Appendix B
Wabuska Drain Concerns and Correspondence between Anaconda; U.S. Department of Fish and Game; and University of Nevada, Reno, Animal Studies

INVESTIGATION NUMBER I (83) E252

EPA Region 9 TSCA Checklist

FACILITY NAME: Weed Heights Development

ADDRESS: 100 Birch, Herington, NV

RECEIVED
JAN 26 1984
ENVIRONMENTAL PROTECTION

PHONE#: _____

TYPE: Realty, Devevelopment

REPRESENTATIVE: (Name & Title) Darril W. Johnson

INSPECTOR(S): Daniel A. Horgan, Field Investigator
Chip Demarest, F.I.

INSPECTION DATE: 20 September 1983

TELE. CONV. 8/19/83 - HARRY PARDICK - WALKER RIVER IRRIGATION DIST.

- WABUSKA DRAIN IS OWNED BY THE IRRIGATION DISTRICT.

- IT WAS BUILT IN THE 40'S TO DRAIN GROUNDWATER FOR THE S.P RAILBED. GOVERNMENT WAS ALSO INVOLVED IN CONST.

- IT IS USED FOR TAILWATER ONLY. NO ONE IS ALLOWED TO TAKE WATER OUT OF IT. IRRIGATION TAILWATER FROM A NUMBER OF RANCHES DISCH. INTO IT INCLUDING MAGINI, LTR, CAMPBELL, COMPSTON.

- THE DRAIN DISCHARGES INTO THE WALKER RIVER NEAR THE J.J. RANCH. THE DISCHARGE IS ONGOING YEAR ROUND.

ALLEN BIAGGI

January 11, 1956

Mr. Webb Hunter
Assistant Sanitary Engineer
State of Nevada
325 West Street
Reno, Nevada

Dear Mr. Hunter:

Since you have so very kindly offered to carry out certain analyses and certain tests for us on our spent solution, we have taken and delivered to you three samples, No. 1A, No. 2A, and No. 3A.

No. 3A is what we term our spent solution and is the solution which comes from our cementation launders after copper has been precipitated. This solution as it leaves our launders is practically stripped of copper, contains possibly 3 grms/liter of free acid, and contains about 25 to 28 grms/liter of iron in the ferrous state. This solution is carried to what we call our evaporation area which is a large area north of the Plant Site, and where by means of a dam this solution is held in this location and allowed to evaporate continuously. The flow to this area varies from 750 gallons per minute in the wintertime to as much as 1200 gallons per minute in the very hot summer months.

As stated above, sample 3A is taken from our evaporation area close to the dam which retains same. Our analysis of the water in sample 3A is .05 grms/liter cu., 1.0 grms/liter free acid, and 13.6 grms/liter total iron (ferrous).

The sample in bottle 2A is one that is taken on the north side of the dam in the evaporation area, the north side being the side opposite the one where our water is held in storage for evaporation purposes. Our analysis of this shows .01 grms/liter cu, acid nil, total iron 10.4 grms/liter.

The bottle containing sample No. 1A is taken in the drainage ditch of the WRID. This south end of the drainage ditch is approximately 300 yards north of our dam. .05 grms/liter cu., acid nil, total iron 9.3 grms/liter.

Mr. Webb Hunter
January 11, 1956

As explained to you, the main reason for this study is to determine if there is some manner in which the spent solutions can be returned to the Walker River without any bad effects to any cattle which might drink it, and also without any bad effects to any fish which might be in the Walker River or in Walker Lake where the Walker River eventually discharges. If possible we would appreciate not only receiving your opinion on this matter, but also what dilution of any one of these solutions would be required in order to make it safe to return it to the Walker River without any bad effects to cattle which might drink it, and fish life in the Walker River proper.

Your offer of help is greatly appreciated. For your information there is attached hereto a copy of a recent letter which we received from Mr. Dunn, Associate Professor of Soils in the Agricultural Department of the University of Nevada. We do not know exactly what additional test Mr. Dunn may be carrying on, but we do know that by talking to him and discussing this problem with him you will be able to give us considerable help.

