E-mail No. 03-1

From: [Chris Nelson]
To: <nrdtrustee@utah.gov>
Date: Tue, Sep 9, 2003 8:50 AM
Subject: Kennecott water clean up.

Utah Department of Environmental Quality,

1-1 I understand that Kennecott has submitted a proposal to clean up the water is contaminated by treating the least contaminated portion and dumping the rest into the Jordan river to be carried to settling ponds on the Great Salt Lake. This plan would dump toxic pollutants like lead, arsenic, zinc, cadmium and selenium in to the river and end up in the settling ponds. This puts these poisons dangerously close the the Great Salt Lake and to communities near the lake. Settling ponds are not meant to be permanent storage sites for toxins like these. When those ponds dry out, those poisons will be blown by the wind on to homes, schools, and the lake causing many serious problems. This proposal by Kennecott is not a clean up proposal, it is a proposal that passes the buck on to the next generation. Postponing a real clean up of these polluted waters will only cause many more serous problems that we will be more difficult to clean up and Utah tax payers will eventually be stuck with the bill.

1-2 Please allow more time for public meetings and public review of the proposal by Kennecott so that the public voice can be heard and so hopefully a better proposal can be agreed upon.

Sincerely,

Chris Nelson

Response to E-mail No. 03-1

1-1: See the Response to Common Comment No. 5, No. 7, and No. 8.

1-2: See the Response to Common Comment No. 1.

E-mail No. 03-2

From: [kathy van dame]
To: <nrdtrustee@utah.gov>
Date: Thu, Sep 18, 2003 6:51 PM
Subject: KUC & JVWCD ground water treatment proposal

Utah Department of Environmental Quality
NRD Trustee
PO Box 144810
SLC Utah 84114

Dear Dr. Nielson,

Thank you for the opportunity to comment on this important issue. The consequences of the decision made now will have consequences for the inhabitants of the Salt Lake Valley for generations. It is particularly important to ensure in as far as possible that in remedying one problem, we don't create or exacerbate another problem.

My comments relate to two areas: air quality and discharge of selenium into the Jordan River. My comments are limited as I have been unable to spend as much time with the documents as I would like, or query DAQ, and I will be out of town for a significant part of the comment period.

AIR QUALITY

Under this proposal, acid plume water extracted from Zone A will be treated by addition to the tailings pipeline, and neutralization will occur in the pipe to the end point that metals and sulfates will precipitate as solids and the water will have a pH of 6.7 or greater. Zone A sulfate plume will be treated in a reverse osmosis plant and the by-product water delivered to the tailings pipe.

2-1 The Magna Tailings impoundment has been a source of significant dust emissions during high wind events. The characteristics of the tailings

Response to E-mail No. 03-02

2-1: See the Response to Common Comment No. 5 and No. 7.

E-mail No. 03-02 (cont.)

deposited in the impoundment have effects on the environment around the tailings impoundment. The file does not seem to contain a clear comparison of tailings discharged to the impoundment with and without the acid plume and reverse osmosis by-product waters. There was no evidence in the file of activity by the DAQ project manager for this project assessing the impacts on local air quality from the change (or lack thereof) in tailings composition due to this project.

2-1

DISCHARGE TO THE JORDAN RIVER

Future generations will wonder what we were thinking when we allowed additional selenium to be discharged to the wetlands in Farmington Bay.

The Jordan River currently delivers large amounts of selenium to the GSL wetlands, arguably mostly as a result of human caused geologic disturbances. Selenium is widely known to bioaccumulate in wildlife with bizarre birth defects in waterfowl and other severe effects. Efforts to reduce selenium discharge to the GSL wetlands will be much cheaper and effective than cleanup later. The proposal to discharge selenium laden water to the Jordan moves a problem that is currently Kennecott's responsibility into the laps of future taxpayers.

2-2

Thank you again for this comment period, and for your attention to this matter. Thank you for your service to Utah.

Peace,
Kathy Van Dame
1148 East 6600 South #7
Salt Lake City, Utah 84121
(801)261-5989

Response to E-mail No. 03-02 (cont.)

2-2: See the Response to Common Comment No. 8.

E-mail No. 03-3

From: [Glenn Rowe]
To: <nrdtrustee@utah.gov>
Date: Tue, Sep 23, 2003 10:10 AM
Subject: Private Wells

3-1 Unless I am not understanding the legal terminology none of your online information or recent news articles discuss the impact on private property owner's wells. Back in 1993 and earlier at some of the public meetings, for which we were notified by direct mailings, there was discussion of the possible need to cap private wells for many years until the plume is cleaned. We are in South Jordan in Zone B and do not use our well for culinary purposes. Is this idea still alive? Are private well owners being notified? Is there any recourse or compensation if this is the case?

Glenn N. Rowe
2427 Temple View Lane
South Jordan UT
84095
254-0274

Response to E-mail No. 03-3

3-1: See the Response to Common Comment No. 10.

Email No. E03-04

From: [FRANK ABEL]
To: <nrdtrustee@utah.gov>
Date: Sat, Oct 11, 2003 4:52 AM
Subject: URGENT SUPPLY

FRANK ABEL
Plot 102 Rue 12 Kumassi 32
Abidjan Cote d'ivoire
Attn - Managing Director
Dear Sir,

I am writting this letter out of a genuine desperation to find a reliable partner in the unfolding transaction.I have been unjustly treated by my partner in a transaction so,
I seek your help, attention and genuine co-operation to our mutual benefit and 1 believe that you will not let down the trust and confidence 1 am about to repose on you.
MY NAME IS MR FRANK ABEL, I am 28 years old and for the past ten years,I have been working in a puublic Relations firm that pays me about two hundred dollars each month. On the 30th of june,our company made a very big financial breakthrough when we made contact with Alhaji Duadu

4-1

Dasuki (xi)and began to supply him his cow medicines. Alhaji Duadu Dansuki(xi) is THE PRESIDENT OF DASUKI AGRO ALLIED FARMS)is a millionaire farmer with CATTLE FARMS in MALI, SENEGAL,
GUINEA, BURKINA FASO, CHAD REP, and a new one located at ZIMBABWE. Moreover, he is the greatest supplier of cattle beef and other dairy products to the whole of West Africa.HE had informed us about the huge amount of money he spends on the purchase of a particular but very important cattle medicine. Precisely, he buys US$ 5,000 per carton. He asked if our organisation can source for a cheaper supplier. We did market research and discovered that we can buy these medicine in Europe for US$2,000 per carton. We moved a proposal to DASUKI AGRO ALLIED FARMS, to supply him at US$4,800 per carton which they accepted. As these supplies progressed and our company is doing fine,I requested to my boss for an increase in our salary.he was so upset that he sacked me without benefits and ten years of dedicated workmanship.I was so desperate that I

Response to E-mail No. 03-4

4-1: The NRD Trust Fund is precluded from being used in the endeavor suggested by Mr. Abel, by the Consent Decree.

E-mail No. 03-4 (cont.)

4-1

went to the Dasuki farms and infomed Alhaji Duadu Dansuki(XI),that I have a foriegn contact that will be willing to supply him this sme products at US$4,400. Per carton. ALhaji Daudu Dansuki in turn confided to me that he is about to place order for one thousand cartons following a suspected outbreak of disease in his farms.I asured Alhaji Duadu Dansuki that my foriegn contact will be in the position to manufacture and supply to him,infact I convinced him that my former boss usually buy from my foriegn contact and that is why he sales to him at a higher price.HOWEVER,I INFORMED ALHAJI DAUDU THAT HE WILL HAVE TO PAY CASH IN ADVANCE BEFORE MY FORIEGN CONTACT WILL SUPPLY TO HIM. For the moment he has stopped all contact with my boss.Please consider on how to handle this profitable project and kindly contact me immediately on my mail box frankabel1@yahoo.ca , for details and negotiations as regards my commission.However,I will insist that my commission will be 20% of the total profit. Note : We will buy one thousand carton at US$2,000,000. We sell to them at US$4,400,000 Dollars, our client pays cash before lifting of the goods. (They must not know our purchase point in Europe).
Thanks and God bless you.
Mr.FRANK ABEL
00225 07983068

Response to E-mail No. 03-4 (cont.)

E-mail No. 03-5

From: [Jay Gatten]
To: <nrdtrustee@utah.gov>
Date: Mon, Oct 13, 2003 10:46 AM
Subject: Southwest Jordan Valley Ground Water Cleanup Project

I attended the Public Hearing that was held in West Jordan on September 10th , I am a Registered Geologist in Utah and I have reviewed much of the data relating to the project. I strongly support the project and urge you to move forward.

5-1

Much time and money has already been spent on this project. There will always be a few dissenters but this ground water cleanup benfits the majority of the residents in the area. The extra time and epenses to drag out the process are not justified.

And what is the alternative? Just wait until the "plume" of high-sulfate water contaminates the existing ground water supply? Let's move on now!

Sincerely, O. Jay Gatten

Response to E-mail No. 03-5

5-1: See the Response to Common Comment No. 3.

Email No. 03-6

From: [Terry Lee Thomas]
To: <nrdtrustee@utah.gov>
Date: Thu, Oct 16, 2003 7:38 AM
Subject: Big Business-RTZ and Kennecott

To: Dianne Nielson
From: Terry Lee Thomas
Re: Corporate.....??? Arrogance!!!

Dear Ms Nielson,

I was in attendance at the public hearing that you conducted at the West Jordan City Hall, and must tell you that I was impressed with the way in which you handled this affair. Your communication style and techniques were impressive. Thank you for granting the time extension for public comment. I am also aware and very disappointed at the power and control that the Republican Party and companies like RTZ and Kennecott have here in the State of Utah. Why do you suppose it was, at the hearing, that after Paula presented Kennecotts cleanup plans and tried to paint a picture of Kennecott as being some sort of heroic organization, that the greatest portion of public comments were of mistrust?? It is my belief that you know the answers to these very complex and volatile questions. My mind also asks, "if she is very close to Governor Leavitt what are our real chances of protecting the little people in this matter?"

6-1

I did notice that following the meeting that you approached Diane Hemingway of the United Steelworkers of America, and explained to her why certain things have happened the way they have in this long and drawn out affair. I say this so that I can tell you that, while I am no expert in environmental affairs, I did and do sense, that several troubling issues remain unresolved, or heavily weighted to the well being of corporate RTZ and Kennecott. In spite of this, there are very intelligent people, who do understand the issues that are watching what is going on here. Is it not true that it was a court ruling, resulting in a consent decree, that really forced these cleanup efforts? Not some nice Kennecott exec sitting at a staff

6-1

Response to E-mail No. 03-6

6-1: See the Response to Common Comment No. 12.

Email No. 03-6 (cont.)

6-1 meeting saying, "Hey guys, lets clean up the water and other environmental systems that we've ruined!!?"

6-2 It disturbs me, when I read that Kennecotts committment to this effort is 5 years when the proposed cleanup is much longer, what?, 40 to 45 years?? Are my tax dollars going to go, once more, to helping Kennecott and RTZ's bottom line?? The property tax scam that this company has pulled off here in Utah is shameful. Why should rebates from this project be given to them, they created the problem while they profited and now want to pass the cost of cleanup on to us, the citizens. It cost the organizations that took them on in court $2 million or so, right? Have those court costs been repaid? Will private well owners and other municipalities, be literally "sucked dry" in this process and Kennecott escapes once more?? I think that the interest bearing account earmarked for ground water cleanup should remain intact until the job is done. I think that the legitmate concerns that have been expressed by many people and organizations should be bargained to acceptable solutions.

There are so many questions to be decided here. If there are ways in which you can mitigate the real concerns of the common citizen I strongly, urge you, to do so. Thank you for the opportunity to comment.

Sincerely,

Terry Lee Thomas

CC: [kcbc]

Response to E-mail No. 03-6 (cont.)

6-2: See the Response to Common Comment No. 12.

As part of the original settlement between the District, Kennecott, and the State Trustee, each party bore its own costs and attorneys' fees. The 3-Party Agreement includes a provision that the State Trustee will retain $815,000 of the State Trust Fund for assessment costs and oversight and management of the projects. This funding is from monies paid to the State Trustee by Kennecott, not from taxpayer funds.

E-mail No. 03-7

From: [mikeandcindy]
To: <nrdtrustee@utah.gov>
Date: Tue, Oct 21, 2003 8:41 PM
Subject: Kennecott's remediation project for contaminated groundwater

Trustee: October 17, 2003

I write to you today to express my concerns regarding the cleanup and use of contaminated groundwater by Kennecott Copper Corp. (RTZ).

I was present at the initial presentation of the plan in West Jordan in September, where their (Kennecott's) presentation was made. There were many concerns by local citizens which Kennecott had no answers for. Diane Heminway, and Rodney Dansie's testimony were particularly telling. Also I have been employed by Kennecott for the past 27 years myself and have witnessed numerous environmental abuses which were covered up and never reported.

7-1 Of particular concern to me, Kennecott is responsible for the contaminated groundwater, some of which was willfully contaminated by the dumping of sulfuric acid and other materials directly onto the soil. As was brought up in testimony RTZ the parent company needs to be tied to this to insure that if Kennecott were to go bankrupt the cleanup will proceed. To reward Kennecott for willfully causing this catastrophe is ridiculous. Not a penny should be returned to Kennecott ever.

Great Salt Lake:

7-2 If I understand the proposed plan correctly concentrates from both Zones A and B could be directly disposed of to the Great Salt Lake after mine closure or if the proper permits can not be obtained. These concentrates will be composed of toxic metals such as arsenic, cadmium, lead and selenium which are known carcinogens and are toxic to humans and wildlife. What could be the effect to this ecosystem?

Response to E-mail No. 03-7

7-1: See the Response to Common Comment No. 12.

7-2: See the Response to Common Comment No. 9.

E-mail No. 03-7 (cont.)

Jordan River:

7-2 I worry about the dumping of trace materials into the Jordan River and to the effect on the wildlife. I wonder if this is being allowed because it saves money, lowering the cost of disposal.

Liquid Mining:

7-3 This is an option I recently heard about and should considered as it would help to cleanup the soil and water as well as recycle these materials for future use.

Residential Wells:

7-4 It was expected the aquifer could be pumped down 40 feet or possibly more. This much change to the water table will likely cause many wells to go dry or become contaminated. There must be a plan to compensate these property owners. Who will determine if Kennecott is responsible? This must be high on the priority list. These people must be compensated if problems arise!

7-5 In closing I would like to state that. I appreciate the extension period given but feel in is inadequate. Please further extend this for another 30-60 days.

Respectfully,

Mike Lund
896 W. 400 N.
West Bountiful, Utah 84087

Response to E-mail No. 03-7 (cont.)

7-3: See the Response to Common Comment No.'s 4 and 5.

7-4: See the Response to Common Comment No. 10.

7-5: See the Response to Common Comment No. 1.

E-mail No. E03-8

From: [Chris Dewey]
To: <nrdtrustee@utah.gov>
Date: Tue, Oct 28, 2003 10:32 AM
Subject: Cleanup of Contaminated South Jordan Groundwater

Hello.,

8-1

I^m a South Jordan resident that is very concerned about the proposed cleanup of the South Jordan aquifer and the dumping of selenium and other salts in the Jordan River. South Jordan is experiencing unrestrained growth. There is no planning for adequate roads much less water. The concern of city planners is increasing the population as quickly as possible. South Jordan residents should pay the extra cost to have the contaminates moved to a suitable location like the plan for Copperton waste to go to a tailings pond. Why move one polluted site to the Jordan River? If South Jordan gets more water they will just grow faster. At some point the water in the aquifer will not be enough. Then we will have polluted the Jordan River and the Great Salt Lake for some greedy people in South Jordan. Make the residents pay and slow the growth.

Does it occur to planners that at some time we may have to say we have all the people we can support and have a decent quality of life? Water should be in that equation.

Thanks,
Chris Dewey
South Jordan, Utah

Response to E-mail No. E03-8

8-1: See the Response to Common Comment No. 8 and No. 9.

E-mail No. 03-9

From: [Steve McDowell]
To: <nrdtrustee@utah.gov>
Date: Wed, Oct 29, 2003 11:09 AM
Subject: water rights

Steven D McDowell
1146 Jordan River Drive
S. Jordan, UT 84095
801 560-4234

October 29, 2003

NRD Trustee
PO Box144810
Salt Lake City, Utah 84114

Dear Sir,

This past July, my wife and I purchased a property located at 11092 S. 1300 W. in South Jordan. This property included the rights to an existing well W. U. C. #2098 and my title company is in the process of recording a Quit claim Deed from Doug Pillow to us for the well rights.

9-1 It has come to my attention that Kennecott is trying to obtain rights to our water with the guise of cleaning it up. I am aware that they need water for a huge development and I feel that this is a thinly veiled effort to steal my water and then to sell it back to others and myself for a huge corporate profit.

9-2 I am asking that there is a hearing on this matter later this week. I am asking that it be delayed at least 60 days to give the water owners more time to gather the facts.

Sincerely,
Steven D. McDowell

Response to E-mail No. 03-9

9-1: See the Response to Common Comment No. 10.

9-2: See the Response to Common Comment No. 1.

E-mail No. 03-10

From: [Ivan Weber]
To: <nrdtrustee@utah.gov>
Date: Mon, Oct 20, 2003 4:28 PM
Subject: Sierra Club Utah Chapter Comments, Kennecott Natural Resource Damage Claim Proposed Settlement

Dear Dr. Nielson,

Please consider the attached comments prepared on behalf of the Utah Chapter. I will also deliver them in hard-copy, with enclosures (which I could not manage to scan in order to attach here).

Sincerely,
Ivan

Ivan Weber
Weber Sustainability Consulting
953 1st Avenue
Salt Lake City, Utah 84103
(801)355-6863 / (801)651-8841 cellular

Response to E-mail No. 03-10

E-mail No. 03-10 (attached letter)

October 19, 2003

Dr. Dianne Nielson, Trustee of the Natural Resource
Executive Director, Utah Department of Environmental Quality
168 North 1950 West
Salt Lake City, Utah 84114

Subject: Critique, Natural Resource Damage Claim Proposed Settlement
Kennecott Utah Copper Corporation Ground Water Contamination

Dear Dr. Nielson:

Please consider the following critique of the Kennecott Ground Water Natural Resource Damage Claim proposed settlement, submitted on behalf of the Utah Chapter of the Sierra Club's more than four thousand members. The mission and purpose of the Sierra Club encompasses the full spectrum of environmental phenomena, from urgent problems to compelling opportunities.

