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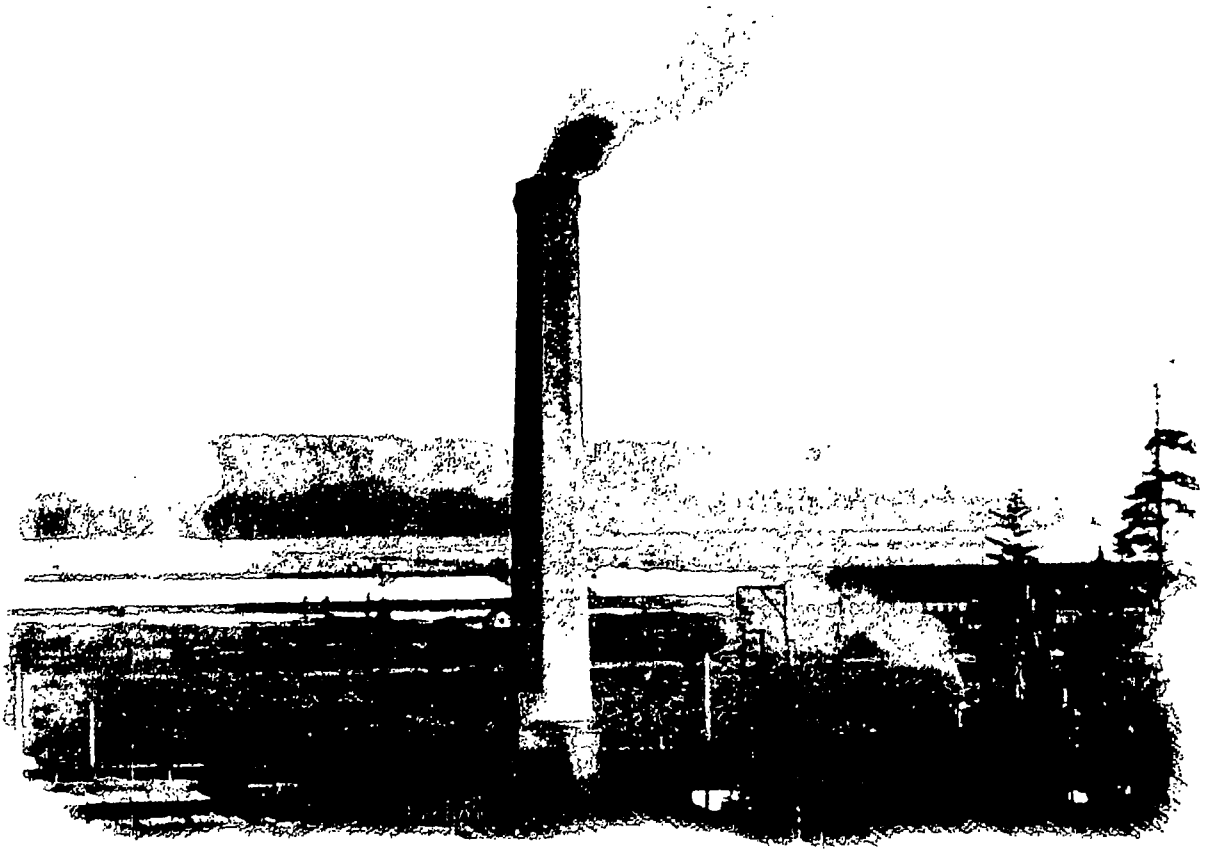
EVERETT SMELTER SITE

Everett, Washington

INTEGRATED
FINAL CLEANUP ACTION PLAN
and
FINAL ENVIRONMENTAL IMPACT STATEMENT
for the
UPLAND AREA

Volume IV



Puget Sound Reduction Works facility looking east. December 10, 1895.
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White	40	23
White	42	23
White	39	23
Wiggins	292	39
Wilson	72	37
Wohl	320	131
Wohl	319	131
Young R.S.	285	26
Young R.S.	284	26
Young R.S.	283	26
Young R.S.	282	26
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Everett Smelter Site
Integrated Final Cleanup Action Plan and Final Environment Impact Statement

Appendix B
Responsiveness Summary

Attachment B3

SEPA Scoping Comments and DCAP/DEIS Comments

Everett Smelter Site
Integrated Final Cleanup Action Plan and Final Environment Impact Statement

Appendix B
Responsiveness Summary

Attachment B3
SEPA Scoping Comments and DCAP/DEIS Comments

Attachment

SEPA Scoping Comments

EVERETT SMELTER SCOPING MEETING

Formal Comments
February 23, 1998

From Flip Chart
(collected by Rick Huey, Ecology)

1. Mediation process not completed; tonight's meeting gives a false impression of what can be accomplished. Are we on a mediation, MTCA or land use track?