Thanking you, I am

Yours very truly,

AEM:ec

A. E. Millar

NEVADA STATE HEA[illegible] DEPARTMENT
DIVISION OF PUBLIC HEALTH ENGINEERING
325 West Street, Phone 2-1746
Reno, Nevada

OFFICE MEMORANDUM

TO:

DATE: 17 January 1956

FROM:

SUBJECT:

Dear Mr. Miller:

Just a note to let you know about the water samples and the rats. Had a long talk with Dr. Dunn and Professor Howard Weeth. Weeth had already started the rats on the first water samples that you sent in from the main lagooning area. In that he had an ideal set-up for cages etc. it was decided that he should follow through and complete the experiments---I will keep in contact with him. He is very much interested in the project. He has all of the water samples that I brought in. He will let you know the outcome.

This is strictly un-official and I should perhaps let Weeth notify you but: Sample of water from main lagoon diluted with 6 parts of distilled water have killed one pair of rats ingesting it for 6 days. It should be well that Weeth does not know that I have told you--- you know how these college professors are.

Kind regards,

WBH.

1791

UNIVERSITY OF NEVADA
MAX C. FLEISCHMANN COLLEGE OF AGRICULTURE

AGRICULTURAL EXPERIMENT STATION | AGRICULTURAL EXTENSION SERVICE | SCHOOL OF AGRICULTURE | SARAH HAMILTON FLEISCHMANN SCHOOL OF HOME ECONOMICS

RENO, NEVADA

DEPARTMENT OF SOILS AND PLANT NUTRITION

P.O. Box 9245

REC'D. FEB 14 1956

February 9, 1956

Mr. A.E. Millar
The Anaconda Company
Weed Heights, Nevada

Dear Mr. Millar:

I have examined the 3 samples of water which were submitted to me by Mr. Webb Hunter, all of which were collected in the area of your mine site. I have found these samples, 1A, 2A, and 3A, to be high in total salts with readings of 22,750 P.P.M. for the 1A, and 2A waters and 31,500 P.P.M. for the 3A. This corresponds to 2.275% salts for the 1A, and 2A waters and 3.15% for the 3A. These waters are unfit for livestock use on account of excessive amounts of salts.

Dr. Weeth conducted some experiments with rats with these waters and found that they would not drink them and consequently died of thirst. With other lots of rats he found that they would take the 1A and 2A waters at a four-fold dilution, and the 3A water at ten-fold dilution. At present the rats are living on these diluted waters. I hope that this will help you with your present problem.

Sincerely yours,

L. E. Dunn

L.E. Dunn
Associate in Soils
and Plant Nutrition

LED:egp

cc: F.C. Batchelder

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RENO, NEVADA

DEPARTMENT OF ANIMAL HUSBANDRY

REC'D. MAY 11 1956 FILE: Corr.

May 10, 1956

Mr. A. E. Millar
Anaconda Company
Weed Heights
Nevada

Dear Mr. Millar:

Having recently been in Yerington and seen your evaporation pond, I have a much better concept of your problem. I also have an idea which may not be feasible, but at least seems so simple that it might be worth considering.

The drainage ditch which runs off perpendicular to the dam carries a fair amount of water. Our rats will consume this water straight and appear to be making good growth. Now if this water is not harmful to soil, plants or animals then it would seem that the thing to do is to increase the flow of water in the drainage ditch. This might be done by making feeder drainage ditches into the main drainage ditch. This might be done by constructing a ditch perpendicular to the drainage ditch and about one quarter mile from the dam. This would pick up subsurface water which would then be carried off in the main drainage ditch. Such ditches should also help to lower the water table on the surrounding lands and the increased flow in the drainage ditch would also be useful for agriculture, or for satisfying the Walker River requirement. This should also help to keep the water level in the evaporation pond low.

There may be drawbacks to this which are not apparent to me, but it does sound relatively simple. I do think an analysis of the water in the drainage ditch at the county road might be helpful. If the water in the drainage ditch is good, the thing to do is to increase, not decrease this flow.