We see nearly the entirety of the Oquirrh Mountain range encompassed in Kennecott's environmental history, culminating in this settlement proposal among other aspects of facility 'closure' planning. Until now, the predominant environmental impacts of Kennecott and preceding activities in and around the Oquirrh Mountains have included the following:

- Air pollution from smelting and refining is a picture that has improved drastically in recent years, while leaving several miles at the north of the range acidified, denuded of topsoil and incapable of supporting most plant growth in approaching decades, if not centuries.
- Deforestation by a combination of over-harvesting in pre-Kennecott, early settlement and timber-hungry underground mining years.
- Overgrazing, which contributed to vegetation community alterations of extensive and permanent nature.
- Acid mine drainage from unknowing and careless waste rock dumping and inadequate leach water control, resulting in polluted surface water

Response to E-mail No. 03-10 (attached letter)

E-mail No. 03-10 (attached letter, cont.)

on the southern east flank of the Oquirrhs, as well as ground water contamination on a world-unprecedented scale, both geochemical and geographical in extent (i.e., concentrated and large).

- 'Cutoff' or interception of all surface water flows except from Butterfield Tunnel and the occasional south-end seep, making clean water available to wildlife extremely rare for at least ten miles of the mountain face.
- Land use changes, including the Bingham Pit and several billion tons of waste rock deposited on the surface; Barney's Canyon gold mine pits, cyanide leach pads and waste rock dumps, with their own acid mine drainage problems; and the Magna Tailings Impoundment with the recent expansion into the North Tailings Impoundment. Together, the surface disturbances make up at least 20,000 acres of the total of approximately 85,000 owned by Kennecott in Salt Lake County. Former surface-contaminated sites that have been *partially* cleaned (i.e., to agricultural land use standards) constitute about 3,000 or so acres of the total.
- Facilities and infrastructure making up both the present and many previous manifestations of the Kennecott industrial complex, one of the largest in the mining industry.
- Highway, railroad and industrial infrastructure severing ecological relationships with the Great Salt Lake shore as thoroughly as can be imagined.
- Vegetation community changes from, and compounded by, all the factors listed above, with the dominance of invasive plant species added (cheatgrass, wild mustard, whitetop, Phragmites, tamarisk, Russian olive, etc.) to form a vegetative landscape alien to native wildlife communities (burrowing owl, kit fox, raptors, etc.) and favoring disturbed-lands species (deer, elk, fox, etc.).

10-1 The human community has undeniably benefited economically for more than a century from the wealth derived from this huge mine and its predecessors. There have been, however, counterposed to economic benefits, the extensive environmental and public health problems created by Kennecott and its predecessors. We *do not* advocate opening a new mine somewhere else (e.g., Lisbon Valley, near Lasal, Utah) in order to obtain

Response to E-mail No. 03-10 (attached letter, cont.)

10-1: See the Response to Common Comment No. 1, No. 8, and No. 9.

E-mail No. 03-10 (attached letter, cont.)

supplies of copper and other metals that our technological society demands. We regret to point out, however, that the Kennecott ground water settlement proposal before us creates a new, macro-scale item that must be added to this list of major Kennecott environmental impacts: Great Salt Lake and Jordan River metals contamination over short and long terms. For these vulnerable aquatic environments, already under siege from urban growth that promises to overwhelm their margins, from MagCorp/US Magnesium dioxins and other regional-scale stressors, this may be the straw that breaks the camel's back. If this settlement proposal is carried out as formulated, we will strenuously advocate reopening of National Priorities List ('Superfund') nomination for the Kennecott South and North Zones because of the breach of trust inherent in the scheme. It is *that bad* a concept, technically and ethically.

10-1 We thank you for extending the comment period by one month from the original deadline, but we must repeat the objections voiced in the first hearing to what is still an excessively short evaluation/comment period, and request additional time for our many interested and concerned members to further digest such a large body of technical documentation. Please extend the comment deadline at least to December 1, 2003, and preferably to January 1, 2004. This is much too complex a confluence of issues, involving multiple pathways of regulatory, scientific and community concern, to be crowded not only into the short timeframe originally proposed for comment, but --- for ordinary citizens with ordinary lives --- also compressed into the one month time extension. It is critical to note that the settlement's inseparability from at least two critical UPDES discharge permits, JVWCD to the Jordan and KUCC to the Great Salt Lake, render holistic understanding of the settlement proposal dependent on these documents, as well as other, previous records of Technical Review Committee discussions, not to mention the December, 2000, Record of Decision. Sorting through these records is a daunting task, at best.

10-2 We are very concerned that this decision has been 'wired' for some time. There have been signals visible both from inside and outside the process that it was likely, but frankly, we did not believe that anyone would so abdicate ecological dimensions of the public trust that some elements of the proposal would be put forth with the finality we've witnessed. Governor

Response to E-mail No. 03-10 (attached letter, cont.)

10-2: The TRC attendance records indicate that Scott Endicott attended TRC meetings regularly from 1994 until 1997. Ivan Weber attended as a citizen (according to the notes) from 1998 to 1999. The membership roster for the Sierra Club indicates that both Ivan Weber and Scott Endicott as members during this time. Members of the TAG group (Herriman Residents for Responsible Reclamation) began attending in early 2000 and have continued since then. In addition, several academic members also attended. The notes reveal that there was no period of time in which the public was not represented. Representatives of local, state, and federal agencies and communities were also present.

E-mail No. 03-10 (attached letter, cont.)

Leavitt's citing of this settlement immediately after his August 11, 2003, nomination to EPA Administrator occurred several weeks *before* the September 2 public notice, alerting us that something 'was up.' As we've gone back through available documents, especially TRC meeting notes and materials presented at TRC meetings, it appears that a decision to abandon
10-2 relatively thoroughgoing, corrective measures that fully engage the precautionary principle, in favor of risk-externalizing dilution and disposal strategies, have been shaping up for about six years, approximately since the Shepherd-Miller study of acid/metals water disposal in the tailings line, which we recall to have occurred around 1996-97. This is critically important, both because of the dealbreaking conceptual faults of that study, but also because of the lack of continuity in what amounted to sadly deficient citizen involvement prior to current representation by Friends of Great Salt Lake's Ms. Joy Emory, TRC member since about 2001. By the time Ms. Emory joined the TRC, it is now apparent that the decision had been made. Documentation since approximately 1997-98 has been very
10-3 deficient in representing previous investigations, concerns and justifications (or lack thereof) of conclusions.

Utah Chapter Sierra Club Comments Abstract: Our comments present the following points:

1. Wrong Questions Beget Wrong Answers: The settlement proposal is conceptually flawed, reflecting process flaws in the Company's and Agencies' management of the Technical Review Committee, and lack of additional conduits for both public education and receiving public reflections, then adapting as the project went along.
2. Time for review and comments: Still more time is needed to educate the public and to afford review and comment opportunity that was not encouraged by the Technical Review Committee structure and schedule.
3. Great Salt Lake and Jordan River ecosystem attributes and significance were suppressed; biogeochemical meaning of terminal basin is ignored; cumulative impacts are dismissed without adequate study, understanding or care; and the Migratory Bird Act of 1918 is ignored.

Response to E-mail No. 03-10 (attached letter, cont.)

10-3: The discussions of the TRC and the investigations which occurred go back to 1992. The TRC meeting summaries document what the concerns of the scientists were and what was done in response to those concerns. A summary of the work prior to 1998 is documented in the Remedial Investigation Report (and its eleven appendices) and the Feasibility Study Report (with its appendices). These documents have been available to the public for some time.

E-mail No. 03-10 (attached letter, cont.)

4. Avoidance of ecological concern and science is at the very base of the settlement proposal.
5. Zone A acid/metals plume metals removal at point of extraction has been suppressed without cause and ignored.
6. Metals removal technology alternatives have been suppressed and ignored, but are demonstrably feasible, especially used in combinations.
7. The tailings impoundments are inadequate as toxic metals repositories.
8. Air quality degradation from metals-toxified tailings impoundment dust appears inevitable, but has been inadequately considered and inaccurately characterized by ignoring metals 'fate' and physical behavior in the tailings line and impoundments.
9. Tailings impoundment vegetation cover is critical to air quality maintenance, but will be compromised or rendered impossible by metals deposits.
10. Environmental accounting and sustainable solutions: The narrow financial analysis applied to alternatives evaluation has effectively precluded assemblage of sustainable solutions.

Utah Chapter Sierra Club Expanded Comments:

10-4 **1. Wrong Questions Beget Wrong Answers:** The settlement is conceptually wrong in that it measures criteria only against human-needs water resource considerations (water and rights to M&I purveyor, 40-year sustainable supply, contamination plume stabilization, water supply cost stabilization). Additional, unavoidably appropriate criteria should have included: assurance of minimal or no ecological consequences, minimal or no human health consequences, no vulnerability to natural disaster, management error or malfeasance, or to corporate or ownership changes. Failure to adequately discuss these additional criteria in a truly public forum (which the TRC generally was not during critical years) through this concept's development render the *concept as a whole* unacceptable, unworkable, and reprehensible. Collectively, we can and must do better than this, both early problem formulation and public involvement and education to assure adaptive improvement of problem and solutions formulation along the way.

10-5

10-6

Response to E-mail No. 03-10 (attached letter, cont.)

10-4: The Trustee's authority to review and approve the Joint NRD Proposal, and to authorize expenditure of the Trust Fund, is derived from the Consent Decree. The criteria that the comment describes as "conceptually wrong" are those set forth in the Consent Decree and the Trustee is obligated to consider those criteria.

10-5: The record demonstrates that over the last 10 years, these issues were not only reviewed by the Technical Review Committee, the concerns were so prevalent that the Technical Review Committee requested additional information on many of them.

10-6: See the Response to Common Comment No. 5.

The composition of the acidic core was known to contain elevated metals and there was no effort to hide this. Selenium, which is not a metal, was evaluated in Kennecott and EPA studies and was discussed by the TRC. The predominant form of selenium in this case is selenate, not selenite. Neutralization is a common chemical reaction with reactants and products. In this case, the products produced are solids, which settle down along with the rest of the solids in the tailings impoundment. The TRC wanted to know how complete that reaction was and whether the solids, once formed, could re-dissolve. All of that data is in the TRC minutes and in the Remedial Design report.

E-mail No. 03-10 (attached letter, cont.)

10-6 Further, the settlement predicates Zone A "acid" plume "treatment" strictly on acid neutralization, a breach of scientific common sense first put forth by the Shepherd Miller study in 1997 on use of the tailings line for neutralization. "Neutralization," as we point out elsewhere, is a Trojan horse that distracts us from the mass transport of toxic metals into the North Tailings Impoundment, if not directly into the Great Salt Lake. Indeed, selenium, pound-for-pound arguably the most ecotoxic of metals in the Zone A 'acid/metals' plume (we insist on use of this technically correct and non-denial-laden terminology, instead of 'acid plume'), is not at all dependent on acidity in some of its most dangerous oxidation states (+2 selenite, especially). Neutralization is a deception. Metals are the reality. Until the settlement reflects this reality, it must be rejected.

10-7 2. **Time for Review and Comments: Still more time is needed** to understand the proposed settlement in the context of separate UPDES permits, to recognize reasonable alternatives abandoned along the way, and to compensate for the conceptual deficiencies of the settlement process and documents on ecological, public health and water resource/rights concerns.

- 10-8 Together, the settlement and supporting permits form a **single system of contaminant disposal** from ground water to surface ecosystems --- a system that we believe was neither intended nor countenanced by the 1995 Natural Resource Damage disposition by Judge Thomas Green in the Third District Court.
- 10-9 **The 'public' component of the natural resource damage claim process has been woefully inadequate**, with meetings consistently held over the years in workday hours, times when the working public cannot get free. There has been no newsletter or public information summary sent out disclosing enough about the thought process to allow formulation of critical thought on alternatives. No 'technical assistance' group or grant was formed or sought. The 'technical review committee' included functionally no representation from the environmental community until very recently, especially

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Response to E-mail No. 03-10 (attached letter, cont.)

10-7: See the Response to Common Comment No. 1.

10-8: See the Response to Common Comment No. 8.

10-9: See the Response to Common Comment No. 1. The Technical Review Committee attempted to accommodate the differing schedules of its members and has consistently indicated a willingness to accommodate other meeting times.

10-10: See the Response to Common Comment No. 1. Technical information developed during studies has been and will continue to be presented to the TRC group. This information has and will continue to be provided to the Sierra Club as a member of the TRC. During the Remedial Investigation/Feasibility Study (RI/FS) public comment and review was sought by the members of the TRC. Media coverage on project activities periodically took place as well.

10-11: This statement is in error. A Technical Assistance Group was formed in 1997 (Herriman Residents for Responsible Reclamation), initially to deal with surface mining waste issues in the Herriman area. They expanded their interest to cover the ground water issues in 2000 and began to participate with the TRC at that time. They received a grant, a renewal, and an extension of performance period. They were extremely active with the agencies during this time period.

10-12: The environmental community was and is represented on the membership of the TRC.

E-mail No. 03-10 (attached letter, cont.)

10-12 AFTER decisions critical to this settlement had been made apparently in the 1996-1999 timeframe. Since the State and EPA --- not to mention the PRP, Kennecott --- have chosen not to educate forthrightly not only the public, but also our political leaders, about this subject, we guess that it falls to us and other public-interest activists to do it. That being the case,

10-13 we need more time: at least another two months will be required to adequately perform the ecological and biogeochemical data accumulation that the State is disinclined to do. Others who are very concerned about water rights and resources implications may need more time than that. Extension beyond January 1, 2004, is the least amount of additional time that can reasonably be expected.

10-14
- Not enough about alternatives has been disclosed.
- As quoted under comment 5, below, "community acceptance" was designed to be undertaken *after* the settlement proposal

10-15 was announced. The present process is the only opportunity for the larger community, beyond agency and immediate, invited neighbors (who are free on workdays) to participate.

10-16 3. **Great Salt Lake and Jordan River Ecosystem Significance:** The Great Salt Lake (GSL) and its watershed constitute the single most important ecological element of our region. As the Kennecott Visitors' Center video points out, the Bingham Canyon Mine is one of two man-made objects that can be seen from space. Although it is not man-made, the Great Salt Lake is even more 'visible from space,' especially to wildlife dependent on it for their lives (as opposed to transitory economic gain).

10-17
- The settlement proposal, together with the supporting, but separate, State (UPDES) discharge permits, **consign the Great Salt Lake ecosystem to an early death due to metals accumulation that would not occur otherwise** Effectively, the settlement's Zone A acid/metals plume metals relocation would accelerate the mass transport of millions of years of natural processes into a few decades. The Great Salt Lake is a terminal basin. Whatever goes in that does not evaporate or

Response to E-mail No. 03-10 (attached letter, cont.)

10-13: See the Response to Common Comment No. 1. The TRC was used as the primary method of communication between the parties involved. Each member was responsible for briefing those of his own organization.

10-14: The alternatives analysis is contained in the KUCC South Facilities Groundwater Feasibility Study from 1998 and was reviewed by the TRC of which the Sierra Club is a member.

10-15: See the Response to Common Comment No. 1.

Community acceptance is an integral component to the selection of a remedial approach, both under the CERCLA and NRD authorities. Community representatives as well as other interested groups were invited to review the investigative studies and participate in the selection of a remedial approach, via participation on the TRC, for the Zone A portion of the project and later on the NRD proposal. At any point during the investigation and project development activities concerns and comments could have been raised.

As presented in the chronology of TRC meetings presented in the Response to Common Comment No. 1, the CERCLA project in Zone A and the State's NRD project have both been in development for some time. At key times the public has been brought into the process prior to the significant decision being made (public comment period for the focus feasibility study, release of the remedial investigation/feasibility study, public comment period of the Record of Decision, public comment period for the NRD project).

10-16: See the Response to Common Comment No. 9.

E-mail No. 03-10 (attached letter, cont.)

10-17

get removed by humans or natural processes STAYS. The molecule stops here, except for water and whatever off-gases.

- The settlement is, therefore, '**eco-ethically challenged**,' to put it charitably. *The Great Salt Lake is not a corporate sink, nor is the Jordan River.* The approximately ten million migratory shorebirds and waterfowl per year in populations of more than 250 species, typically, that are dependent on the GSL in their seasonal migrations are unique, living, treaty-protected international wildlife (Migratory Bird Act of 1918), warranting our utmost efforts on their behalf to conserve all elements of their complex ecosystem. Similarly, the riparian habitat values offered by the Jordan uniquely in the Lower Provo watershed are much too rare and important to diminish for the sake of accommodating an increment of water demand in a culture tragically --- almost pathologically --- reluctant to conserve water, much less to pay its true cost.

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- **Landscapes teach,** and so do government policies toward landscapes. What would this settlement teach about Utah's official regard for Nature and for living beings in Nature? That Utah holds wild lives in comtempt, that they are secondary and disposable to the will of business interests and corporate expediency, that they are not appreciated as intrinsic magnets for sustainable economic development, in and of themselves. When was the last time you heard of a Utah *State-initiated* eco-tourism task force? More money is spent on bird watching than on hunting, nationally; and have we got birds! Does this add up to a business development thrust in State government circles, as it has begun to be in Davis County? Not so far, not at all.
- **Birds Protected by the Migratory Bird Treaty Act of 1918**: "The Migratory Bird Treaty Act is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protect selected species of birds that are common to both countries (i.e., they occur in both

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Response to E-mail No. 03-10 (attached letter, cont.)

10-17: See the Response to Common Comment No. 9.

A number of studies were conducted (some under the guidance of the TRC) to consider the impact of a project involving the Jordan River, the tailings impoundment, or the GSL. Additional studies are contemplated, and all discharges will be subject to regulatory approval. The amounts of metals and non-metals coming from this project are extremely small in comparison to the total amounts of these contaminants entering the Lake from other sources.

10-18: Both EPA and DEQ are authorized and required to protect public health and the environment. Staff members for both agencies have been and will continue to be mindful of the impact this project could have on the Great Salt Lake watershed and the aquifer in the Affected Area. The Consent Decree recognized the importance and challenges of the groundwater cleanup. This project has taken many years to reach this decision selection point because of the exhaustive investigation of cleanup alternatives, to assure that this project would remain protective of public health and the environment. Through continued monitoring and modeling activities both agencies will audit the projects ability to attain the established goals, in a manner that continues to be protective of public health and the environment. The regulatory programs of DEQ with permitting authority will review their individual permits every five years to assess the protectiveness allotted by the individual permits. If project activities fall outside of the protective parameters established under State permitting programs, the particular problem will be addressed swiftly.