2. Could comments from past documents (Ecology) be applied at this stage? Commentor addressed much that is relevant during those comment periods. *(See attached RI/FS comments from David A. Taylor)*

3. Citizens that sold homes were told they could return to enjoy a park. Also, properties sold at residential value; commercial development may raise values. Were sellers taken advantage of?

4. Why is maintaining a park (for City) such an effort?

5. Cleanup should dictate use, not vice versa. Why won't cleanup achieve pre-contamination conditions?

6. It is inappropriate for contamination to be left under homes with an exposed crawlspace. Any contamination left behind will be a stigma.

7. Very concerned about leaving contamination on-site. Who would manage it over time?

8. This is an excellent opportunity for public views/park. Tops of buildings could be used for viewpoints.

9. We don't want commercial zoning or traffic. Site should be remediated for residential use. Add residential use to scoping/land use.

Comments Noted During
Questions that Pre-ceded Formal Comment

1. Could Marine View Drive be redone as a 'parkway' similar to road near Legion Park?

2. Pea patch use of hillside (seen at Asarco open house) seems odd with concerns about liability/health.

3. Traffic access seems limiting.

violated in every way. Thank you.

MS. LEE: Okay. Viola, go ahead.

531. MS. OURSLER: My name is Viola Oursler. I live at 551 Pilchuck Path, which is very close to where the smelter site is.

I want to say that I fully support what Anne Robinson had to say in her comments. I do have a few other things that I will write out and mail in. Anne has been involved in environmental work for at least, what, seven years now, Anne?

MS. ROBINSON: Ten.

MS. OURSLER: Ten years, and she really knows what she's talking about, and I say I want to give her every bit of support to what she said, because I know it's accurate. Thank you.

MS. LEE: Thank you, Viola.

Is there anyone else who would like to comment at this time? Dave?

MR. TAYLOR: Is there anybody before me?

MS. LEE: No. You are next.

532. Mr. TAYLOR: I was going to prepare something to say, but after five years, I guess I'm pretty well-rehearsed.

My name is David A. Taylor. I live at 538 East Marine View Drive, right in the middle of this deal,

1 and it shakes me up just to stand up here and talk
2 about it. I fell the pressure on me here.
3 First of all, the mere inference that any toxic
4 material be imported to our neighborhood from down
5 below the residential district from basically a heavy
6 industrial site is definitely out of the question, and
7 I would adamantly object to any of that type of
8 activity happening.
9 It appalls me that anyone would suggest to another
10 human being that any contamination be contained in a
11 facility in the vicinity of where people live. We live
12 in a residential area, and it's been zoned for the
13 construction of homes and happy families, not the
14 construction of containment facilities for toxic waste.
15 Arsenic is something that any child will tell you
16 is a poison -- a poison. That's what we are talking
17 about here, but we've narrowed it down here through a
18 feasibility study where we are going to try to
19 entertain, after five years, the blocking off of
20 Pilchuck Path, the avenue that the fire department
21 would come and save lives, if necessary, from East
22 Marine View Drive from the north, and only after those
23 firemen show up will they be endangering their lives
24 after that house falls into a foundation that has been
25 exempted from a cleanup plan suggested by a company who

1 excavates dirt for a living and extracts the fine
2 metals from the ground, then runs off and leaves
3 whoever is left over holding the bag.
4 In other words, if you rob a bank, would you
5 suggest to the individual to pay back less than he
6 robbed? But not only do these people rob the mother
7 nature of its elements, but they leave behind the worst
8 elements known to man, which we call poison -- poison.
9 Okay. So if you entertain a thought that you are
10 going to subject anyone to poison, would you suggest
11 fencing that off with a barbed wire? Would you solicit
12 to a city with any type of respect whatsoever that you
13 build a fence higher than the accepted zoning code?
14 Would you make false accusations to citizens and news
15 media that you are going to tear down houses after you
16 have robbed them from people -- tear down houses and
17 relandscape?
18 Now let me emphasize relandscape in the
19 feasibility study. Relandscape is to remove a home and
20 then import and push dirt, highly contaminated soil,
21 into a pile 70-feet high that continues for an entire
22 block that would devour this entire building that we
23 are in many, many, many times over. Seven stories high
24 is considered a highrise in this city.
25 Commentary last evening, starting from 6:00 until