Yours very truly,
H. J. Weeth
H. J. Weeth
Assistant Professor of Animal Husbandry

HJW:jv

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RENO, NEVADA

DEPARTMENT OF ANIMAL HUSBANDRY

August 7, 1956

Mr. A. E. Millar
Anaconda Company
Yerington Mine
Weed Heights, Nevada

Dear Mr. Millar:

Enclosed is a report on our studies with rats on Anaconda Evaporation Pond water. We have profited by our experience with this work, since it ties in with our new Regional Research Project, W-46, on the effect of water quantity and quality on range livestock. I have found that little is known about the effects of quality of water on range livestock production and believe this to be an important area of research for Nevada.

Our studies on the Anaconda Evaporation Pond water are very incomplete, but I hope they will be helpful.

Yours very truly,

H. J. Weeth

H. J. Weeth
Assistant Physiologist

HJW/mb
enclosure

OBSERV. N ON THE EFFECTS OF ANACONDA L. ORATION POND WATER AND ASSOCIATED WATERS ON THE GROWTH OF RATS

I Attempts to Find a Dilution of Evaporation Pond Water which would Support Life and Growth of Rats.

A. Straight Water, 25.1 Gm. per Liter Ferrous Sulphate.

Three littermate pairs of 28 day old rats were placed on pond water and distilled water. Rats on pond water lost 37.7 percent of their original body weight in four days. Only 17 Gms. of water was gone from water bottle, probably by evaporation, and rats were obviously dying from thirst. Control rats, on distilled water, had gained 48.5 percent over starting weight and had consumed 258 Gms. of water in the four days. Rats will not drink the straight evaporation pond water containing 25.1 Gms. per liter ferrous sulphate.

B. Dilutions of Evaporation Pond Water.

The above three rats were placed first on a 1:3 (pond to tap water) dilution and then on a 1:6 dilution, and all perished without consuming this water. These rats would not drink water containing an estimated 3.6 Gms. per liter of ferrous sulphate although they were dying of thirst. The three control rats were placed on a 1:12 dilution of pond water for eight days, during which time they increased their body weight an average of 45.5 percent and consumed 369 Gms. of water. This water contained an estimated 2.1 Gms. per liter ferrous sulphate. A number of uncontrolled experiments were then conducted to establish more closely the dilution of evaporation pond water that rats would consume. On the basis of this experience a controlled experiment using a ten percent dilution of evaporation pond water (2.5 Gms. per liter) was initiated. Four 28 day old male littermate pairs were used. One control rat died at 49 days of age. The control rats gained an average of 119 Gms. during the 28 to 70 day growth period. Experimentals gained 202 Gms. Water consumption was 22.6 Gms. and 25.7 Gms. per rat per day for controls and experimentals respectively. It appears then, that water containing 2.5 Gms. per liter of ferrous sulphate supported normal growth and water consumption in this group of rats.

Twelve rats were then tested on evaporation pond water diluted to contain an estimated 2.9 Gms. per liter of ferrous sulphate. Littermate controls were carried on distilled water. The mean 70 day body weight of the rats given diluted evaporation pond water was 161 Gms. and of the controls 182 Gms. The rats given distilled water gained significantly more than those given the pond water. The average difference in body weight gain from 28 to 70 days was 19 grams. Water consumption was 16.8 and 16.7 Gms. per rat per day for the pond water and control rats respectively. Four of these pairs of rats were examined after sacrificing. There was no evidence of kidney hypertrophy or damage. The adrenals of the experimental rats weighed 21.2 mgm. per 100 Gms. of body weight vs. 17.6 mgm. for the controls. This may be indicative of a stress. The intestinal contents of the experimental rats were black in the cecum and large intestine; however, the intestinal wall did not appear to be affected. Feces of experimental rats were always dark and showed the water to be slightly cathartic. The normal sized kidneys indicate that there was no polyuria. This is also indicated by the lack of poly dipsia in the experimental rats.