E-mail No. 03-10 (attached letter, cont.)

countries at some point during their annual life cycle)." (US Fish & Wildlife Service Division of Migratory Bird Management website, http://migratorybirds.fws.gov/intrnltr/treatlaw.html).

- **Great Salt Lake birds that are also on the Migratory Bird Act of 1918** list of protected bird species (based on a cursory, comparative scan, comparing list in E.V. Rawley, "Wildlife of the Great Salt Lake" in Great Salt Lake: a Scientific, Historical and Economic Overview, ed. by J. Wallace Gwynn, UGMS/UDNR Bulletin 116, June, 1980, pp. 298-299, with the list on the USFWS website at http://migratorybirds.fws.gov/intrnltr/mbta/mbtandx.html#alpha, where scientific names are listed; for more information go to http://migratorybirds.fws.gov/intrnltr/mbta/mbtintro.html) includes AT LEAST the following:

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American Avocet
American Bittern
Red-winged Blackbird
Yellow-headed Blackbird
Bufflehead
Canvasback
American Coot
Double-crested Cormorant
Common Crane
Sandhill Crane
Whooping Crane
Least Curlew
Long-billed Curlew
Long-billed Dowitcher
Ruddy Duck
Wood Duck
Bald Eagle
Golden Eagle
Snowy Egret
Perigrine Falcon
Prairie Falcon
Gadwall

Response to E-mail No. 03-10 (attached letter, cont.)

10-19: Please refer to Response to Common Comment No. 9.

E-mail No. 03-10 (attached letter, cont.)

Marbled Godwit
Common Goldeneye
American Golden Plover
Lesser Canada Goose
Great Basin Canada Goose
Snow Goose
Eared Grebe
Western Grebe
Pied-billed Grebe
Bonaparte's Gull
California Gull
Franklin's Gull
Ring-billed Gull
Great Blue Heron
Black-crowned Night Heron
White-faced Ibis
10-19 Killdeer
Common Loon
Mallard
Common Merganser
Oldsquaw
White Pelican
Brown Pelican
Wilson's Phalarope
Pintail (Northern)
Snowy Plover
Virginia Rail
Redhead
Sanderling
Western Sandpiper
Least Sandpiper
Pectoral Sandpiper
Baird's Sandpiper
Spotted Sandpiper
Solitary Sandpiper
Greater Scaup
Lesser Scaup

Response to E-mail No. 03-10 (attached letter, cont.)

E-mail No. 03-10 (attached letter, cont.)

White-winged Scoter
Shoveller
Black-necked Stilt
Whistling (Tundra) Swan
Blue-winged Teal
Cinnamon Teal
Green-winged Teal
Forster's Tern
Caspian Tern
Black Tern
American Wigeon (?)
Willet
Greater Yellowlegs
Lesser Yellowlegs

10-19

- **The Great Salt Lake is a place to celebrate, not to kill. Some of these species exist in greater populations at the Great Salt Lake than at any other place on earth.**
- **Baseline studies targeted at comprehensive understanding of the Great Salt Lake ecosystem and watershed still have not been done, after all these years. As urban growth encroaches and makes vulnerable more and more ecosystem variables, the lack of this baseline knowledge becomes, increasingly, a moral deficiency, as well as a scientific gap.**
- **'Ramsar' designation to promote international recognition of this hemispherically critical wetlands complex should be a State priority, as it should have been for decades.** (Ramsar is a 1979 international convention named for the town in Iran where a meeting to draft the rules for wetlands recognition were drafted. Strictly speaking, it has nothing to do with the United Nations, and results in only voluntary measures to protect designated wetlands. See http://www.ramsar.org for more information. Ramsar "Mission Statement: "The Convention's mission is the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as

Response to E-mail No. 03-10 (attached letter, cont.)

E-mail No. 03-10 (attached letter, cont.)

a contribution towards achieving sustainable development throughout the world" (Ramsar COP8, 2002)." Recognition

10-19 of the Great Salt Lake's importance must start somewhere. If it won't start in Utah, then it will start wherever it starts.

4. **Avoidance of ecological concern and science is at the very base of the settlement proposal:** Throughout alternatives screening, studies of

10-20 impacts and formulation of remediation 'designs,' ecological impacts to the Great Salt Lake and to the Jordan River have been ignored. Parallel processes in State government have repeatedly dismissed consideration

10-21 of numerical water quality standards for the Lake based on biogeochemical and ecological constraints. Permits have been issued jeopardizing the ecosystem, effectively spelling its doom over the long

10-22 term in a way that is entirely avoidable by metals removal and sustainable alternatives choices. Alternatives screening omitted Great Salt Lake and Jordan River ecological considerations almost

10-23 completely, notwithstanding the 'risk assessment' analyses prepared by Kennecott and Kennecott consultants in the 1990s. The GSL, we remind the Trustee, is a terminal basin, which will retain and accumulate any and all toxic metals of concern. The Lake is demonstrably already at the critical threshold for selenium effects on birds. Mass transport of an enormous additional consignment from Kennecott's acid/metals and sulfate plumes can only lead to ecological disaster.

10-24

- **Sulfate plume treatment:** Concentrates discharge to the Jordan River is not ecologically acceptable or responsible, however appealing water reclamation may to water utility administrators seeking to match supply with demand at least cost. Selenium and TDS, as pointed out by USFWS, are immediate problems that will be irresponsibly exacerbated by the settlement proposal.
- **Acid/metals plume disposal:** Metals relocation from the acid/metals ground water plume to the north tailings impoundment next to the Great Salt Lake is neither ecologically acceptable nor

10-25 responsible. Metals <u>do not</u> go away magically; if they are put into the top end of the gravity-fed tailings pipeline, they will come out at the bottom, even if acid is partially or entirely neutralized.

Response to E-mail No. 03-10 (attached letter, cont.)

10-20: This is untrue. Not only the discussions in the TRC indicate this wasn't ignored, but also the formation of work groups to look at these issues and the hiring of contractors to study the potential different discharges provide ample proof that the ecological issues were seriously considered throughout the deliberations. As part of the discussions, direct discharges to the Great Salt Lake (GSL) were, in fact, discussed. It was studied and rejected. The literature on selenium is extensive and growing every day. The particular selection chosen here for discussion is curious and not balanced. The permit limit for selenium was based on actual results of bioassay toxicity tests and includes bioaccumulation factors.

10-21: See the Response to Common Comment No. 9.

10-22: There is no evidence that the ecosystem is being exposed to significant or unnecessary risk by permitting discharges to waters of the state. In fact, the continued regulation of such discharges allows for continued monitoring of in-stream conditions and protects the designated beneficial uses of the water body. The UPDES system only provides the authority to limit concentrations of pollutants discharged to a water body, it does not provide the authority to require a specific type of treatment technology.

10-23: See the Response to Common Comment No. 9.

10-24: See the Response to Common Comment No. 8, and No. 9.

E-mail No. 03-10 (attached letter, cont.)

10-25 Hollow claims of metals "treatment" in the tailings line must be recognized as counter-intuitive and abjectly unscientific, and must be rejected.

10-26
- **Baseline studies** of the Great Salt Lake ecosystem have still not been done, despite years of pressure on both State and Federal agencies. Both US Fish and Wildlife and the US Geological Survey have led recent, post-Kesterson Marsh exploration of selenium in the GSL's saline environment, but even they have emphasized that much, much more needs to be done in order for understanding to approach the threshold of competent policy formulation. Add to selenium the alarming probability of MagCorp/US Magnesium dioxin emissions through air, water and solid media, and the potential for synergistic effects should compel agencies at all levels to formulate immediately a plan for rapid advance of scientific knowledge about the Great Salt Lake ecosystem. The present settlement proposal flies in the face of this need, indeed exploiting the absence of scientific data and interpretation to justify use of the Lake as a metals disposal sink.

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- **Selenium ecotoxicology** has been effectively avoided by the State's utter lack of initiative in study and gathering of data on the Great Salt Lake ecosystem, despite years of discussion and exploration by Kennecott, including the company's hosting of a national-scale conference on selenium in aquatic environments. A true reflection appeared in the Salt Lake *Tribune* article printed Saturday, October 18, 2003, quoting Mr. Don Ostler, Executive Director of the Utah Division of Water Quality: "I don't see any scientific information that shows there's a problem in the wetlands," said Ostler. "There are perceptions but no presentation of data." Apparently, despite a storm of scientific study and very extensive data accumulation on the Great Salt Lake, sites elsewhere in Utah, and on sites all over the western states of the USA, it is incumbent on the public to force before the State of Utah's perception the existence of this literature. A partial bibliography is enclosed with these comments, and a more extensive literature search will produce a supplement to these comments for later submittal before the comment deadline.

10-25: See the Response to Common Comment No. 5.

10-26: See the Response to Common Comment No. 9.

- **After Kesterson:** Since California's Kesterson Marsh came to light in the 1980s, the biological sciences and public agencies throughout the world have focused attention on selenium that could be considered unprecedented, were it not for Rachel Carson's *Silent Spring* and the almost countless studies done since its publication on pesticides, dioxins and other persistent organochlorines. This presents an interesting Utah contrast with the typical public policy development process, however, in that the MagCorp/US Magnesium dioxins have been ignored, like nearly all other issues of Great Salt Lake biogeochemistry and ecology that may not be conducive to industrial use of the Lake as source and sink. By contrast, the 1999 Great Salt Lake Management Plan process bravely began with "A Starting Point for Issue Identification," including a list pertaining to "Lake Hydrology and Water Chemistry," which in turn included the following (among others):
  - "The potential for groundwater contamination of culinary water supplies from mining activities might be reduced by directly discharging wastewater concentrate containing acid and sulfates into the lake. Would this pose a risk to the Lake's ecosystem? How?
  - Should the State begin to establish a scientifically defensible numeric water quality standards [sic] for GSL as a receiving water body? Why?"

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By the time the Management Plan was issued, however, these questions had gone functionally dead, and no resolution of these issues was offered. The Great Salt Lake Draft Comprehensive Management Plan (Utah Department of Natural Resources Great Salt Lake Planning Team, Nov. 3, 1999, pp. 54-55) offers a useful summary of the way State water quality classifications affect administration of GSL water quality issues, after enumerating the five basic water quality classes:

> "Class 5 GSL. Protected for primary and secondary contact recreation, aquatic wildlife and mineral extraction.
>
> "Most of the main classes are divided into sub-classes which

address specific pollutants and beneficial uses. GSL is in its own class (Class 5). Primary and secondary recreation, aquatic wildlife, and mineral extraction are the defined beneficial uses of the lake's waters. Numerical water quality standards have not been established for GSL, but DWQ has established narrative standards for discharges to the lake and permits for waste water discharges are established on a case-by-case basis. Applications for waste water discharges are reviewed and regulated by the Water Quality Board to prevent the addition of pollutants which would be injurious to the defined uses. The general policy is that, to the extent feasible, no pollutants (discharges) should be delivered to the lake in amounts that result in concentrations greater than those already present in the lake…. Dischargers are regulated by state and federal effluent limitations for total suspended solids (TSS), biochemical oxygen demand, coliforms, pH and some metals. A public notice process is followed to allow comment on any concerns. Except for sewage treatment facilities, most facilities do not directly discharge into the lake and a mixing zone is allowed most cases."

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- **Selenium ecosystem science is very recent**, a fact that argues strongly for application of '**precautionary principle**" to public policy. Work thusfar on selenium aquatic ecosystem and wildlife impacts in the West has been restricted primarily to critical areas where response was needed, such as Stewart Lake, near Jensen in northeastern Utah, and in such major, obvious occurrences such as Kesterson Marsh, the Salton Sea and others in the USFWS Migratory Bird Refuge system where locations receive agricultural return flows for their sources of water. Although we have not yet gained access to recent relevant studies on the Great Salt Lake, we understand that cooperative work by the late Doyle Stephens, Kidd Waddell and others of US Geological Survey and US Fish and Wildlife Service has begun to address this deficiency of data for the Great Salt Lake. One thing is certain: Selenium is one of the environmental 'genies' which, when 'let out of the bottle,' are extremely damaging to wildlife, difficult to

contain and remediate, and expensive to remedy. An act as careless as the proposed Kennecott settlement, which conceptually proposes to relocate metals-contaminated acid ground water from one geological/geographic circumstance (alluvial fan at the toe of a Basin-and-Range montane copper mine) to one that is a basin-bottom, terminal basin, incapable of flushing itself, must not be allowed. There are better, feasible choices.

- It is obvious that **selenium is necessary for nearly all** life at levels varying from not-more-than an almost undetectable trace for algae and other simple plant life (J. Vymazal, *Algae and Element Cycling in Wetlands*, section 5.13.2 "Selenium in Algal Nutrition," pp.356-7) to relatively significant benefits for selenium as an anti-oxidant in human diets. In between, it is increasingly clear that aquatic selenium is disastrous for birds and fish in excess of two parts per billion (ppb), and possibly less. The Clean Water Act limit of 5 ppb is not sufficiently protective of wildlife, most biologists now contend. The USFWS Salt Lake Field Office argues, in fact, for Jordan River selenium limits not in excess of that level (2 ppb) for total Se in the Jordan, and limits on each separate UPDES discharge permit to maintain that cap (see attached copy, USFWS 8-15-03 letter commenting on UPDES discharge permit UT0025551 by Jordan Valley Water Conservancy District to the Jordan River). Others have argued for limits as low as 0.5 ppb in aquatic environments. Certainly, the Kesterson Marsh experience of teratogenic (embryo deforming) effects of selenium in an irrigation return reservoir have so horrified the community of biologists, ornithologists, agricultural managers and those of the general public who possess basic compassion with wildlife that there is growing resolve to identify, for each waterbody/ecosystem nexus, the appropriate numerical limits for each selenium compound that may occur (see T. Harris, *Death in the Marsh*). The most recent, major works by Lemly and others (A. D. Lemly, *Selenium Assessment and Aquatic Ecosystems: A Guide for Hazard Evaluation and Water Quality Criteria*, Springer-Verlag, 2002) are not available to us, but we will endeavor to digest their implications for this complex set of selenium concerns. We can

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only assume that there is extensive discussion of these concerns in ecological and biological technical journals, but we can't justify holding up these comments pending a literature search.

None --- literally none --- of that work has made its way into public policy applied to the Great Salt Lake under the current administration, despite the coincidence of this administration with the advent of a preponderance of evidence that action is warranted. Only the Clean Water Act constraints of 5 ppb have been applied to the Jordan River. We seriously doubt that this constitutes responsible public policy, and sincerely beg resolute attention to this precise set of questions at the highest level of watershed science. It is one of the most urgent of several primary needs that *demand* numerical water quality designation for the Great Salt Lake, as quickly as can be done with scientific thoroughness, a collective act that simply must precede any decision to allow further discharge of selenium and most other metals into the Great Salt Lake. In fact, the North End discharge should be halted, as much for the reason that there are other reasonable, technologically feasible choices that can avoid this measure, with few downsides and affording greatly reduced ecological uncertainty, compared to this hyperbolically ill-advised settlement proposal.

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Despite the recent nature of scientific inquiry, Selenium sources are no surprise, nor should the discovery that one of the worst is on our doorstep be in any way startling. Tom Harris, in *Death in the Marsh*, warned that Kennecott may be a major selenium source but could not investigate it because of high Great Salt Lake water levels in the mid-'80s when he was making his informal survey of sources in Western states. Sources have long been identified in scientific and industrial literature (e.g., Ihnat, *Occurrence and Distribution of Selenium*; Rosenfeld and Beath (U. of Wyoming), *Selenium;* Zingaro and Cooper, *Selenium;* Bay Institute of San Francisco Selenium Symposium Series; several Electric Power Research Institute (EPRI) studies) alerting us that the Great Salt Lake watershed may not be exempt from selenium

effects from several potential sources:

- **Copper mining, smelting and refinining** of pyrite-rich ores constitute a long-recognized major source of selenium, as a geological inevitability. Selenium occurs with sulfur in trace proportions of Se in proportion to S. Two major sources occur in copper 'beneficiation,' one at near the process end and the other at the beginning. After smelting, copper purification to >99% pure copper is done by an electrolytic process that drops out most impurities. The copper refinery electrolyte sludges, containing gold, silver, selenium, and often vanadium, tellurium and other trace metals, are refined to leave selenium as one of the last metals to be removed or disposed. At the beginning of the mining process, sulfuric acid leach water from pyrite oxidation and intentional sulfuric acid application to dissolve available waste rock metals into surface- and ground-water contaminated with a catalog of metals, as represented in the extreme in the 'Zone A' acid/metals plume. This can also be done by design, as is proposed at the Lisbon Valley mine south of Moab. In the Kennecott case, refining electrolytes is the primary source of selenium at the "North End" contaminated ground water zone, which is presently being pumped at massive rates directly into the Great Salt Lake. Kennecott is currently discharging an estimated 8,000-10,000 gpm of diluted water from the Garfield Wells, north of the Refinery, in order to eliminate a source of liability. This discharge is being pumped and diluted to approximately one part per million (ppm) selenium, not to exceed the permit limit of 54 ppm after the 'mixing zone,' directly into the Great Salt Lake, under a UPDES discharge permit, thus contributing from the North End to the growing total selenium load in the Great Salt Lake. It is worth noting, here, that the ecological limit established by the **Clean Water Act is five parts per billion (5 ppb), ten thousand times less than is allowed to be discharged into the Great Salt Lake by the State DWQ permit (54 ppm).**

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The South End natural resource damage claim settlement deals overtly with the consequences of fugitive leach water from pyretic waste rock. Beginning in 1903 or so, Kennecott pulverized billions

Response to E-mail No. 03-10 (attached letter, cont.)

10-27:

Current waste rock dumping:

As meteoric water passes through the waste rock piles, oxidation of the rock will occur. However, a single pass through the waste rock pile is insufficient to generate significantly contaminated water. The contaminated leach water, which leaked from the reservoirs, resulted from many successive passes through the waste rock piles, i.e. the water was continuously re-circulated thereby concentrating the contaminants. Initially, Kennecott even found this insufficient for copper extraction and added sulfuric acid to the leach water.

