the mine pit will be used for about 24 years. Once the pit is abandoned, water will be allowed to collect in it. It is estimated that the pit will eventually fill to a depth of 50 feet. This is less than the current piezometric surface in the mine pit area. Therefore, seepage from the mine pit over the long term should actually be less than the migration of water which is currently occurring from that area.

In addition, data indicates that the quality of the seepage should not present problems. Only 12 percent of the excavated rock is anticipated to have an acid potential capable of leaching heavy metals. The pH is expected to remain the same as it is in the present groundwater and the removal of the

existing Manhattan mercury mine as part of the mining process may actually improve the water quality in the area.<sup>7</sup>

Finally, should problems occur due to seepage from the mine pit once it has been abandoned, the waste discharge requirements can be revised to require continued drainage of the water from the pit.

e. Procedural Issues

The petitioners raise several concerns that relate more to the procedures which are to be followed than to the actual operation of the mining facility.

Petitioners Cain, et al., object that Provision 12 of the waste discharge requirements has no provision for public review of the financial assurances which are to be submitted by the discharger to the Regional Board Executive Officer for his approval. On January 20, 1984, the Regional Board held a public meeting to consider the discharger's financial responsibility proposal. The petitioners and other interested parties were invited to participate in that meeting and future public consideration of this issue has been scheduled by the Regional Board.

The same petitioners seek assurance that notice and an opportunity for public input will be provided if there is an increase or decrease in the materials designated as Group 1 wastes. This would involve a material change in the waste discharge requirements which can only be done by formal action of the Regional Board following a noticed public hearing to consider the proposed

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<sup>7</sup> McLaughlin Project Environmental Report, D'Appolonia, Vol. 1, pp. 3-47 to 3-49.

McLaughlin Project, Project Description/Environmental Assessment, D'Appolonia, pp. 6-5 and 6-6.

changes. We note, in addition, that all data gathered from the groundwater monitoring wells will be on file in the Regional Board offices and available for public review.

Petitioners request that the certifying professionals, presumably the consultants who submit technical reports to the Regional Board on behalf of the discharger, be required to submit evidence of their adequate financial responsibility. We do not think this is necessary. The discharger will ultimately be responsible for any inadequacies which may come to light in the consultants' submittals. Therefore, the inquiry of the Regional Board has been appropriately focused on financial recourse which it may have against the discharger rather than its recourse against those who may be making submittals, on behalf of the discharger.

#### IV. CONCLUSIONS

After review of the record and consideration of the contentions of the petitioners, and for the reasons discussed, we conclude as follows:

1. The decision not to require a liner in the tailings pond was appropriate. However, the discharger must dig new trenches along the axis of the dam which is being constructed to act as a barrier to any seepage escaping the tailings ponds. The trenches can be used to confirm the presence of an inferred fault and to determine if it is active. Depending on the results, modifications to the facility may be required.

2. An impervious barrier under the dam must be keyed into sound bedrock and the impervious core of the dam to provide an effective barrier in the mouth of the canyon.

3. The monitoring program around the tailings disposal site must be developed in greater detail before we can determine its adequacy. If the

petitioners continue to have some specific concerns which are not satisfied by the monitoring program approved by the Regional Board staff, they should seek Regional Board review of the matter. If still dissatisfied, they should file a timely appeal seeking our review of their concerns.

4. Seepage from the waste rock site would not drain into Morgan Valley. In any event, the site has adequate containment features to prevent the leaching of heavy metals.

5. The monitoring program around the waste rock site must be developed in greater detail before we can determine its adequacy. If the petitioners continue to have some specific concerns which are not satisfied by the monitoring program approved by the Regional Board staff, they should seek Regional Board review of the matter. If still dissatisfied, they should file a timely appeal seeking our review of their concerns.

6. There is adequate assurance that seepage from the mine pit will not end up in ground or surface waters, especially after the pit is no longer in use.

7. The discharger's assurances of financial adequacy have been, and will continue to be, subject to public review.

8. A change in the materials designated as Group 1 waste can only take place via a noticed public hearing and Regional Board action to revise the waste discharge requirements. In addition, all groundwater monitoring data are available for public review.

9. Emphasis should be placed on inquiries into the financial responsibility of the discharger which is ultimately responsible for the mining operation, rather than inquiring into the financial status of the discharger's consultants.

V. ORDER

1. Provision 24 is added to Regional Board Order No. 83-124, waste discharge requirements for McLaughlin Mine, as follows:

"The discharger shall dig additional trenches to bedrock along the axis of the dam which is being constructed as a barrier to escaping seepage from the tailings pond. The trenches will be used to confirm the presence of an inferred fault and to determine if it is active. The Regional Board Executive Officer will review the results of this analysis and the Regional Board will revise the waste discharge requirements to require design modifications if appropriate."

2. Provision 25 is added to Regional Board Order No. 83-124, waste discharge requirements for McLaughlin Mine, as follows:

"An impervious barrier must be keyed into sound bedrock and the impervious core of the dam to provide an effective barrier in the mouth of the canyon."

3. The petitions of Sheila Andres and Clifford and Marion Cain, et al., dated October 20 and 21, 1983, appealing Regional Board Orders Nos. 83-124 and 83-125 (NPDES Permit No. CA 0081477) are hereby dismissed.

Dated: APR 5 1984

  
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CAROLE A. ONORATO, Chairwoman

  
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WARREN D. NOTEWARE, Vice-Chairman

  
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KENNETH W. WILLETS, Member