I do not know of any literature dealing with ferrous sulphate in drinking water. V. J. Hiller of Oklahoma A and M supplied rats with magnesium sulphate water and concluded that one percent magnesium sulphate was deleterious. Twinning laboratories at Fresno, California considered water with over 400 p.p.m. of sulphate to be unsuitable for consumption. We got growth depression with an estimated 0.29 percent ferrous sulphate but not in a group of rats supplied 0.25 percent ferrous sulphate in drinking water. It is interesting to note that salt water causes polydipsia and polyuria; whereas ferrous sulphate water does not. It apparently becomes unpalatable at the higher levels. Another point worth noting is that a rusty precipitate forms on the side of the drinking bottle after the ferrous sulphate water has been in the bottle several days.

II Consumption of Bar Ditch Water

It was found that rats would not drink water taken from the bar ditch directly behind the evaporation pond dam. When diluted to 25 percent however they would drink this water.

III Observations on Drainage Ditch Water.

Water from the drainage ditch at the County Road was also offered to rats as a sole source of drinking water. This water is clear and apparently contains no ferrous iron and only a small amount of ferric iron. In an initial uncontrolled experiment it was found that rats drank this water undiluted in normal amounts and made good growth. In a controlled experiment, involving nine littermate pairs of rats, the animals given this water gained an average of 129 Gms. from 28 to 70 days of age. Controls given distilled water gained 112 Gms. during the same period. This difference was significant. Rats on drainage ditch water consumed 19 Gms. per rat per day vs. 16 Gms. for rats on distilled water. It is apparent that the drainage ditch water was readily consumed and that this water did not interfere with growth of the rats.

IV Summary.

Young, growing rats will not consume straight evaporation pond water, but will die of thirst if no other water is available. Evaporation pond water diluted to contain an estimated 2.5 Gms. per liter of ferrous sulphate supported normal growth in one group of rats. Pond water containing an estimated 2.9 Gms. per liter of ferrous sulphate depressed growth, but did not affect water consumption. No mortality was encountered at this dilution; however, increased adrenal size in rats consuming this diluted water suggests a stressed condition. Feces and ingesta in the large intestines of the experimental rats were dark and there was slight scouring.

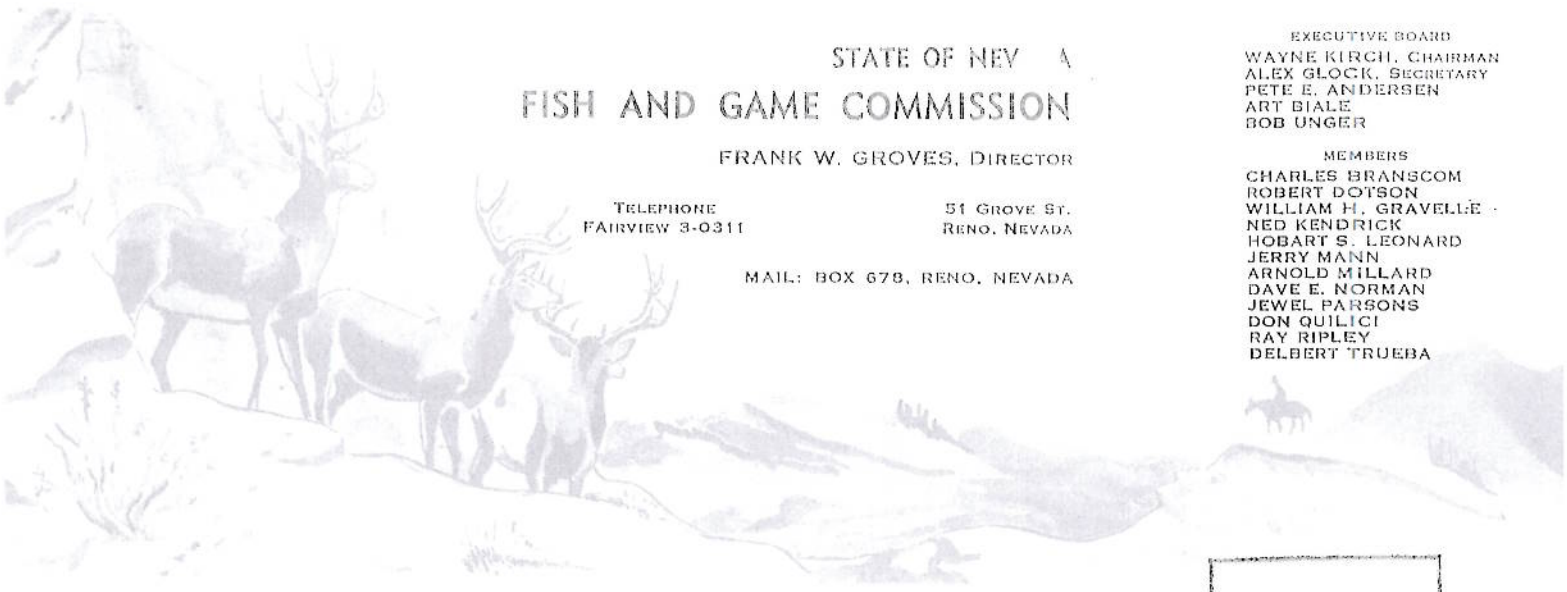
Rats would not consume bar ditch water (water taken from behind evaporation pond dam) unless it was diluted to 25 percent with distilled water.