Previous leaching contamination:

Continued contamination from past leaching practices on the waste rock piles is handled in several ways. 1) Active leaching, i.e. re-circulating water collected from the dumps, was terminated in 2000, however sufficient residue exists in the waste rock piles to generate contaminated water for a very long time. 2) The waste rock piles are permitted under the State's groundwater program. The permit has two separate series of wells for detection of contamination. If the wells detect contamination above permit limits, Kennecott is required to follow a series of mitigating steps ultimately leading to a contaminant investigation and corrective action plan. Dry Fork, Saints Rest and Keystone are areas currently under going corrective action under permit requirements. 3) Meteoric water from the waste rock piles is collected and routed to the process circuit for neutralization. 4) Also, as part of the mine closure plan, up gradient, uncontaminated water is intercepted prior to contacting contaminated areas, thereby minimizing the amount of contaminated water. Contouring and re-vegetation as part of the reclamation plan will be done to minimize infiltration into the dumps and collect otherwise uncontaminated water.

E-mail No. 03-10 (attached letter, cont.)

of tons of pyrite-bearing waste rock and allowed it to be exposed to air and moisture, creating conditions for pyrite to break down and form an extremely efficient metals solvent, sulfuric acid, in prodigious quantities. That the scale of ground water contamination from sulfuric acid is so huge should surprise no one who has seen the 2.5 mile-wide, 1,500 feet-deep pit. Neither should there be denial of the world-beating scale of this phenomenon, at the foot of the world's largest and oldest waste rock piles produced from pyrite-laden ores of copper, lead, zinc, silver, gold and molybdenum. You can't say that it is one of the largest metals producers without acknowledging that it is also one of the world's largest metals polluters. The roughly 15,000,000 tons of copper produced in Kennecott's century (Kennecott Visitors' Center video, "Kennecott Utah Copper's Bingham Canyon Mine") has also produced at least a quart of contaminated ground water for each pound of copper. This happened historically, mostly (but not entirely) between 1965 and about 1988 due to poorly managed leach water leakage from the Large Bingham Reservoir (one million gallons to seven million gallons per day of leakage of pH <3.0 waters saturated with metals and salts into ground water) prior to remediation and reservoir lining. This leakage produced the present 'Zone A' acid/metals plume, with some help from other drainages, such as Midas to the south. It is possible, however, that current waste rock dumping in Bingham Canyon and Dry Fork Canyon could become a future source of ground water contamination, with contributions from Barney's Canyon dumps into the Dry Fork Canyon area.

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- To say that 'we now know better' than to inflict this pollution on the environment is to suppose that we will choose to do so. **The present settlement presents evidence to the contrary.** True, we now collectively know how to use available technologies to prevent most of mining's pollution to water. Recent melding of technology, engineering, economics and political will COULD conspire to mine an ore body sustainably, in theory. For this to happen, the mining company must *want* to integrate technology, engineering, economics and political will --- inspired by ecological

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ethics --- into preventive, corrective and restorative action, or nothing will be done. The settlement goes only a small portion of the way there, the easy, obvious part, leaving the crux of sustainability to future generations.

- Considering the magnitude of this ground water pollution act by Kennecott, and the perilous nature of potential impacts on the Great Salt Lake and its watershed, it is both fitting and just that higher expectations be enforced on behalf of the surrounding environment, instead of this compounding of the problem represented by the settlement proposal.
- From memory, we list the following approximations of chemical constituents and properties of the acid/metals plume water:
  - Aluminum > 2,000 ppm
  - Iron > 600 ppm
  - Copper > 100 ppm
  - Manganese ~ 300 – 400 ppm
  - Zinc > 120 ppm
  - Magnesium > 4,000 ppm
  - Cadmium – approaching 1 ppm
  - Lead – also approaching 1 ppm
  - Selenium > 10 ppm
  - Sulfate > 30,000 ppm
  - pH ~ 3.4 to 3.6
    - Mineral acidity more than 90% made up of dissolved aluminum, dwarfing pH as primary acidity

(These numbers are at some variance with those presented in the settlement documents, but they can probably be verified by review of TRC meeting note, presentations and discussions.)

Should the South End metals be allowed to be discharged to the Great Salt Lake, either directly (via the same 'outfall' as that from North End selenium ground water contamination) or indirectly (through the tailings impoundments and their eventual leakage or catastrophic degradation), **the cumulative effects of these conjoined discharges are not even remotely addressed in such a way that it would justify further metals and selenium releases from South End sources of such enormous magnitude,**

10-24

10-24 **especially when technological choices exist to avoid it all in the first place.**

Other selenium sources may be regionally significant but less direct in their effects on the GSL:

- Irrigation return flows from Jurassic and Cretaceous soils that are sometimes rich in selenium. This was the genesis of the Kesterson Marsh catastrophe, resulting in deformed and dead bird embryos, discovered in the 1980s (Tom Harris, *Death in the Marsh*, 1991), as well as the northeastern Utah occurrence at Stewart Lake, where Harris reported the highest selenium measurements known in living tissue at the time, in catfish.
- Phosphate refining for fertilizer, as is done from Phosphoria Formation rock throughout the West (e.g., Uinta Basin). The Phosphoria Formation, often hundreds or thousands of feet thick, is also a natural selenium source into surface and ground waters, as is suspected in Spanish Fork Canyon in the Lower Provo River, where the formation outcrops.

10-28

- Coal mining and coal combustion, especially in power plants and major industrial facilities. For many years, EPRI has addressed this problem on behalf of member utilities in cooling water circulation systems and in power plant releases to rivers and lakes, without resolution. Airborne releases of selenium on a wide geographic scale are substantially unevaluated, despite awareness of immense total quantities of particulate selenium released by this mechanism. Ecological consequences to forests, crops and aquatic systems and ecosystems are similarly unknown.
- Oil extraction, gas extraction, coal bed methane extraction (esp. surface water discharges), and oil refining are, with near certainty, major selenium sources, since there is a range of consistent

10-28: See the Response to Common Comment No 9.

10-28

association between sulfur and its surrogate, selenium. Tar sands and oil shale, were they to be developed, would pose extreme problems of isolating water-borne selenium discharges from surrounding water bodies for this essential reason.

- Pulp and paper production, generally not an activity in our region, is an ongoing selenium source in the American southeast and northwest, as well as in Canada and elsewhere in the world.

- Selenium is very reactive, cycling readily from oxidized to reduced or to elemental form, or oxidizing from reduced to 'higher' oxidation states. The dynamics of the Great Salt Lake may be the worst-case scenario for supposed 'safe' discharge of selenium. No adequate study has been done of the fate and consequences of this aspect of the proposed settlement. This, alone, constitutes a 'deal-breaker.'

10-29

- Selenium may cause 'synergistic' impacts with other elements and compounds. Vanadium, particularly, appears in scientific literature as an element possibly causing such synergistic effects. "Sentinels" are telling us, according to current USFWS work on the Great Salt Lake, that the ecosystem is vulnerable to further cumulative effects (see USFWS 8-15-03 comment letter on the JVWCD UPDES permit UT0025551 to the Jordan River). Unless the Trustee is completely certain that cumulative *and* synergistic effects are categorically impossible, this settlement proposal must be rejected on the face of the matter. The Great Salt Lake ecosystem, including the Jordan River, are far too unique and ecologically important to jeopardize for corporate expediency.

10-30

5. **Zone A acid/metals plume metals removal at point of extraction has been suppressed without cause and ignored.** The Record of Decision (Dec. 2000) *required* metals removal from acid/metals plume extraction

Response to E-mail No. 03-10 (attached letter, cont.)

10-29: See the Response to Common Comment No. 9.

Additional study of synergistic effects may be warranted. However, the form of selenium present in the Kennecott contaminated water is selenate. Studies have documented that sulfate has an antagonistic relationship with the bioavailability of selenate. This means that in the presence of elevated sulfate concentrations, like those that are present in the RO concentrate streams and acid plume water, the selenate that is present is not as available which lowers the overall toxicity of the selenium.

10-30: See the Response to Common Comment No. 5.

The document to which the commenter refers is the "Explanation of Significant Differences" which is a required CERCLA document when treatability studies conducted in the course of Remedial Design suggests a different treatment alternative might reduce costs or increase effectiveness. The document compares the original Record of Decision (2000) and the final Remedial Design (2002) and explains what the differences are between the two remedies under CERCLA and why the new approach is better than the old. The document was authored by EPA Region VIII and signed by both the EPA and DEQ in the summer of 2003. The statement that metals removal takes place in the tailings line is amply supported in several studies overseen and reviewed by the TRC.

E-mail No. 03-10 (attached letter, cont.)

flows by nanofiltration, but the settlement proposal brushes this aside, apparently based on the fraudulent claim of metals "removal" in the tailings line. Here is a direct transcription of the line item from the ROD/Settlement comparison and notes of differences obtained from DEQ files (from p.2, entire document attached to these comments, 4pp long; origin or exact date is unknown, but it appears to have been an appendix to the settlement proposal submittal to the Trustee):

"Remedy in Record of Decision - Pretreatment of acid water using nanofiltration
Remedy in Design Phase - Acid water sent directly to tailings line without pretreatment. **Neutralization and metals removal takes place in the tailings line.** **Neutralization by tailing can be augmented with lime if needed.**
Differences - Nanofiltration step eliminated in final design"

10-30

There is no way to dignify this facile claim that "…metals removal takes place in the tailings line." We must call it what it is: Fraudulent, 'junk' science, deceiving and possibly dishonest. This isn't a magic-show 'black box' with applicable spells from Hogwarts. **Metals don't just 'get removed'** without scientifically described process intervention of credible natural phenomena. Nothing of the sort happens in this large but simple gravity pipeline. What is sometimes called the "law of conservation of matter" reminds us that if we put metals into the top end of a closed pipe (the tailings line is gravity fed), then the metals will come out at the bottom relatively unchanged. They may be transformed into different metals compounds as a result of reactions that take place in the pipe --- precipitation resulting from partial neutralization, which is being claimed --- and they will be very thoroughly 'hammered' by the extreme violence of falling about 1,200 feet in a 50,000 gpm flow of >30% tailings solids, but they *will* come out at the bottom, nonetheless, with the only exception being those that bind to 'scale' on the insides of the pipe or other parts of the closed vessel along the way.

10-31

The true difference between the ROD's recommended nanofiltration 'pretreatment' to remove toxic metals, on the one

10-31: See the Response to Common Comment No. 5.

The issue was considered in the context of comparing the concentrations of metals in tailings from mining operations with the metals in the waste from the groundwater treatment. If the differences had been significant, this would have triggered an investigation by the Risk Assessment Task Force. The increases in metals from the addition of the acid plume waters were assessed to be minor.

hand, and mass dumping of the acid/metals-laden water "directly to tailings line without pretreatment," on the other, is the metals. They would be removed by nanofiltration and not be put into the pipe (as long as concentrates aren't put into the pipe!); without nanofiltration, they go into the pipe and into the environment at the bottom end. We are willing to recognize that some degree of neutralization will occur, but 'neutralization' is not the core issue at stake here. ***The long-term metals impacts on disposal-area ecosystems and public health are the collective, critical point.*** Metals could be removed by any of, or a combination of, several technologies (see next Sierra Club comment item "6. Metals removal technology alternatives…").

10-31 This provision of the settlement proposal, to 'remove metals by putting them into a pipe,' is no better than smoke and mirrors. We must not allow ourselves to be deceived into thinking that there are no other issues than 'neutralization' nor choices other than simple discharge. If treated by nanofiltration or other membrane filtration technology, permeate (the purified fraction of water flow) could be reclaimed, affording even more culinary water than the settlement proposes. Concentrate (all the contaminants loaded into a slurry) disposal is a burden, to be sure, *but it is so because of past management choices and mistakes* that allowed extremely acidic/metals-saturated leach water to escape over more than half a century, and is therefore an obligation that cannot merely be discharged into handy ecosystems for corporate expediency.

Not on our watch.

10-32 It is possible, moreover, for truly 'sustainable solutions' (see Sierra Club comment 10, below) to be applied in order to dramatically reduce ecological and other environmental impacts, and to dramatically compensate for treatment costs by accrual of revenues from sale of byproducts commodities. These commodities may be substances recovered from concentrates and from selective precipitates from other, non-membrane purification processes, and even materials made from the tailings, themselves, IF they are not made excessively toxic by

10-32: The commenter appears to be concerned that the Technical Review Committee did not investigate the ecological impacts this project may have on the Great Salt Lake. The table included in Response to Common Comment No. 1 provides an understanding of when ecological concerns were discussed during the TRC meetings. Resource recovery of the metals in the plume water in Zone A has and was investigated early on during the remedial design phase of the CERCLA process. This remedial alternative was not selected. See the Response to Common Comment No. 5 for a further understanding of how the acid plume is being addressed.

The commenter lists the screening criteria for selecting a particular remedial option. Please keep in mind that these criteria are for remedies investigated under CERCLA. However, in this particular case similar criterion were used by the TRC in its review and recommendation to the State Trustee concerning the Joint Proposal for a ground water treatment project. The commenter implies that both ecological concerns and community acceptance were not considered as criteria to assess the proposed treatment option. As has been noted before, both EPA and DEQ are aware that ecological studies on the potential impacts from discharges to the Great Salt Lake were performed and reviewed by the TRC at various times. Please refer to Response to Common Comment No. 9 for a listing of some of these studies.

DEQ notes that it was never intended that the public would be left out, however it was intended that a remedial choice would be presented to the public for their opinion. The EPA and DEQ felt it was prudent to narrow the field for remedy selection to the best technology screened by the criteria listed for CERCLA projects, under the National Contingency Plan (NCP).

metals transport.

Omission and/or avoidance of ecological values: We do not have available all the TRC meeting notes over the years, but one, in 1998, is very telling. In these notes from the January 21, 1998, TRC meeting, the major agenda item was the review and screening of 'general response actions,' including remedial technologies, as they appeared at the time. The 'general response action' alternatives included:

- "No Further Action (except source control and monitoring)
- Institutional Controls
- Point-of-Use Management
- Containment
- In-situ Treatment
- Collection/Treatment/Delivery"

The 'screening' process imposed criteria, as follows (quoting from TRC notes):

10-32

- "Threshold Criteria:
  - ✓ Overall protection of human health and the environment
  - ✓ Compliance with potential ARARs [applicable, relevant and appropriate requirements]
- Balancing Criteria:
  - ✓ Long-term effectiveness and permanence
  - ✓ Reduction in toxicity, mobility or volume through treatment
  - ✓ Short-term effectiveness
  - ✓ Implementability
  - ✓ Cost
- Modifying Criteria:
  - ✓ State acceptance
  - ✓ Community acceptance"

Notes on the 'modifying criteria' indicate that:

- ✓ "The UDEQ has been and currently is involved in each step of the RI/FS process for this site.
  Although this criterion will be addressed after the Proposed Plan is released, the TRC has provided community input throughout the development of the RI report and FS discussion

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document."

Italicized/bold emphasis added by Sierra Club to call attention to the apparent intent of Trustee, EPA and Kennecott to defer 'community acceptance' process until period after announcement of settlement proposal.

Six 'remedial technologies' were screened against these criteria:
I. "No Further Action
II. Institutional Controls
III. Point-of-Use Management
IV. Hydrologic Containment, RO Treatment, Delayed Acid Plume Extraction and Delivery [with permeate to one of four 'delivery options', one of which is 'Directly to the Great Salt Lake']
V. Hydraulic Containment, RO Treatment, Active Extraction of Acid Plume and Delivery [with same four 'delivery options']
VI. Hydraulic Containment, RO Treatment, Active Pumping of the Acid Plume and Lime Treatment" [with lime addition taking place such that, "Sludge generated from lime treatment would be placed in a newly created, lined repository, and Permeate from the lime treatment plant could potentially be sent to RO plant for polishing and ultimate municipal use"]

The last page of the Powerpoint-generated notes is transliterated to MS Word exactly, as follows:

10-32

10-33: See Response to Common Comment No. 5 for an understanding of the statutory authority that the remediation of the acidic, metals plume in Zone A (acid plume) is being addressed.

Metals removal alternatives were evaluated in a pilot testing program. Updates on the progress of this strategy were a routine part of TRC meetings. When during the final design phase of the project this strategy did not produce any economic benefits or any environmental benefits, it was dropped due to high cost, difficulties in maintenance, and production of few, if any, environmental benefits. Only a small amount of water was produced and it was at high cost. In addition, the technology would have produced an additional waste stream requiring disposal. Selective precipitation, which did show promise in the beginning, was dropped from the selected remedy under the CERCLA action failing the cost-effectiveness criteria required by the National Contingency Plan (NCP). Very serious consideration was given to this approach.

"Comparison of Alternatives
Relative Comparisons of Advantages and Disadvantages of the Options

• In general, protectiveness of human health and the environment increases from Alternative I to VI.
• In general, ARAR compliance increases with increased remedial action (Alternatives I through III do not comply).
• Of the six options, Alternative I does not provide long-term effectiveness and permanence.
• Alternatives IV through VI provide better long-term effectiveness and permanence by reliable controls
• Alternatives I through III provide little or no reduction in TMV. [toxicity, mobility or volume]
• Alternatives V and VI provide the greatest reduction in TMV, but VI generates large amounts of sludge.
• Alternatives IV through VI permanently reduce TMV by extraction of contaminant mass.
• Costs increase as a function of the degree of action taken at the site (generally increasing from Alternative I through VI)."

10-32

[*For the table to be included the original was reformatted to fit into CRS]

This sequence of quotations from the January, 1998 TRC meeting presentation is useful here to show the state of the implied settlement proposal at that time. Whether nanofiltration was 'in' or 'out' of the proposal, the primary alternative was metals removal *before* any plume disposal in the tailings pipeline, creating the problem of great amounts of sludge (from lime treatment, in this case, but it could be nanofiltration concentrate sludges, as well). There was, therefore, intent to remove metals near the point of origin, though there was mention of possible filtration concentrates disposal directly into the Great Salt Lake. 'Community acceptance,' as noted above, was anticipated to happen after the settlement proposal was announced --- i.e., it hasn't happened yet, as of January, 1998, and the TRC isn't to be understood as representing that public process. Costs were predicated in the TRC presentation to increase linearly through the six alternatives, with no consideration of modifying factors, such as potential revenue from resource recovery byproducts (we discuss these

10-34: See the Response to Common Comment No. 4 and No. 5.