1 twelve o'clock midnight. I hope that the date has been
2 quoted here. I believe yesterday was the 16th. Was it
3 the 15th? Tonight is the 16th. It's hard to think
4 straight in these kinds of situations. People
5 mentioned things so obtrusive as cranes blocking their
6 view at a distance of almost a mile away. Cranes so
7 great in height that they couldn't be destroyed in a
8 day, blocking the view of the Puget Sound.
9 To instigate moving something so hideously large
10 as a 70-foot pyramid volcano cesspool of elevation --
11 any number of different descriptions have been given to
12 this suggested ideology after five years of intensive
13 engineering study -- to suggest that the general public
14 accept something like this into the city of Everett is
15 just beyond my imagination.
16 Now, I have tied my children down, one of them to
17 a board, combined with my wife, to have blood extracted
18 after the infant was born to see it that child had been
19 affected by contamination, and after that ordeal and
20 all my other children have been tested, inclusive of
21 myself, we found out that the vials had been mischanged
22 and mislabeled. So accidents happen. So we had to go
23 back and do it again, but only after that did we find
24 out, oh, my goodness it's only detectable in the blood
25 after two hours of exposure. Well, how much exposure

1 are you going to get when there is snow on the ground
2 or heavy rain has fallen? Not to say the least of the
3 animals that drink this water that runs off this toxic
4 hillside.
5 My cat was photographed, and the family pets were
6 photographed by the news media. They were also shaved
7 of their fur and tested. Two of those three pets are
8 now dead as of this month. All that is left of those
9 pets are their photographs, but not before a health
10 advisory came out that said do not pet your pets,
11 because their fur is contaminated; not before my
12 children were told through health advisories don't go
13 outside and play in the yard, and if you do, have full
14 coverage on, and don't chew gum; not after my house was
15 vacuumed more than once. Just imagine in your mind's
16 eye someone knocking on your door with vacuuming
17 equipment and saying I'd like to come in here and
18 disturb every room in your house and check for poison;
19 would you put your kids in the kitchen while we do
20 this. Then after that, get a letter in the mail that
21 says the poison in the children's room on the
22 children's rug is so excessive that we would like you
23 to limit their activities in their bedroom.
24 I ask of anyone listening to this commentary, is
25 that a humanistic thing to tolerate? To look out of

1 the view window of your home and see a sign that says
2 Toxic Park, because people have been beaten into
3 submission by this company world wide who has ended
4 this predicament 60 times or more right now, and ask
5 you to show up here tonight, a night when your children
6 are performing down at the City Auditorium down here in
7 the middle of the city, one of which I have a child
8 participating in right now, and add these kinds of
9 events up over five years.
10 It takes my breath away, because I will never be
11 able to revisit those times, and somehow over and over
12 citizens have congregated and said people are running
13 from our homes. They won't visit us. Our real estate
14 value is done down to nothing.
15 Our kids don't understand why they can't run out
16 in the yard when the sun shines, like the rest of the
17 children through the sprinkler for fear they are going
18 to get mud on their food, skin their foot, and ingest
19 poison, and try to go to sleep at night before asking
20 their father and mother is this little thing on my foot
21 a result of poison, dad or mom.
22 My daughter, five years old, at Hawthorne
23 Elementary School which sets on the downwind side of
24 fallout here is learning how to pronounce words and
25 write letters she copied off the side of the neighbor's