Water in the drainage ditch at the County Road was consumed undiluted in normal amounts, and this water supported normal growth of rats.

Report prepared by

H. J. Weeth

August 1, 1956



STATE OF NEV A
FISH AND GAME COMMISSION

FRANK W. GROVES, DIRECTOR

TELEPHONE
FAIRVIEW 3-0311

51 GROVE ST.
RENO, NEVADA

MAIL: BOX 678, RENO, NEVADA

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December 17, 1958

DEC 18 [illegible]
NOTED
HRB
Return to Mgr's Office
For Your Files

Mr. A. E. Millar, General Manager
Anaconda Copper Company
Weed Heights, Nevada

Dear Mr. Millar:

In accordance with our discussion today, this letter is to summarize the high points of our meeting which concerned the possible pollution of Wabuska Drain and the Main Walker River, by the effluent arising from your company's operations at Weed Heights.

On December 9 we received complaints regarding this highly colored material flowing into Wabuska Drain, and on that same day we flew over the area to determine if the complaint was valid or not, and found that a bright orange material was flowing in rather large quantities from a point in the Wabuska Drain immediately below your retaining ponds, through the entire length of Wabuska Drain and into the Main Walker River. On that same day we had one of our personnel investigate the complaint from the ground. He found that the offending material was entering Wabuska Drain as spring-like flows immediately below your retaining ponds.

On Monday, December 15, 1958, the following persons met in your office at Weed Heights to discuss this problem with the objective of trying to amicably work out a satisfactory correction of this situation.

Mr. A. E. Millar, General Manager
Anaconda Copper Company December 17, 1958

Mr. A. E. Millar, General Manager, Anaconda Copper Company
Mr. A. J. Gould, Plant Superintendent, Anaconda Copper Company
Mr. Thomas J. Trelease, Fish and Game Commission
Mr. A. J. Dieringer, Fish and Game Commission
Mr. Calvin Allan, Fish and Game Commission
Mr. Sam Millazzo, Fish and Game Commission

At that time we told you we were in the process of gathering information on your company's effluent to determine whether or not it was deleterious to fish life. We explained that we were proceeding with tests on bio-assays on fish which were to be held in cages in various sections of the Wabuska Drain and the effected parts of the Walker River. Inasmuch as part of the area on the Wabuska Drain was within your property, we requested permission for access onto your company's premises for our purposes, and you gave us that permission. We will conduct tests with live fish in the following locations.

1. On Wabuska Drain a short distance below that area in which the effluent enters the drain.

2. At the extreme lower end of the Wabuska Drain just before said drain issues into the Walker River.

3. At a point in the Walker River a short distance below the area where the Wabuska Drain flows into the Walker River.

4. A control will be set up with live fish in the Walker River immediately above the point where the Wabuska Drain flows into it.