With regard to remediation technologies for the Zone A contamination, Kennecott evaluated over 40 different remediation technologies, combinations of technologies and alternatives. Evaluation of these technologies was presented in the Feasibility Study for Kennecott Utah Copper South Facilities Groundwater Plume, March 16, 1998 – Version B. The following treatment strategies were specifically investigated and were considered by Kennecott to address both its CERCLA and NRD requirements.

Selective precipitation ("liquid mining") for the recovery of alumina was evaluated as one of the technologies. Although this technology has the potential to remove alumina as a saleable product, the technology is far from being ready to implement at a full scale. In addition, the selective precipitation leaves the other contaminants behind that still require additional treatment.

Nanofiltration was studied for a number of years at a pilot scale.

The decision to neutralize acidic groundwater in the tailings line is based on years of studies documented in Appendix A of the South Facilities Remedial Design. Kennecott also has tested this technology for a short period of time at full scale to demonstrate the scientific, technical and economic viability of this process Fundamentally, acidic water must be neutralized before it can be reused or discharged. Employing nanofiltration does not solve this problem. Nanofiltration simply concentrates the acidic water in a concentrate stream that still requires the same neutralization capacity as the unconcentrated volume of acid water extracted from the ground. Through full scale testing, Kennecott was able to demonstrate that the acid plume water was neutralized in the tailings line, the contaminants were precipitated out of the water, the contaminants were deposited in solid form into the tailings impoundment and the water was clean enough to reuse in Kennecott's milling process or discharge under Kennecott's discharge permits.

under our last point, "10. Environmental Accounting and Sustainable Solutions," below).

10-32 In only one instance in the entire TRC meeting is there mention of the word, 'ecology' or a derivative of that term, that one instance being in reference to the Jordan River. At no time is there reference to any concerns about the ecology of the Great Salt Lake, which happens to be by far the most significant ecological phenomenon in our region. We submit this to be an effect of lack of numerical water quality standards, compounded by a societal and governmental lack of biological ethics.

The settlement snatches defeat from the jaws of victory, in ecological terms. A job that was in the process of being relatively well done, tempered by an ongoing lack of ecological consciousness, as late as 1996-97, was turned into a tragedy of the largest proportions imaginable for the region's dominant ecological feature and one of the region's most conspicuous public trusts (with air quality and drinking water). This has to be placed in a position of dubious honor alongside MagCorp/US Magnesium's dioxin production (with which there may be synergies in the Great Salt Lake) for sheer environmental destructiveness.

10-33 6. **Metals removal technology alternatives have been suppressed and ignored in the settlement, but are feasible, especially used in strategic combinations.** Kennecott knows intimately, and has developed at least to large pilot applications, treatment technology alternatives that are not only technically effective, but are also economically feasible by virtue of *selective precipitation* or *selective recovery* of metals plume chemical constituents. The acid/metals plume can be viewed as a liquid mine. As reported in years of TRC meetings and in reports to EPA Region VIII and 10-34 to the Trustee, Kennecott has done extensive work in evaluating **biosufide** and **filtration** (ultra-, nano- and reverse osmosis filtration) as **selective precipitation** technologies. At some historical point we have been able to reach only by deconstruction, Kennecott abandoned nanofiltration and biosulfide treatment technologies hastily and without adequate cause (ref. summary of differences between the Dec. 2000 ROD and the

10-34: (cont.) By neutralizing the acid plume water in the tailings circuit and by adding the Zone A RO concentrate, the contaminated water is being put to a beneficial use, as it is recycled from the tailings impoundment into the milling process to produce copper from the Bingham Canyon Mine. The precipitated contaminants are deposited in the tailings impoundment at a ratio of 100 parts tailings to 2 parts contaminants (which is mainly gypsum or calcium sulfate). As noted in the Explanation of Significant Difference (ESD) document signed by EPA and the Utah Department of Environmental Quality in 2003, nanofiltration was removed from the Zone A selected remedy under the CERCLA authority. Originally it was proposed by Kennecott to use the extracted acid core water as a source of water to be treated and supplied to the public in the Affected Area. The produced water would allow Kennecott to meet their water production requirements for a reduction of the letter of credit, as prescribed by the Consent Decree. However, this treatment alternative did not produce any economic benefits or any environmental benefits (as described above).

Kennecott ultimately determined that a higher extraction of sulfate water from the Zone A plume could provide a sufficient stream of water to meet the Consent Decree production requirement. However, extractions of acid core water were still required under the Consent Decree (for containment) so Kennecott proposed that the acid core water extractions would continue as proposed to prevent the further migration of the plume in Zone A. The extracted acid core water is proposed for disposal in the North Expansion Impoundment via the Kennecott Tailings Pipeline, after neutralization in the tailings pipeline. The geochemical studies demonstrating the neutralization potential of the tailings material, the impact to the aquifer from the proposed higher extractions, the feasibility study to treat the sulfate water stream to produce treated municipal quality water, and other studies were presented to the TRC between 1999 and 2003. The TRC assessed this approach by Kennecott and agreed that it was appropriate. EPA revised the selected remedy and memorialized the change in the referenced ESD document.

Settlement, obtained from UDEQ files). If the obligations and responsibilities imposed by Kennecott mal-management as the contamination's source are to be honored by a supposed corporate 'good citizen,' then metals removal for highest-and-best use should be a paramount consideration. The December, 2000 Record of Decision (see Sierra Club comment 5, above) stipulated that nanofiltration would be used to remove metals and excess salts, a measure that we would probably find acceptable, depending on verification and monitoring to accompany this technology, and eventual disposition of the removed concentrates (i.e., NOT into the Great Salt Lake or the tailings impoundments, thence eventually into the GSL). Pilot work at Kennecott proved the efficiency of nanofiltration in this particular application, specifically to acid/metals ground water flows. That's how nanofiltration came to be the technology of choice at the point of the ROD's announcement. It is dismaying in the extreme to see that organizational politics and a frankly disreputable drive to improve the bottom line at the expense of the Great Salt Lake and the public trust has been exercised here, with apparent support from UDEQ and EPA.

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7. The tailings impoundments are inadequate as toxic metals repositories, especially considering pass-through hydrology, Lake level changes, and potential for geological hazards occurrences. The tailings impoundments are not RCRA-qualified repositories in any sense. But the metals proposed to be relocated there warrant the application of RCRA repository criteria for permanent isolation from the environment. Neither the old, Magna Tailings Impoundment nor the North Tailings Impoundment are lined. In fact, they operate by promoting water to pass through the fine sand materials that make up the dikes (made entirely of tailings), to be collected in a similarly-unlined, perimeter canal (C7 Ditch) for collection and recirculation into the Copperton Concentrator process line, or for discharge to the Great Salt Lake.

10-36

10-37

- **GSL Hydrological Unpredictability:** Counting on the North Tailings Impoundment for reliable, long-term isolation of toxic metals contaminants from the Great Salt Lake is unnecessarily

Response to E-mail No. 03-10 (attached letter, cont.)

10-35: See the Response to Common Comment No. 7 and No. 13.

More specifically, the DEQ has permitting authority over the operation of the North Expansion Impoundment (proposed receiving facility of treatment concentrates). The concern of pass-through hydrology has been assessed by the DWQ under the State's Ground Water Protection Program. There are monitoring and compliance requirements under Kennecott ground water protection permit, which are aimed at preventing offsite migration of contaminants. The chemistry of the deposited materials is such that as long as the impoundment remains at a neutral pH (6.5-7.0) the metals that are bound within the impounded substrates will remain stable and not available to the environment. Control of acidity in the tailings slurry begins at the Copperton Concentrator and is monitored along the tailings pipeline both as a requirement of the State's ground water protection permit for the pipeline and the CERCLA authority.

The term "toxic" is not applicable as the concentrate has been repeatedly tested and does not exhibit any hazardous characteristics.

The issue of stability of the tailings pond was thoroughly examined in the course of the Environmental Impact Studies conducted by Kennecott as a part of the Clean Water Act 404 process. Both proximity to the Lake and seismic stability were considered in that process.

10-36: See the Response to Common Comment No. 5.

For further information, the decision to neutralize acidic groundwater in the tailings line is based on years of studies. The commenter is referred to *Final Design for Remedial Action at South Facilities Groundwater*, available at the DEQ website. Specifically, review Appendices A and C which address the concern regarding deposition of metals in the tailings impoundment. Leachability studies demonstrate that lime sludges generated by treatment of Zone A acid groundwater readily pass Toxicity Characteristic Leaching Protocol (TCLP), and thus by definition do not require disposal in a RCRA-type repository.

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risky, in the face of regional hydrological unpredictability, especially to extreme Lake level fluctuations. As stated by Atwood and Mabey ('Flooding Hazards Associated with Great Salt Lake,' Genevieve Atwood and Don R. Mabey, in *Environmental and Engineering Geology of the Wasatch Front Region,* Utah Geological Association Publication 24, 1995, W.R. Lund, ed.; page 483), "Twice in historical time Great Salt Lake has risen to an elevation of 4,212 feet above sea level. The second rise occurred in the 1980s and cost industry and government over $300 million. Rises to even higher levels should be considered in the design of structures on the lake bed. Wind setup and wave runup associated with sustained high-velocity winds cause flooding up to several feet above the static lake level. This super-elevation of the flooding level varies by several feet around the lake shore. The magnitude of the setup and runup is determined by wind velocity, fetch, lake depth, shoreline exposure, lake bed slope, and the configuration of the beach or constructed shoreline feature such as a dike or causeway." It is flatly irresponsible to ignore the long term potential of iterative physical attacks on the tailings impoundments, as well as the potential inherent in these episodes for metals mixing with Great Salt Lake waters and sediments.

10-37

- **Low-water hydrology** also appears to be off the 'radar screen' in the settlement, not considered at all. The settlement's assumptions seem to be based on studies of the tailings impoundment vicinity done during the sustained mid-1980s-early 1990s high-water episode, in the course of application for the tailings expansion that became the North Tailings Impoundment (~3.5 square miles of the total 12.5 sq.mi. impoundment area). With the Great Salt Lake's level low and falling due to several years of drought, hydraulic 'head' must necessarily have altered the hydrological gradient. Lake margin soils consist of a complex interlayering of sands, gravels and clays, with few of these layers capable of resisting hydraulic flow even slightly, much less to meet the impermeability expectations we'd have of a 'liner' system. Indeed, these soils present preferred pathways to horizontal migration in more cases than not. Given the porosity of the North Tailings Impoundment

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Response to E-mail No. 03-10 (attached letter, cont.)

10-36: (cont.) Through full scale testing, Kennecott has demonstrated that the acid plume water can be neutralized in the tailings line (either from excess neutralization potential in the tailings or through addition of lime), metals are precipitated out of the water and deposited in solid form in the tailings impoundment, and the decant water is clean enough to reuse in Kennecott's milling process or discharge to Great Salt Lake under Kennecott's discharge permits. This information has often been brought to the TRC membership for their evaluation.

10-37: Prior to State Engineer approval in the mid-1990's for the construction of the North Tailings Impoundment, numerous studies were conducted addressing site, geotechnical, engineering and environmental considerations. These studies included assessing the impacts of flooding and wave run-up on the North Tailings Impoundment such that the design of the embankment incorporates these concerns. This information is included in the final environmental impact statement document which was submitted to the U.S. Army Corps. Of Engineers to address some 404 permit requirements for the north expansion impoundment (Final EIS, Dec. 22, 1995).

10-38: The tailings impoundment is underlain by a 9 to 15 foot thick layer of Bonneville Clay that effectively limits vertical movement of impoundment solutions, acting as a liner. In addition, the alkaline treatment of acidic waters and treatment concentrates in the tailings pipeline converts dissolved metals into stable precipitates before entering the impoundment. A Groundwater Discharge Permit issued by the Utah Division of Water Quality for the tailings impoundment requires intense monitoring of operational flows and ground water in the vicinity of the impoundment ensuring no environmental degradation.

Kennecott has performed studies on the wastes to be discharged in the tailings impoundment and submitted them to the TRC including EPA and the State of Utah. The studies show that the RO concentrate, acid plume water and resulting neutralized precipitates (which were analyzed in a State certified laboratory) do not exhibit any hazardous characteristics. Furthermore, when the wastes are combined with tailings, they represent less than two percent of the total volume of material placed in the tailings

E-mail No. 03-10 (attached letter, cont.)

dike and canal, there is literally nothing in the way of migration of metals from the impoundments into the Great Salt Lake at low Lake water levels, even without exacerbation of the problem by geological disaster. *Hydrological models of the tailings impoundment vicinity were done during GSL high-water years*, finding to no one's retrospective surprise that hydraulic gradients were generally upward (artesian), and only insignificantly vectored toward the Lake. Now that the GSL level is quite low and falling, **we do not know that this is still true**, nor that it will be true in future, "geological timeframe" low-water episodes. It is common-sense engineering wisdom that hydraulic 'head' has changed by as much as ten or twelve feet since the Tailings Expansion Project EIS was done, a change probably conducive to communication of contaminants from the unlined tailings impoundments and the unlined collection ditch system (C7 Ditch) to the Great Salt Lake. What if the Lake drops ten or fifteen more feet? 'Snapshot' environmental decision making doesn't work around the shores of our extremely dynamic terminal basin. These analyses need, first, to ***understand*** how the Lake and its ecosystem work over both short and long terms; second, to ***respect*** ecosystem functions and values; and third, to ***engineer within ecosystem constraints.*** 'Snapshot' engineering isn't good enough when the Great Salt Lake's miraculous ecosystem is at stake. The long term here means centuries, certainly, and millennia, appropriately.

10-38

- **Seismic instability has not been considered, but evidence suggests should be emphasized in this evaluation.** We are overdue for an earthquake in the Richter 7.0 to 7.2 range, which UGS and USGS literature says can produce great instability in Lake sediments, as well as significant 'seiche' tidal wave events due to Lake shallowness and significant tectonic ground displacement. Liquefaction, structural displacement, resonant amplification effects like those observed in Mexico City's similar circumstances, and "seiches" (earthquake-generated lake waves) all offer opportunity, over geological timeframes, to degrade or destroy impoundment dike structures and to mix whatever is put into the tailings impoundments into the Great Salt Lake.

10-39

Response to E-mail No. 03-10 (attached letter, cont.)

10-38: (cont.) impoundment. As documented in Appendix A of the Kennecott South Facilities Remedial Design, the following supports storage of these wastes at the tailings impoundment:

- The tailings are underlain by several feet of low permeability clay that essentially acts as a liner (see Final EIS, Dec. 22, 1995)
- The groundwater gradient beneath the tailings impoundment is upward, indicating that contamination from the tailings impoundment would not migrate into the aquifer even if it could penetrate the layer of clay beneath the impoundment.
- The tailings impoundment is located over an aquifer that is too salty for use as a drinking water aquifer making it a less sensitive area.
- The tailings impoundment is covered under State and Federal air, surface water, groundwater and reclamation permits that require various long term monitoring.

10-39: Significant seismic analyses of the tailings impoundment site and method of construction were completed as part of a final environmental impact statement (Final EIS, Dec. 22, 1995) conducted for the tailings north expansion project completed in 1995. The development of the tailings dam employs the use of cycloned sand tailings using a modified centerline method of construction. The combination of using cycloned sand tailings placed and compacted as an engineered fill in conjunction with an underdrain system provides for a structure that is stable and safe under the design earthquake conditions, the Maximum Credible Earthquake. State statutes define the Maximum Credible Earthquake as "the most severe earthquake that is believed to be possible at the site on the basis of geological and seismological evidence."

E-mail No. 03-10 (attached letter, cont.)

8. **Air quality degradation from metals-toxified tailings impoundment dust** appears inevitable, but has been inadequately considered and inaccurately characterized by ignoring metals 'fate' and physical behavior in the tailings line and impoundments. Air quality implications of metals precipitates and consequent evaporates at surface are not considered. Kennecott's "Little Gobi" creates sufficiently severe, intermittent dust storms now; we hardly need toxic metals added to the cloud when these storms occur.

   - **Metals salts** discharged into the tailings impoundment may behave differently from the rosy scenarios presented in settlement documents, which assume homogeneous diffusion, as though the tailings were a liquid. Tailings are extremely fine, relatively uniformly-sized sand. Tailings may will surely act more like a sand filter than a liquid, segregating and classifying some compounds, such as colloidal aluminum hydroxides and hydroxy-sulfates, possibly bound up with arsenic, selenium, copper, cadmium, chromium and other constituents of the acid/metals plume; while passing through some compounds that 'want' to remain dissolved regardless of pH (acidity, chemical neutrality or alkalinity). Some elements and compounds may, in fact, be dissolved and mobilized by high alkalinity.
   - **Evaporates** from Kennecott's leach water, even in slight dilutions similar to the acid/metals ground water plume, are observed to form on the ground surface in the course of accumulation and drying of some metals compounds. Some of these evaporates may be susceptible to dust formation and air transport into populated areas and neighboring ecosystems. The burden of proof that this will not happen is on the PRP (potentially responsible party, Kennecott) and the Trustee. It is a sufficient concern among those who have seen the properties of leach water evaporates that it deserves full consideration, rather than the absence of consideration that it has received in the settlement.

10-40

Tailings impoundment vegetation cover is critical to regional air quality maintenance, but will be compromised or rendered impossible by metals deposits.

10-41

Response to E-mail No. 03-10 (attached letter, cont.)

10-40: See the Response to Common Comment No. 5 and No. 7.

Wind blown dust from the tailings impoundment is monitored and does not exceed human health exposure criteria established by EPA and the State of Utah. Samples of soil and dust from the town of Magna that contained trace amounts of tailings in some cases were analyzed and did not exceed health criteria. The contaminants that will end up in the tailings impoundment represent less than two percent of the volume of material being placed and will not significantly alter the chemical nature of the tailings. The significant majority of "contaminants" that come from the south end waters will be sulfate. The sulfate will precipitate out of solution with calcium to form calcium sulfate. Calcium sulfate is more commonly known as gypsum, which is the same material that is used in wallboard for construction of residential houses.

The issue of inappropriate metals loading was considered in the context of comparing the concentrations of metals in tailings with the tailings/acid mixture. If the differences had been significant, this would have triggered an investigation by the Risk Assessment Task Force. The increases in metals were evaluated by the TRC and judged to be minor.

10-41: The Utah Department of Environmental Quality and the U.S. EPA Region VIII agree with the commenter about the importance of vegetative cover on the tailings pond. The Division of Oil, Gas, and Mining (DOGM's) permit involving the tailings pond requires that it be revegetated after closure. If the surface of the tailings has become toxic for ANY reason, then revegetation will obviously be more challenging, perhaps more costly. But the permit requires that, however costly, the revegetation must occur. As a management practice, this requirement places an emphasis to protect the impoundment from acidification.

E-mail No. 03-10 (attached letter, cont.)

Since abandonment of the Magna Tailings Impoundment, less water has been placed into this nine square-mile area immediately north-northwest of Magna, Kearns and West Valley City, and west of Salt Lake City. High wind episodes, usually preceding storm fronts, have picked up and distributed many tons of tailings as dust clouds throughout the Salt Lake Valley, resulting in stringent efforts by Kennecott to establish vegetation on the impoundment surface. Temporary dust suppression measures have been necessary, especially in areas that have resisted plant growth.

- Dust prevention plans for the abandoned Magna tailings impoundment depend on creating vegetative growth, as will be the case when the North Tailings Impoundment is abandoned in upcoming decades, theoretically when the Bingham Pit closes. Vegetation establishment appears not to have been very effective, casting suspicion on the neutralization-capacity theory of the tailings impoundment.
- Aluminum, the dominant acid-generating element in the acid/metals contamination plume, is phyto-toxic, moreover: it retards or kills plant growth. Mass transfer of metals to the north tailings impoundment may prevent vegetation from being established on that surface, as a consequence of aluminum, alone. Arsenic, copper and probably other metals and salts constituents of the acid/metals plume and leach waters cannot help to meet this vegetation cover imperative. In any case, the model of sustainable native vegetation in GSL lakeshore environments is of scattered, 'clumpy' vegetation, including forbs and small shrubs, not a landscape one would recognize as sufficiently preventive of dust-forming capacity in high winds to inspire confidence that the vision is adequate. Given some degree of phyto-toxicity (plant poisons) present, vegetation may be relegated to extreme sparseness, possibly even demanding very expensive, very extensive alternative measures to prevent dust *in perpetuity, for all practical purposes*. For this reason alone, the mass relocation of metals into the tailings impoundments is ill-advised, and surely in violation of air quality permit conditions for reclamation.

10-40

Response to E-mail No. 03-10 (attached letter, cont.)

E-mail No. 03-10 (attached letter, cont.)

9. **Environmental accounting and sustainable solutions:** The narrow financial analysis applied to alternatives evaluation has effectively precluded assemblage of sustainable solutions. It appears that all decision making has occurred according to 'net present value' calculations, or some other calculus that 1) depreciates the future and 2) externalizes wildlife and Jordan River and Great Salt Lake ecosystems.

- The basic principle of "extended producer responsibility" must apply here. Kennecott **manufactured** the ground water contamination in the course of making copper, silver, gold, molybdenum, selenium and other related products. Considering the sulfate and the acid/metals plumes together, Kennecott has manufactured at least a quart of contaminated water for each of the approximately 30 billion pounds of copper it made in the Twentieth Century. Kennecott, therefore, **bears full responsibility** to remedy the damaging contamination byproducts in such a way that the public trust is not violated. If the settlement is carried forth as proposed, then an additional environmental cost for energy and global warming impacts will accrue per pound of copper.

10-42

- The settlement allows damage to the public trust to occur on a massive scale in the form of metals discharges to the Jordan River and, both directly and indirectly, to the Great Salt Lake.
- Technological remedies that would afford metals removal prior to disposal of possibly-acceptable salts into the Great Salt Lake (though not the Jordan River) have been dismissed by the device of separate evaluation of each technology by NPV investment evaluations that also place value on ecosystems, habitats, wild lives and the public trust that protects them. Combined technology applications integrating comprehensive environmental accounting presents the only sustainable approach:
  - For example, **biosulfide** pre-treatment, by engineered application of controlled microorganism cultures that biologically mediate selected chemical reactions, can selectively precipitate copper and aluminum. The biosulfide process can produce copper concentrate at higher copper content than the Concentrator's floatation process, and produce high-commercial value 'alumina' (aluminum oxide in

10-43

10-42: See the Response to Common Comment No. 12.

10-43: With regard to remediation technologies for the Zone A contamination, see the Response to Common Comment No. 4 and No. 5.

A number of the sustainable solutions were in fact evaluated in the course of this study. Included were concrete, the solar photovoltaic power, and the biosulfide processes. These suggestions were proposed by Kennecott and discussed in open forums including the Focus Group discussions regarding future land use at the tailings impoundment. Approval of the Joint Proposal is not expected to preclude future sustainable management of the tailings impoundment.

various forms); **nanofiltration** can remove most remaining salts to near-drinking water standards; reverse osmosis can 'polish' to culinary standards;

- **drying by distilling** can reduce concentrate volumes for repository disposal, if necessary, further capturing culinary water, facilitating further resource extraction. The cost-benefit balance sheet for this holistic approach to remediation looks very different from the rigid, one-technology-at-a-time methodology applied to the settlement's analysis of alternatives.
- If energy is integrated into these equations --- which it surely must be, in this age of seemingly inevitable global climate change from fossil fuel use excesses, and in light of the recent report on regional water resource implications of global climate change --- then we are compelled to draw on abundant solar, wind and possibly other renewable energy forms in order to render energy use for contaminated water remediation not only less drastic than it would otherwise be, but make of water treatment a probable sustainable economic development tool for the region. We should recall that Kennecott and a few other Great Salt Lake shore industries are uniquely sited to employ 'salt gradient solar ponds (SGSP),' a type of low-tech, anti-convective pond capable of generating both heat and electricity by use of saturated salts in pond bottom layers that capture and hold solar heat, trapped by the density of salt layers above. Heat, in turn, can be extracted by circulating liquids through tubes in the bottom layer for direct use (greenhouses, 'district' or industrial/commercial heat), or for conversion to electrical power. The technology is proven, with plants in operation at many locations around the world (e.g., Univ. of Texas – El Paso, has had a small working plant for more than twelve years; see http://www.cerm.utep.edu/solarpond/2epsp.html). Salts from water treatment concentrates (minus toxic metals) may be usable as SGSP density-gradient salts, moreover, reducing disposal costs and making use of what would otherwise be wasted.

10-43

Response to E-mail No. 03-10 (attached letter, cont.)

E-mail No. 03-10 (attached letter, cont.)

These are only a few of several possible beneficially synergistic technology integration that can reduce overall cost more than enough to justify even to corporate accountants the undertaking of integrated-thinking sustainability projects, instead of simplistic, habitual approaches that 'pump-and-dump' into out-of-sight, out-of-mind waterbodies. **It just happens that these particular waterbodies are anything but out of mind, however out of sight we may imagine them to be.**

- The tailings, themselves, in the hands of enlightened company management, could become the source of one of the best 'green' building materials known: autoclaved aerated concrete (AAC). AAC samples exist made directly from Kennecott tailings from the Magna Tailings Impoundment, produced by the Pennsylvania State University Materials Laboratory (Dr. Michael Grutzeck). These samples show all the positive properties that have made AAC the dominant building material of Europe for more than 80 years: light weight, great thermal insulation value, strong performance in seismic events, rapid construction, easy workability with common hand tools, extreme fire resistance, good resistance to moisture and mildew. One US/Canadian company, E-Crete, is manufacturing AAC in Arizona using copper floatation process tailings, like Kennecott's, as the primary mineral filler. Early AAC samples made by an E-Crete predecessor (Airstone) from Kennecott tailings passed leachability tests. Whether these tailings will pass leachability tests (TCLP) after the mass transport of the contents of the acid/metals plume's contamination into the tailings impoundment, or not, is a question that is important to anyone who hopes to see this sustainable alternative to forest products and common masonry products come into existence. AAC, as it happens, is a heat-intensive manufacturing process, so it could be an on-site user of heat from salt gradient solar ponds and other solar-thermal technologies.
- Solar photovoltaic power is also worth considering. The nine square mile area of the abandoned Magna Tailings

10-43

10-43

Impoundment could produce as much as 700 megawatts of solar (PV) 'green' electricity, which can be sold at 'peak' price rates, if covered with panels proposed by one solar farm developer, essentially at little or no cost to Kennecott. This power source can be accounted, also, as a 'sustainable' contribution to the positive side of the ledger by which Kennecott's societal and environmental obligations could be resolved.

10-44

What does the Sierra Club need to see in the Kennecott ground water natural resource damage claim settlement? At least the following:

- **Ecological functions and values of the Great Salt Lake and its watershed must be adequately understood and considered in the full light of scientific scrutiny.**
- **Ecologically, environmentally and economically sustainable solutions to the problem must be formulated.**
- **Zone A metals from the acid plume must not be transported to the tailings impoundments or to the Great Salt Lake.**
- **Selenium must not be discharged into the terminal basin of the Great Salt Lake where it will accumulate, nor into the Jordan River, where 'assimilative capacity' may already have been exceeded.**
- **Jordan River water quality of any other critical parameter must not be degraded by concentrate discharge.**
- **Kennecott should change contaminants to resources by resource recovery, and create positives from negatives, wherever possible.**
- **Ecological and environmental <u>restoration</u> should prevail as the overarching objective, instead of sneaking through some rate of attrition that the community will tolerate.**

Hope is the most fundamental ingredient of sustainability, closely followed by compassion, restraint, selflessness, and community-centeredness. In order for us to trust the Trustee, not to mention the Company and the assembled regulators, there must be a gulf filled with hope, compassion, restraint, selflessness and community-centeredness. The Great Salt Lake lies before us as a beacon, reminding us that 'community' consists not just

10-44: This summary has been responded to as discussed in the response to common comments and in previous paragraphs. It is the Trustee's judgment that approval of the Joint Proposal best balances the many competing factors with the legal framework of the Trustee's obligations under CERCLA and the Consent Decree.

of the human community, but also of our wild neighbors in such miraculous profusion.

Please carefully consider these comments, submitted on behalf of Sierra Club's Utah members. We request that we be kept informed of all future events, publications and alterations of the settlement process as they may be scheduled.

Sincerely,

Ivan Weber
For the Utah Chapter

Encl: US FWS letter of comment 8-15-03 on UPDES Permit UT0025551 (4 pp) [hard-copy only]
"Explanation of Significant Differences…" document, date unknown (4 pp) [hard-copy only, though we will endeavor to scan the document and make it available on request]

CC: Agencies:
EPA Region VIII, Eva Hoffman
Kennecott Utah Copper Corp., Bill Williams, Louis Cononelos, Marcelle Shoop
USFWS Utah Field Office, H.R. Maddux Utah Field Supervisor
USGS – Utah Office
Utah Geological Survey
Utah Div. of Oil, Gas and Mining

Organizations, Institutions and Interested Individuals:
United Steelworkers of America, Mike Wright, Diane Heminway, Wayne Holland, Kelly Hansen
Friends of Great Salt Lake, President Lynn DeFreitas, TRC Rep. Joy Emory
Great Salt Lake Audubon Society, Jeff Salt
National Audubon Society, Wayne Martinson

The Nature Conservancy, Utah Office, Dave Livermore, Joel Peterson
Utah Waters, Exec. Dir. Darrell Mensel
Utah Rivers Council
Mineral Policy Center
HEAL Utah, Exec. Dir. Jason Groenewold
Wasatch Clean Air Coalition, Kathy Van Dame
Dr. Ty Harrison, Westminister College Dept. of Biology
Dr. Genevieve Atwood and Dr. Don Mabey
Tom Belchak
Dr. John Veranth, Chairman, Utah Air Quality Board
Ms. Ann Wechsler, Utah Water Quality Board

Response to E-mail No. 03-10 (attached letter, cont.)

E-mail No. 03-11

From: [Ivan Weber]
To: <nrdtrustee@utah.gov>
Date: Wed, Oct 29, 2003 7:38 PM
Subject: Re: Addendum, Sierra Club Critique, Kennecott NRDC Settlement Proposal

My apologies, Dianne and everyone on this list: I dropped off the attachment somehow.

Ivan
----- Original Message -----
From: Ivan Weber
To: nrdtrustee@utah.gov
Cc: [mark.Clemens]; [marc.heileson]; [jwalker]; [wmartinson]; [jpeterson]; [Ldefreitas]; [Joy Emory]; [AWECHSL]; [john.veranth]; [Jason]; [jeffsalt]; [dvd.kvd]; [Darrell Mensel]; [Zachary Frankel]; [Steve Erickson]; [Lewis Downey]; [Dan Randolph]; [editor]; [rford]; [lucy Jordan]; [bruce_waddell]
Sent: Wednesday, October 29, 2003 6:22 PM
Subject: Addendum, Sierra Club Critique, Kennecott NRDC Settlement Proposal

Dear Dr. Nielson:

Please add the attached addendum to the record of Utah Chapter Sierra Club comments submitted on the proposed settlement of the Kennecott ground water contamination claim. We understand that the comment period has been kept open until November 21, allowing a beginning of public review and understanding of the problem --- though many people are only now becoming aware that it exists, at all. This deserves better.

Congratulations are in order for Governor Leavitt's confirmation to the office of EPA Administrator, and to you for the obvious opportunity for you to move to the national level of environmental administration.

Thanks very much,
Ivan

Response to E-mail No. 03-11

E-mail No. 03-11 (cont.)

Ivan Weber
Weber Sustainability Consulting
953 1st Avenue
Salt Lake City, Utah 84103
(801)355-6863 / (801)651-8841 cellular
[phyto]

CC: [mark.Clemens], [marc.heileson], [jwalker], [wmartinson], [jpeterson], [Ldefreitas], [Joy Emory] [joypat2000], [AWECHSL], [john.veranth], [Jason], [jeffsalt], [dvd.kvd], [Darrell Mensel] [dmensel], [Zachary Frankel] [z_frankel], [Steve Erickson] [erickson.steve1], [Lewis Downey] [LDOWNEY], [Dan Randolph] [drandolph], [editor], [rford], [lucy Jordan] [lucy_Jordan], [bruce_waddell]

Response to E-mail No. 03-11 (cont.)

E-mail No. 03-11 (attached letter)

October 29, 2003

Dr. Dianne Nielson, Trustee of the Natural Resource
Executive Director, Utah Department of Environmental Quality
168 North 1950 West
Salt Lake City, Utah 84114

Subject: Addendum to Critique, Natural Resource Damage Claim Proposed Settlement Kennecott Utah Copper Corporation Ground Water Contamination

Dear Dr. Nielson:

Please incorporate the following additional points and requests into the Utah Chapter Sierra Club's comments on the proposed settlement (continuing the item numbering from our previous submittal):

11-1

11. Some significant portion of the aquifer is ruined. Even if the near-neutral Sulfate plume portion can be purged, over time, the Zone A acid/metals aquifer is surely ruined for effective use as an aquifer, not only for the foreseeable future, but probably permanently. Many of the metals compounds present will have adsorbed, bound to alluvial soil particles in great quantities. In previous comments, we called attention to the discrepancy between our memory of previous statements about acid/metals plume pH, on the one hand (3.4-3.7), compared to the pH claimed in settlement presentation documents (~4.3). This latter number is approximately the threshold of aluminum precipitation. Has this event happened in the aquifer, or is it about to happen in the tailings line, producing a startlingly high-volume, low-mass precipitate that may behave in ways the Company and the Trustee do not anticipate? Which is it? Wouldn't it be a good idea 1) to be sure of this phenomenon, and 2) to disclose the true chemical condition of the acid well waters to the public? Aluminum is toxic to plant life and may have physical and biochemical effects we do not fully understand, particularly in the water column of such a unique and dynamic saline waterbody

Response to E-mail No 03-11 (attached letter)

11-1: See the Response to Common Comment No. 5.

Acid plume water is extracted from Zone A and neutralized in the Kennecott Tailings Pipeline. Please refer to Table 15 of Appendix C of the *Final Design for Remedial Action at South Facilities Groundwater* which reports results of full scale and bench scale tests on metals removal by neutralization in the tailings pipeline: 99.9% of aluminum is removed from solution and precipitated as a solid in the tailings impoundment thereby preventing aqueous alumina from reaching Great Salt Lake ecosystems.

E-mail No. 03-11 (attached letter, cont.)

as the Great Salt Lake. Unless and until the Trustee is absolutely certain of the harmlessness of metals in the GSL ecosystem, these metals must not be placed into harm's way in the North Tailings Impoundment, much less directly into the GSL through Kennecott's unfortunately permitted Outfall 008.

The greatest significance of this difference may lie in the amount of the metals compounds precipitated by dilution, in-situ neutralization due to aquifer alkalinity, and other factors, either in the aquifer or prospectively in the North Tailings Impoundment. Please keep in mind that the pH of water leaked from the Large Bingham Reservoir was generally <3.0 and as low as 2.6 or so, leaking (according to previous Kennecott studies and contractor studies in the public record) at a rate in the range of one million gallons to seven million gallons per day. This took place for about 30 years, yielding a total leakage between eleven billion and seventy-seven billion gallons of *de facto* leach water (i.e., highly acidic and metals-laden, as a result of waste rock leaching that yielded 'acid mine drainage'). Other, less well-defined sources must be added to this quantity, moreover, particularly from the drainages between Bingham Creek and Midas to the south, prior to cutoff wall and leach collection system commissioning.

11-1

Regardless whether the pH is actually lower than claimed, thereby retaining a great deal of the aluminum in solution, or the pH actually is at the aluminum precipitation threshold, there will be enough aluminum hydroxide precipitated by dilution and/or neutralization to surprise even those who have observed this phenomena in bench tests. A considerable proportion of the total metals content in the aquifer will be left in place, rendering the aquifer unusable, probably forever, requiring institutional controls forever.

12. Aquifer recharge has been contaminated and blocked (precluded) as a result of collection system commissioning, residual contamination and institutional controls imposed. Although it has been engineered, this deprives the public of the benefit of the

11-2

11-2: The Eastside Collection System (toe drains, capture trenches, cut-off walls, storage reservoirs, etc.) were required under CERCLA and the Consent Decree to prevent the uncontrolled release of leach water and alluvial flow from the main drainages along the eastern front of the Oquirrh Mountains. This system collects the alluvial flow and leach water filtering through the waste rock dumps, and redirects it toward Kennecott's holding reservoir complex outside of the Town of Copperton for use in their process circuit.