Studies will also be conducted on the insect and plant life on both the Wabuska Drain and the effected parts of the Walker River.

Bottom samples will be taken to determine the degree of deposition of the material. Full chemical analysis will be obtained of the effluent and electro-fishing studies will be conducted on Wabuska Drain.

Mr. A. E. Millar, General Manager
Anaconda Copper Company December 17, 1958

As we indicated to you at the meeting we will keep you informed of the results of this research and will be glad to have Mr. Gould accompany our men in any or all of these studies. Our men will notify Mr. Gould prior to the time the experiments are set up so that he will be able to be more acquainted with the developments.

In addition, a tour was made of the company's grounds with Mr. Gould who very efficiently showed us the plant's operations. We then flew Mr. Gould over the Wabuska Drain from its source to its terminous at the Walker River, thence down the Walker River to Weber Reservoir. It was pointed out to Mr. Gould on this flight that the discoloration extended from the confluence on Wabuska Drain and Walker River, downstream to Weber Reservoir. No discoloration was noticeable in the Walker River above that point where Wabuska Drain issues into it. On the contrary, the water here was blue-green in color and clear.

We pointed out at this meeting that we would not put a deadline on any corrective action until we had obtained sufficient information to determine whether or not the material is deleterious to fish life. At that time then, it would be necessary for us to set up a deadline.

I believe I have listed all of those things which were discussed that were pertinent to the object at hand. In the event I have left anything out I would appreciate a letter from you to that effect stating those items which may have been omitted.

I would like to take this opportunity to express our appreciation for the attitude that both you and Mr. Gould had on this problem, and your apparent willingness to correct the matter. We will be glad to help you insofar as we possibly can.

Sincerely yours,

Thomas J. Trelease

TJT/ps

Thomas J. Trelease
Chief of Fisheries

December 18, 1958

Mr. Thomas J. Trelease
Chief of Fisheries
Fish and Game Commission
Box 678
Reno, Nevada

Dear Mr. Trelease:

This will acknowledge your letter of December 17th in which you discuss your preliminary meeting in this office regarding the possible pollution of Wabuska Drain by seepage from our evaporation area on our property.

As stated to you in the meeting, we have watched the Wabuska Drain Ditch only to a certain extent, namely analyzing same for iron content and for pH. Where this drain ditch crosses Highway 95A we have consistently found the pH to be 7.0 and the iron content to be 0.05 grams per liter.

After your visit I made the trip to the point where the drainage ditch empties into the Walker River. From a visual standpoint there is no doubt but there is some discoloration of this water as it flows into the Walker River. We have yesterday made a quick analysis of the water as it flows into the Walker River and also an analysis of the water above this point and below it. Our findings in all 3 cases are a pH of 7.5 and the iron content .01 grams per liter. It is interesting to note that these samples which were taken yesterday, December 17th, also showed at the point where the Wabuska Drain Ditch crosses the Campbell Ranch road a pH of 6.8 with an iron content of 0.09 grams per liter; at this point fish were noticed in the drain ditch. What type or kind of fish I am unable to state.

I am simply giving you the above figures to show why we do not consider this too serious a problem.

On the other hand, we most certainly will be very happy to work with you in doing anything we will be able to do to clarify this situation. Evidently a very minute amount of iron being in a flocculent state can cause some discoloration in the water.

Mr. Thomas J. Frelease
December 18, 1958

We have already given certain orders to the staff to perform certain work which we believe will in time block the little seepage which might be causing this condition. We will continue with this work and also with other plans, and I believe that by a mutual cooperation program this can be clarified.

We cannot see that the material is deleterious to fish life, however, we must admit that there is this discoloration existing.

We will be very glad to work with your representatives, and we will be very interested in following the experiments which they perform. On the other hand, we would ask that you have your people work with our staff in order that all may be done with the one purpose in mind, namely, to clear the discoloration.

Yours very truly,

AEM:EC

A. E. Millar

cc: WMK
WJF Sr.