Kennecott contends and the DEQ agrees that the aquifer is still recharged by precipitation that falls within the valley, the potential ground water that flows through the bedrock aquifer of the Oquirrh Mountains and infiltration from the irrigation canals located in the valley. Kennecott and DEQ recognized that with the source control measures in place (i.e., Eastside Collection System) the aquifer had a finite recharge value and a certain sustainable yield. The sustainable yield for this particular aquifer was calculated as part of the damage assessment; 8235 acre-feet per year from the contaminated aquifer. This assessment included the State Engineer's office as part of the review team. The required production total for a full reduction of the Letter of Credit has taken sustainable yield into consideration.

11-2 aquifer, a public trust, forever. The Consent Decree takes this into account, but we ask that the Trustee not lose sight of this damage in weighing obligations of the PRP, Kennecott.

11-3 13. There are profound water resource and water rights implications of this severance of recharge, contamination of ground water, and ruining of the aquifer. A specific study of these implications by the State Engineer is in order, and should be requested on behalf of well owners and water rights owners in the affected area, as well as on behalf of water users in the entire region, who will be forced to seek other water resources as a result of Kennecott's mismanagement of its process waters, resulting in the subject ground water contamination.

11-4 14. The Utah Chapter Sierra Club requests that our comments be answered in writing.

11-5 15. The Utah Chapter Sierra Club requests that the Trustee publish in commonly accessible print media or mail to those who submit comments the list of all those who comment. This will constitute a significant step toward remedying the deficiencies of the 'citizen review' shortcomings of the TRC.

11-6 16. Only a much more significant extension of the review period can acceptably allow the public to digest and respond to the settlement proposal. Others are suggesting that a moratorium of at least one year be imposed to allow the public sufficient opportunity to respond. The Utah Chapter Sierra Club concurs with this suggestion, and hereby requests that the Trustee's decision on the settlement be deferred until November, 2004.

Thank you for incorporating these additional comments into our previously submitted critique.

Sincerely yours,

Response to E-mail No. 03-11 (attached letter, cont.)

11-3: The Division of Water Rights is working with Kennecott to ensure that water rights associated with this proposal are properly handled within the confines of state statutes. All applications have been and will continue to be subject to the review process as required by law. The State Engineer continues to study the implications of Kennecott's operations on the aquifer as well as those of other water users and will act within his statutory authority on behalf of all water users.

11-4: All comments have been responded to. Copies of this document will be available for viewing at the City Recorder's Office, City of West Jordan, located at 8000 Redwood Road, West Jordan or at the Utah Department of Environmental Quality offices located at 168 North 1950 West, Salt Lake City. A copy will also be made available for viewing at the following web link: http://www.deq.utah.gov/issues/nrd/index.htm. For hard copies please contact the Utah Department of Environmental Quality at (801) 536-4402.

11-5: The Comment Response Summary (this document) provides the name of each individual that provided a comment to the State Trustee for Natural Resource Damages during the public comment period.

Also, see the Response to Common Comment No. 1.

11-6: See the Response to Common Comment No. 1.

E-mail No. 03-11 (attached letter, cont.)

Ivan Weber
for the Utah Chapter

CC: Agencies:
EPA Region VIII, Eva Hoffman
Kennecott Utah Copper Corp., Bill Williams, Louis Cononelos, Marcelle Shoop
USFWS Utah Field Office, H.R. Maddux Utah Field Supervisor
USGS – Utah Office
Utah Geological Survey
Utah Div. of Oil, Gas and Mining

Organizations, Institutions and Interested Individuals:
United Steelworkers of America, Mike Wright, Diane Heminway, Wayne Holland, Kelly Hansen
Friends of Great Salt Lake, President Lynn DeFreitas, TRC Rep. Joy Emory
Western Resource Advocates (LAW Fund), Joro Walker, Atty.
Great Salt Lake Audubon Society, Jeff Salt
National Audubon Society, Wayne Martinson
The Nature Conservancy, Utah Office, Dave Livermore, Joel Peterson
Utah Waters, Exec. Dir. Darrell Mensel
Utah Rivers Council
Mineral Policy Center
HEAL Utah, Exec. Dir. Jason Groenewold
Wasatch Clean Air Coalition, Kathy Van Dame
Dr. Ty Harrison, Westminister College Dept. of Biology
Dr. Genevieve Atwood and Dr. Don Mabey
Tom Belchak
Dr. John Veranth, Chairman, Utah Air Quality Board
Ms. Ann Wechsler, Utah Water Quality Board

Response to E-mail No. 03-11 (attached letter, cont.)

Email No. 03-12

From: [Alysia Watanabe]
To: <nrdtrustee@utah.gov>
Date: Fri, Oct 31, 2003 4:24 PM
Subject: Toxic chemical disposal

12-1 My understanding is that the selenium removed from the tainted groundwater in West Jordan is being allowed to be dumped into the surface lagoons of KCC which discharges to the wetlands of the Great Salt Lake. This may be the cheap way to do it but it is hardly reasonable to allow one's community toxic waste to increase the chemical load in another community's natural resource. I had thought we had moved past the age of using the Great Salt Lake as a toilet.

12-2 The wetlands in particular are a sensitive ecology. There are published studies from Calif. showing the toxic effect of selenium on birds. I would think it would be a future PR nightmare if DEQ ignored the concerns of another state Department. Dept. of Natural Resources has expressed its concerns over this toxic discharge.
Please add my adamant opposition to disposes of selenium in any manner that will allow it to reach the wetlands of the GSL.
Alysia Watanabe
3622 Kaibab Cir., SLC 84109

Response to E-mail No. 03-12

12-1: See the Response to Common Comment No. 9.

12-2: See the Response to Common Comment No. 8 and No. 9.

E-mail No. E03-13

From: [Nichole Madrid]

To: <nrdtrustee@utah.gov>
Date: Sun, Nov 2, 2003 9:41 PM
Subject: Jordan Valley Groundwater Cleanup

To whom it may concern,

13-1 I'm no scientist or expert on this particular subject, but, I am a water user. I've seen your response that the amount of removed contaminants are well below the EPA acceptable levels (which would have been more stringent if not blocked by the current administration), when discharged into the Jordan River. My question is, "Why would we spend all the vast amount of resources required to remove pollution from the ground water only to discharge it into surface water?!?" If I understand your plan properly, and to paraphrase, It's unhealthy in ground water but fit for surface water. HUH?????????????? I can't believe the State of Utah is willing to risk the long term effects of this discharge on the wetlands used as a flyway stopover by international migratory birds. Have you had any response from other governments? I imagine we should take into account their desires as well, considering "our" actions will affect "their" birds and possibly have an effect on "everybody's" wildlife. Remember that these birds will be a part of the food chain elsewhere. Also, there are many other uses of the Jordan River water besides the wetlands issues. What consideration has been given to other ground water users with wells in the areas affected by the pumping project? The State Engineer will verify that in this prolonged drought the valley's water table is dropping.

13-2

13-3

13-4 My personal feeling is that Kennecott should be solely responsible for the removal and disposal of this contamination!!! Although, I stand for these chemicals to be properly disposed of in an environmentally safer manner, I'm against removing the contamination if it is to be dumped back into a water source.

13-1

I would appreciate a personal response, if possible, as I'm trying to become more educated about this subject. Thank-you for your time and consideration of this correspondence.

Response to E-mail No. E03-13

13-1: See the Response to Common Comment No. 8 and No. 9.

13-2: See the Response to Common Comment No. 9.

13-3: See the Response to Common Comment No. 10.

13-4: See the Response to Common Comment No. 12.

E-mail No. E03-13 (cont.)

Sincerely,

Lindy Carlton
2628 E. Woodchuck Way
Sandy, Utah 84093-2810

CC: [lindy.carlton]

Response to E-mail No. E03-13 (cont.)

E-mail No. E03-14

From: [Bryan Holbrook]
To: <nrdtrustee@utah.gov>

Date: Tue, Nov 11, 2003 3:45 PM
Subject: public comment

Dear Ms. Nielson,

I and my family read with interest the article in the Tribune one week ago regarding the plan to clean up the groundwater known as the "Southwest Jordan Valley Ground Water Cleanup Project". The six of us do not live in the immediately affected area, but we are very concerned about the water in
14-1 the Jordan River and the Great Salt Lake. We feel it is a grave mistake to discharge any contaminants from the cleanup into the river, and thus the lake. These will eventually have to be cleaned up, and will have a highly adverse effect in the interim. It would be far more foresightful and
14-2 long-term cost effective to properly dispose of the contaminants from both zones now.

14-1 Please be aware that six of your citizens feel very strongly against the proposal to discharge contaminants into the Jordan River.

Thank you,

Bryan Holbrook

Response to E-mail No. E03-14

14-1: See the Response to Common Comment No. 8 and No. 9.

14-2: See the Response to Common Comment No. 7 and No. 9.

E-mail No. 03-15

From: [Peter Maier]
To: <nrdtrustee@utah.gov>

Date: Wed, Nov 12, 2003 2:08 PM
Subject: Comments: Southwest Jordan Valley Ground Water Cleanup Project.

Dear NRD Trustee:

Attached to this message my comments regarding the proposed ground water cleanup project.
Please let me know if you were able to open the file. If not, I can sent my comments by mail,

Sincerely,
Peter Maier, PHD, PE
(435) 882-5052

CC: [Lynn de Freitas] [ldefreitas]

Response to E-mail No. 03-15

E-mail No. 03-15 (attached letter)

To: NRD Trustee, Utah Department of Environmental Quality.

From: Peter Maier, PhD, PE

Date: November 12, 2003.

Comments: Southwest Jordan Valley Groundwater Cleanup Project.

Introduction:

The Clean Water Act of 1972.

"This Act simply means that we can not use our rivers to treat our sewage any longer".
This was Senator Muskie's statement on the Senate floor, when Congress passed the Clean Water Act in 1972.

The goal of the CWA was is to eliminate all water pollution by 1985 and Congress demanded a 'Technology' based implementation program, thereby specifically rejecting a 'Water Quality' based program, since such a program would be subject to local political pressures to lower treatment requirements, when receiving water bodies were already 'polluted'.

We now know, 31 years later, that the NPDES permit requirements, which were supposed to implement the CWA, will never achieve any of the goals of the Act, due to a faulty application of an essential pollution test.

The Jordan River, as a result, now receives daily about 15,000 lbs of nitrogenous (urine and proteins) waste from the three main sewage treatment facilities in the Valley, which equals to 3000 of 20 lbs bags of fertilizer each day.

The Great Salt Lake and its wetlands.

Response to E-mail No. 03-15 (attached letter)

E-mail No. 03-15 (attached letter, cont.)

Utah State University professor Wurtsbaugh monitors the Farmington Bay and stated in a recent newspaper article that nitrogenous nutrients and algae

blooms are so prolific that he on days can not see more then 4 inches into its murky depths and that at times his oxygen sensors register zero at all depths.

Water and Wastewater (sewage) Treatment.

Treatment basically means that 'undesirable' solids in water or wastewater are removed from the water. This can be achieved with the use of different technologies, each yielding certain solid removal efficiencies.

Reverse Osmosis, basically is a molecular filter, which will filter out even the smallest solids (ions), as long as they are larger than the water molecules. Although the filtrate is 'clean', the solids that caused the water to be 'polluted' are now concentrated into the waste stream. In order to achieve 'real' treatment, these solids in the waste stream requires further treatment.

Comments regarding the Proposed Jordan Valley Ground Water Cleanup.

15-1

The groundwater to be 'cleanup' contains sulfates and heavy metals and the proposed reverse osmosis treatment will extract 'clean drinking water', but the waste stream containing all the 'pollutants' are proposed to be discharged either in Kennecott's tailing ponds or in the Jordan River. The latter clearly violates the Clean Water Act, since this 'polluted' water into the Jordan River has not been 'treated' prior to disposal.

The Department of Environmental Quality issued a NPDES permit for such discharge, which is based on 'acceptable pollution levels' in the receiving waterways, clearly also violating the Clean Water Act, since Congress specifically rejected such a 'water quality' based permit program.

Public Health Concerns.

1. *Impact of Present Wells.*

Response to E-mail No. 03-15 (attached letter, cont.)

15-1: See the Response to Common Comment No. 8 and No. 9.

E-mail No. 03-15 (attached letter)

The geological makeup of the Valley is very complicated and 'ground water' flows in acquirers would be very hard to predict. Since the original

'pollution' was very acidic and contained sulfates, it would be not surprising if the sulfates would drop out when the acidity of the groundwater was neutralized by 'normal' ground water. This undoubtedly affected the permeability of the aquiver passing on the contaminated water.

Ground water computer models may indicate groundwater flows, but verifications of such models are extremely difficult and results should only be valued as an indication.

Although Utah often is called a 'dry' State, where evaporation exceeds precipitation, this is not the case in the Valley, especially not when also irrigation is considered. What this means is that surface groundwater penetrates into the soil and ends up in acquirers. This surface ground water is very contaminated by the anthropogenic use of the land. Pumping out (extracting) ground water may cause this contaminated shallow groundwater to be drawn into deep aquiver and cause presently good wells to become contaminated, not with sulfates, but with herbicides, pesticides and other pollutants.

15-2

2. *Impact on Great Salt Lake and its Wetlands.*

Sulfates, selenium and heavy metals are all natural elements that are released from the mining operation. Their concentrations, after dilution in the Jordan River may not exceed present 'standards', but as we have witnessed in the past, standards are changed when better information and scientific data becomes available. Presently nobody can claim to know how this discharge of selenium and heavy metals may affect the future of the Great Salt Lake and its wetland as the result of bioaccumulation.

15-3

What we however already know is that the wetlands are eutrophic and at times lack dissolved oxygen. With the presence of organic matter and bacteria this first would cause anoxic conditions, whereby bacteria use their enzymes to release the oxygen bond mainly in the sulfates and nitrates. Reducing nitrates into nitrogen gas would be beneficial, but the reduction of sulfates into Hydrogen Sulfide (H2S) gas, would not only be a public health

15-2: See the Response to Common Comment No. 10.

15-3: See the Response to Common Comment No. 9.

hazard, but would cause odor problems in the Valley.

15-3

When section would turn anaerobic, organic matter will be converted into methane gas and since some interim organic matter break down compounds are volatile, they also will cause odor problems.

3. *Programs and Models used to establish pollution levels*.

15-4

All programs and models used depend of certain 'test' values. Since most of these values were established early last century, they all ignore sub-micron particles and some test procedures, like the TDS (Total Dissolved Solids) test have been conveniently changed to achieve faster testing results. Unfortunately this also has caused the fact that 'organic' solids not any longer are measured. Evaluating an ecosystem without these sub micron organic solids can hardly be called science.

4. *Reverse Osmosis Process.*

This process does not remove solids, it basically extracts water and if 'treatment' is considered, the waste stream requires additional treatment to remove the solids. During the past 30 years remarkable advances have been made in the making of the membranes and this form of 'treatment' now can be applied in small household filtering systems.

15-5

Still the major problem is the plugging of these membranes. Especially organic sub-micron particles are troublesome, which could prove to be very expensive (due to membrane replacements) in the future.

Especially the 'makeup' water proposal, using shallow groundwater may prove to contain high levels of sub-micron organic matter and may cause unforeseen and expensive operation and maintenance problems in future. To contemplate potential problems it is recommended to visit the 'glycol' recovering facility at the Salt Lake City Airport, which also incorporate reverse osmosis in their 'treatment' process.

Conclusion:

15-1

The Clean Water Act requires 'Best Available Treatment' prior to any discharge into open waterways. Although Reverse Osmosis technically achieves to goals of extracting drinking water, its proposed waste stream

Response to E-mail No. 03-15 (attached letter, cont.)

E-mail No. 03-15 (attached letter, cont.)

15-4: The UPDES permit program adopts standards and guidance that U.S. EPA recommends for program administration. The NPDES permit program, as defined by EPA, provides for the regulation of certain parameters that have been shown to have measurable effects on the receiving stream. Sub-micron organic solids are not one of these parameters at this time. If at some time in the future EPA recommends their regulation, Utah may incorporate the new standard into state regulations.

15-5: The potential for plugging of reverse osmosis membranes through the treatment of shallow groundwater was evaluated during pilot testing. JVWCD is anticipating that the membranes will be replaced during the 40-year term of the project. These costs have been included in the cost of the project.

15-1

disposal in the Jordan River containing all the original pollutants, not only directly violates the CWA, but also does not make any common sense since 'real treatment' is feasible.

If somebody would suggest extracting 'drinking water' from municipal sewage and discharging the 'waste stream' into the Jordan, people at DEQ would only smile.
Why is this 'cleanup' proposal any different?

Call me if you have any questions or if you need additional information,

Peter Maier, PhD, PE
44 Lakeview
Stansbury, UT 84074
(435) 882-5052

CC: Friends of the Great Salt Lake
Others

Response to E-mail No. 03-15 (attached letter, cont.)

E-mail No. E03-16

From: [Scott Goudie]
To: <nrdtrustee@utah.gov>

Date: Mon, Nov 17, 2003 8:09 AM
Subject: Jordan Valley Water Conservancy District Discharge Permit

To: Utah Department of Environmental Quality
From: Scott Goudie

To whom it may concern,

I recently learned that you are reviewing a proposal that would allow organizations to dump pollution into the Jordan River. I am appalled to think that anyone would actually be considering such an action. I am even more appalled that an organization such as The Department of Environmental Quality needs time to consider such an action. I believe this is an obvious attempt for some organizations to line their own pockets and pass on their responsibility to someone else. There is a lot of wildlife that could be affected by such an action not to mention people and there pets use that water for recreation such as; boating, fishing, and hunting. What are the ramifications to people when they eat fish and duck that comes from this water? I belong to a hunting club that gets its water from the Jordan River and my family and I spend a significant amount of time in that water. I believe that if you don't want something in your own yard you have no business dumping it into a river.

Please say NO to the Jordan Valley Water Conservancy District Discharge Permit.

Sincerely,
Scott Goudie

Response to E-mail No. E03-16

16-1: See the Response to Common Comment No. 8 and No. 9.

16-2: See the Response to Common Comment No. 12.

E-mail No. E03-17

From: [Sylvia Wilcox]
To: <nrdtrustee@utah.gov>
Date: Mon, Nov 17, 2003 9:44 PM

Subject: kennecott

Dear Sir/Madam:

I am writing to express concern over the leakage and delivery of contaminated water from Kennecott into our groundwater, and most especially, directly into the Jordan River and Great Salt Lake.

17-1 I hope you will take great care to see that Kennecott filters the waste water adequately so that aquatic life and avian life in these two jewels of nature not be damaged or destroyed. Let us not be so shortsighted in seeking economic gains over losses to our quality of life. These two waterways are integral to the survival of other industry (ie brine shrimp) but also to the survival of birds that travel the entire continent and all the complex interactions between them and other aquatic life on the continent, as well as right here in our valley.

Sincerely,

Sylvia Wilcox

Response to E-mail No. E03-17

17-1: See the Response to Common Comment No. 8 and No. 9.

E-mail No. E03-18

From: [John Tudor]
To: <nrdtrustee@utah.gov>
Date: Mon, Nov 17, 2003 10:26 AM

Subject: Polluted groundwater

18-1 I am writing because of my concern for the agreement about disposing of polluted groundwater from Kennecott mining into the Jordan River or the GSL watertable north of Magna. These acidic and sulfur compounds with heavy metals can permanently damage or destroy habitat in the river, the marshes, and the lake itself.

It does not seem that the level of toxicity in the effluent is being held to strict enough standards to protect our river and its fish and birds. The GSL provides massive amounts of food to migratory birds and should not be allowed to concentrate heavy metals and other toxic substances.

18-2 Utah and Kennecott should shoulder the burden of doing this job correctly. Industrial cost and development of housing are not the only important things in the state.

18-1 Please withhold approval on these plans until all concerns have been answered. And stop the further discharge of toxic substances into unlined storage, until this can be resolved.

Thank you for your attention.

John Tudor, M.D.
1309 Federal Heights Drive
Salt Lake City, UT 84103
801-521-9334

Response to E-mail No. E03-18

18-1: See the Response to Common Comment No. 8 and No. 9.

18-2: See the Response to Common Comment No. 12.

E-mail No. E03-19

From: [Brock Dethier]
To: <nrdtrustee@utah.gov>
Date: Mon, Nov 17, 2003 12:59 PM

Subject: Kennecott

19-1 I am writing to urge the Department of Environmental Quality to withhold approval of the Kennecott environmental plan until the plan addresses the
19-2 large, long-term issues: How can the Great Salt Lake survive the selenium poisoning allowable under the current plan? How will Kennecott pay for poisoning huge aquifers? Will the plan preserve the brine shrimp fishery in the lake? Why won't the tailings impoundment cause the same toxic metal problems as Owen's Lake?

19-2 The environmental cleanup of Kennecott needs to be on the same scale as the operation itself: huge. And the company, not we the citizens of Utah, should pay for every cent of damage it has done and the damage that
19-1 its pollutants will cause for centuries to come. Please don't let the Lake be poisoned just because Kennecott has political friends!

Brock Dethier
--
Brock Dethier
Assistant Professor
English Department
Utah State University
435-797-3546

Response to E-mail No. E03-19

19-1: See the Response to Common Comment No. 7, No. 8, and No. 9.

19-2: See the Response to Common Comment No. 12.

E-mail No. E03-20

From: [Bonnie Fletcher]
To: <nrdtrustee@utah.gov>
Date: Tue, Nov 18, 2003 12:33 PM

Subject: Re: Kennecott groundwater contamination clean-up via dumping into Jordan River

Ms. Dianne R. Nielson
Executive Director
Department of Environmental Quality
State of Utah
168 North 1950 West
Salt Lake City, UT 84116

Dear Ms. Nielson:

I am very upset to learn that thousands of tons of salts and ~150 lbs. of selenium are to be discharged into the Jordan River on an annual basis in an attempt to clean contaminants from the ground water polluted over the years by Kennecott Utah Copper Corporation. Although it is necessary and laudable that this corporation needs to perform this clean-up, it is like "*robbing Peter to pay Paul*" Why must we contaminate another part of our environment?

20-1

As I understand it, there have been no studies done to determine the overall impact of such dumping into the river. Such acts in the past have caused many problems not only at the site of dumping, but also downstream. Dumping salts and selenium into the river is irresponsible and appears to be a quick-fix solution with no regard for the long-term effects.

As a member of Great Salt Lake Audubon, I have enjoyed many hours walking along the Jordan River Parkway and also along the south shore of the Great Salt Lake, watching the incredible and diverse wild life. Many volunteer hours in our chapter have been spent removing visible garbage from the Jordan River over the last couple of years. The Jordan River ecosystem and the adjoining Great Salt Lake floodplains are internationally

20-1

Response to E-mail No. E03-20

20-1: See the Response to Common Comment No. 8 and No. 9.

E-mail No. E03-20 (cont.)

significant wetlands that comprise a unique and fragile lake ecosystem.

Please, please reconsider this proposal:

20-1

DEQ must set an example of preserving "environmental quality" in this state. We owe it to our children and their children.

Thank you for your time.

Sincerely

Roberta ("Bonnie") Fletcher
5186 S. 4520 W.
Kearns, UT 84118

Response to E-mail No. E03-20 (cont.)

E-mail No. E03-21

From: [Jill Mower]
To: <nrdtrustee@utah.gov>
Date: Wed, Nov 19, 2003 6:10 PM
Subject: kennecott settlement

Dear NRD Trustee,

I would like to promote the idea of the DEQ withholding approval until further studies have been done in response to several urgent concerns.

1) How the lake's ecosystem assimilates selenium, with possible synergies occuring with other elements and compounds, under a wide variety of salinity, overturning/stratification and fluctuating lake levels.

21-1

2) How the Great Salt Lake's brine shrimp and brine flies may assimilate other metals, as well as dioxin from MagCorp/US Magnesium.

3) How the aquifer is affected.

4) How could it be that the blowing dust from the tailings impoundment will not cary toxic metals?

5) How will the tailings impoundments behave in eqrthquakes of predicted magniture.

No additional discharges by Kennecott or JVWCD should be permitted until DEQ establishes numerical water quality standards.

Thank you,

Jill Mower
705 South Redwood Road #69
Salt Lake City, UT 84104

Response to E-mail No. E03-21

21-1: See the Response to Common Comment No. 8 and No. 9.

E-mail No. E03-22

From: [Lynna Beaman]
To: <nrdtrustee@utah.gov>
Date: Wed, Nov 19, 2003 8:45 PM
Subject: GREAT Salt Lake

22-1 Please take care of the Salt Lake. Do not allow Kennecot to increase Se and other metal content of the lake.

Sincerely,

Bob and Lynna Beaman
735 Willow Way
Heber City, UT 84032

Wasatch County
U.S.A.

Response to E-mail No. E03-22

22-1: See the Response to Common Comment No. 8 and No. 9.

E-mail No. E03-23

From: [Stanley Schwartzman]
To: <nrdtrustee@utah.gov>
Date: Fri, Nov 21, 2003 9:44 AM
Subject: Kennecott's proposal

I am writing to express my concern about Kennecott's proposal for the treatment of its toxic material near the Great Salt Lake. I think the Utah Dept. of Environmental Quality should withhold approval of
23-1 Kennecott's plan until further issues can be addressed.

There are a number of environmental concerns that need to be taken into account and satisfactorily dealt with in regard to all life before approval should be granted to Kennecott's proposals. These concerns include:

1. The effect of increased selenium on the Great Salt Lake's ecosystem
2. The effect of other metals on the lake's brine shrimp and brine flies as well as these metals interactions with other pollutants in the lake
3. The effect of their plan on the aquifer
4. The negative impact on air quality and human life from wind blown dust, possibly toxic, off of tailings impoundments

Given the possibility for significant environmental degradation, the DEQ
23-2 should allow no further discharges from Kennecott or JVWCD until numerical water quality standards are established.

The negative effects from improper disposal of Kennecott waste are dangerous not just for life in Utah. What happens here has an impact on life throughout the hemisphere.

Very truly yours,
Stanley Schwartzman

Response to E-mail No. E03-23

23-1: See the Response to Common Comment No. 9.

23-2: See the Response to Common Comment No. 8.

E-mail No. E03-24

From: [Terry Way]
To: <nrdtrustee@utah.gov>
Date: Fri, Nov 21, 2003 2:11 PM
Subject: SW Jordan Valley Cleanup Project - Comments from SLCounty Mayor and Public Works Department

Dear Trustee -

24-1 Salt Lake County Mayor Nancy Workman and the County Public Works Department are opposed to any pollutant discharge to the Jordan River which would reduce water quality that could hinder it's future ability to discharge stormwater to the system. The State allowing Kennecott Utah Copper and Jordan Valley Water Conservancy District to pump, treat and discharge wastes to the system could do just that. The Mayor and the

24-2 Department recommend that the wastes produced by this project be pumped to and discharged into the tailings pond or some other similar disposal method. Disposal of wastes into the River is not the answer.

Thank you for the opportunity to comment on this project.

TW

CC: [David Marshall], [Neil Stack]

Response to E-mail No. E03-24

24-1: See the Response to Common Comment No. 8.

24-2: See the Response to Common Comment No. 7.

E-mail No. 03-25

From: [Matthew Lindon]
To: nrdtrustee
Date: Fri, Nov 21, 2003 4:07 PM
Subject: Kennicott settlement

25-1 Just a note to say that, in the State Engineers Office and Dam Safety, we are concerned with changes in the usage of the tailings pile that may increase

the flows onto this structure and oversaturate some of the tailings. Seismic Stability has been an issue with these tailings for years because of saturation from inadequate drainage and consequential slope stability. Adding more saturated toxic tailings could further exacerbate the problem.

25-2 In addition the Kennecott land company is planning a development for approximately 100,000 people on their west side holdings, over the next 10 years, with all the added runoff going directly into the ground, toxic plumes and water table. This development will increase the volume of runoff and inject it into the ground. I dont believe the DEQ knows the effect of this hydrologic change on water quality on the west side, in the Jorden River and in the Great Salt Lake.

25-2 We did not learn of some of the facts of this settlement until recently and appoligice for the late nature of this note but we did want to registir a comment before the deadline. This entire concept needs more study, better science and a coordinated consideration by the DEQ.

Sincerely,

Matt Lindon PE
Utah DNR, Dam Safety Hydrologist

Response to E-mail No. 03-25

25-1: The seismic stability issues noted by the commenter are associated with the southern tailings impoundment that was upgraded and enveloped by a North Tailings Expansion beginning in 1995 specifically designed to address seismic concerns. (Please refer to the second paragraph of this response for further information). Kennecott no longer actively discharges to the southern tailings impoundment, which is undergoing closure and reclamation activities. All of the flows associated with the remediation activities of the Joint Proposal will be directed to the North Tailings Expansion impoundment. These flows represent a fraction ($1/20^{th}$) of the total annual flow reporting to the north impoundment, or less than 2% of the total volume being deposited in the impoundment. Kennecott will continue to construct and monitor the North Tailings Dam as required by the State Engineers Office. Neither the tailings nor the contaminants exhibit hazardous characteristics.

Significant seismic analyses of the tailings impoundment site and method of construction were completed as part of a Final Environmental Impact Statement (Final EIS) conducted for the tailings north expansion project completed in 1995. The development of the tailings dam employs the use of cycloned sand tailings using a modified centerline method of construction. The combination of using cycloned sand tailings placed and compacted as an engineered fill in conjunction with an underdrain system provides for a structure that is stable and safe under the design earthquake conditions, the Maximum Credible Earthquake. State statutes define the Maximum Credible Earthquake as "the most severe earthquake that is believed to be possible at the site on the basis of geological and seismological evidence."

25-2: The Kennecott Daybreak development is a separate project, unrelated to the Joint Proposal. Discharges and runoff from those operations will be regulated under state and local environmental laws, including storm water management.

E-mail No. 03-26

From: [Amy Wildermuth]
To: '"nrdtrustee@utah.gov '" <nrdtrustee@utah.gov>
Date: Fri, Nov 21, 2003 8:25 PM
Subject: Comments on Proposed Southwest Jordan Valley Cleanup

Please see attached memo.

Response to E-mail No. 03-26

E-mail No. 03-26 (attached memorandum)

To: Utah Department of Environmental Quality, NRD Trustee

From: Amy Wildermuth

Date: 11/21/03

RE: Comments on Southwest Jordan Valley Ground Water Cleanup Project

After reviewing much of the project documentation and attending two meetings on this cleanup, I offer the following brief comments on the proposed Southwest Jordan Valley Water Cleanup Project.

Although this project appears to have benefits, like most things in life, it does not come without costs. In particular, after treating ground water located in the Zone B area, contaminant will remain. This contaminant, consisting of various metals and including a significant amount of selenium, is to be discharged into the Jordan River. The metals in the discharge will then make their way into the wetlands surrounding the Great Salt Lake and eventually into the Great Salt Lake.

This discharge and the debate surrounding it raise two broad questions: (1) Is the Trustee satisfied that it has fulfilled all of its duties and obligations under the relevant federal statutes, most importantly the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), particularly with respect to adequately considering all available alternatives and options and (2) Is the Trustee satisfied it has fulfilled its duties and obligations under the public trust doctrine of Utah?

26-1

With respect to the discharge from Zone B, the Jordan Valley Water Conservancy District has applied and been issued an NPDES permit for the discharge of post-treatment contaminant as required by the Clean Water Act.[1] But a trustee's duties under both CERCLA and the public trust

Response to E-mail No. 03-26 (attached memorandum)

[1] I understand this permit has been challenged and is currently under review.

26-1: Please refer to Response to Common Comment No. 8., No. 12 and No. 13.

E-mail No. 03-26 (attached memorandum, cont.)

doctrine would appear to require more of the trustee than simply an agreement that the relevant party will apply for, receive, and comply with an NPDES permit. Instead, a trustee like Utah DEQ here has an obligation to consider the public interest as well as manage and preserve waters for the benefit of present and future generations.

26-1

In its simplest form, this is a question of how one acts when faced with uncertainty. Since most environmental issues involve varying degrees

of uncertainty, the Utah DEQ surely encounters uncertainty on a daily basis. But what makes this situation tricky—and this cleanup more difficult—is that when the department acts as a trustee, it takes on a new role: its trustee duties require it to act more cautiously in the face of uncertainty than it does in most of the other situations it faces as an agency.

In essence, the Utah DEQ must put on a different hat with respect to this project. Wearing that new hat, the question is whether the department has properly discharged its trust duties and obligations. For example, in the face of the scientific debate over the effect of selenium in the discharge, is
26-1 the Trustee obligated to require that the contested discharge at a more cautious level because that is in the public interest? And because the trustee's duties and obligations extend in futuro, is the trustee also required to ensure careful and extensive monitoring of the discharge and its impact because that too is in the public interest?

It is, to be sure, difficult to view issues through the new and different lens of trustee duties and obligations. But the department's role as Trustee requires that it examine the cleanup proposal from this new point of view. It also requires that the department act in accordance with those new duties and obligations when evaluating and determining the contours of any cleanup that it approves.

cc: Friends of the Great Salt Lake

Response to E-mail No. 03-26 (attached memorandum, cont.)

E-mail No. 03-27

From: [TA Belchak]
To: <nrdtrustee@utah.gov>
Date: Fri, Nov 21, 2003 9:47 PM
Subject: Comments regarding Consent Decree Requirements

Thank you for extending the comment period to November 21. We take this opportunity to state our position on the ability of the Consent Decree of August 21, 1995 to guide decisions regarding the Kennecott groundwater

contamination and the production of municipal quality water to the affected area of the Southwestern Salt Lake Valley.

P. 5 Paragraph E. A statement is made regarding the "injury to, destruction of, and loss of surface and groundwater" Our interpretation of this statement suggests that due to contamination, the use of the water is hindered. The term "lost use" is NOT used in the Consent Decree, although we concur that the CONTAMINATION causes a lost use. We object to the use of the term "lost use" as a form of inefficiency in certain treatment technologies. Lost use should be reserved for the loss of surface and groundwater use due to Kennecott Utah Copper Corporation operations and damage to the state's water supply.

27-1

P. 10 Paragraph a. The (single=1) letter of credit shall be "increased annually by 7 percent of the then current amount of the letter of credit". We maintain that ANY deviation from the required 7 percent escalation of the letter of credit is a violation of the Consent Decree. Please do NOT reduce the escalation of the letter of credit unless the letter of credit is cashed. In addition, since the Consent Decree allows for a single letter of credit, please do NOT consider dividing this potentially valuable asset. In a discussion with Mr. Fred Nelson of the State of Utah Attorney General's office, it was understood that the NRD Trustee MAY cash in the letter of credit and THEN allocate funds. Please understand that dividing this potentially valuable asset can be considered a violation of the Consent Decree.

P. 18 Paragraph C. It is our understanding that ONLY the State, Kennecott, and a local water district are bound by this Decree. Third parties, including political subdivisions of the State have potential claims regarding additional

Response to E-mail No. 03-27

27-1: See Response to Common Comment No. 12. The proposal to establish two ILC's has been reviewed by the Trustee and the Attorney General's office and is not considered to be inconsistent with or contrary to the provisions of the Consent Decree.

Terminology used in the project documentation has been clarified in the July 11, 2004 revised Joint Proposal.

For claims by third parties, see the Response to Common Comment No. 10.

E-mail No. 03-27 (cont.)

27-1 expenses of water deliveries due to additional infrastructure needs caused by the contamination. Kennecott may defend against any claims. Municipalities and private owners are able to initiate actions to remedy their damages.

We thank you for considering this additional comment, and look forward to responses at your earliest convenience.

Tom Belchak

LANCE Consulting Group, L.C.
1780 W. 9000 S. Suite 301
West Jordan, UT 84088

CC: [Ron Christensen]

Response to E-mail No. 03-27 (cont.)

E-mail No. 03-28

From: [Shane Jones]
To: <nrdtrustee@utah.gov>
Date: Tue, Nov 25, 2003 12:27 PM
Subject: JVWCD and Kennecott Consent Decree/Remediation Plan

28-1 In reviewing the information on the web site, am I to understand that we are pumping contaminated water out of the ground, cleaning it, and then dumping the contaminants back into the Jordan River? Under UPDES,

cities are spending millions of dollars to try and keep contaminants out of the river.
Am I missing something? Shane

Shane C. Jones

Bluffdale City Engineer

[shanejones]

ph. (801) 446-9129

cell. (801) 870-1708

fax (801) 253-3270

"BLUFFDALE: DEDICATED TO THE VISION OF A SELF SUFFICIENT RURAL COMMUNITY WITH A UNIQUE COUNTRY LIFESTYLE"

Response to E-mail No. 03-28

28-1: See the Response to Common Comment No. 8 and No. 9.