1 house, who was one of the customers that Asarco
2 entertained a purchase offer that was an ordeal almost
3 two years long, when they finally did release them of
4 the responsibility of selling their health.
5 MS. LEE: You have one minute.
6 MR. TAYLOR: Thanks. I didn't know there was a
7 limit. How long does this last?
8 MS. LEE: There is a ten-minute limit on comments,
9 so try to conclude them. You have a minute left, Dave.
10 MR. TAYLOR: I only have about an hour and a half
11 left, so I'll come to the next one, too. Let it be
12 noted that I've been cut short here, and we will be
13 adjourned after I complete, I guess.
14 MS. LEE: Yes, we will adjourn after you speak.
15 MR. TAYLOR: At any rate, I would like to
16 adamantly object to any plan which has such hideous
17 ideas in it that I can't even stand down there at
18 Pacific Copy & Printing without having a bunch of
19 people ask me for permission to understand what the
20 hideous thing I'm having this company copy is, and all
21 it was was a depiction of what the preferred
22 alternative Asarco has, which is a seven-story toxic
23 volcano that could ooze for years and leave the City of
24 Everett holding the bag under pretenses that if it's --
25 Viola, help me here. What is it when we set up a guard

shack with barbed wire? That's institutional controls. Thank you very much.

MS. LEE: Thank you, Dave. Okay. Any more people that want to comment? Okay. Please remember that there are forms on the back table. If you want to write a comment or if you have anything more to say you didn't have a chance to say tonight, please feel free to write them, or come to the next public hearing which will be in a week and a half; Tuesday, November 28th.

On behalf of Ecology, thank you for coming tonight. I appreciate your cooperation and your courtesy.

This hearing is concluded at 9:10 p.m.

for thousands of years, actually until somebody moves, that arsenic, it's going to stay right where it is right at the present time. So I question how long that plastic liner will be effective.

Anyway, I guess as my final statement I would say we need to do a cleanup so the children who live in the area in homes where there has been contamination can play in their yards and have the freedom that children should have in order to develop properly. That concludes my remarks, Susan. Thank you.

MS. LEE: Thank you, Viola. Dave Taylor.

537. MR. TAYLOR: My name is David A. Taylor. I presently reside at 538 East Marine View Drive.

This will be the second portion of my testimony. I gave it a good shot last time and ran out of time. So we are going to hit it again tonight, a little bit more specific this time to technical improvements, at least along the way in my five years of this saga.

Seven parts per million seems to have been a level set by the State, and the way I was raised, when somebody sets the speed limit and you exceed the speed limit, you are putting yourself in the liability of punish. Anything above seven parts per million is going to punish me as a homeowner, and I am not just talking about out in my yard. I'm talking about

1 underneath my house where I crawled myself today to
2 change a furnace filter.
3 I would rather have seen in a feasibility study
4 diagrams showing me how my water pipe was being
5 protected from excavation accidents, rather than cross
6 sections of 70-foot high eyesores imposed on a city
7 that's going to be wearing that tattoo the resist of
8 its existence, if it manages to survive something as
9 hideous as that. I would have rather seen diagrams
10 that showed me how my human protection was going to be
11 dealt with concerning such simple things as furnaces
12 and how those crawl spaces would be capped and or
13 solidified or my house jacked up, which seems to be a
14 common practice if houses are moved. It doesn't seem
15 to be that difficult of a task, but in this case if we
16 want to clean up underneath a house, somehow our
17 engineering intelligence doesn't break that barrier.
18 Any remediation of yards -- in other words, the
19 soil that is left after they get done cleaning up
20 should be fertile soil, I would expect, in no less
21 depth of two feet. Now, any common individual who has
22 had his hands on a cultivator as a result of trying to
23 grow his own food if he is out of work, which has
24 occurred to me, is going to see that cultivator digs a
25 little bit deeper than six inches the minute you start

to put it in gear. It can dig down to two feet no problem, and certainly if you listen to the feasibility study here, you will see it will be kicking gravel up into your pant legs after it digs six inches, and only then you've destroyed the top soil that has grass on it after they've left.

The boundaries that will be cleaned up should be governed by who is inhabiting that existing place after they have done their purchase plan. I wouldn't expect in any feasibility to see any barbed wire fenced left behind that indicated to me World War II tactics with prisoners. I would expect with the City involved that aesthetics be paramount, not blocked pyramids that we can see in Egypt if we want to go back in time. Come on. Let's be realistic.

I want to see inspection plans of filtration systems for the people left behind that are breathing air while this mass excavation is going on. I want to see rugs vacuumed. I want to see samples done.

I want to see samples of drinking water that's supposedly protected by pipe that in my instance is probably 50 years old coming into my house. Pipes rust out. They leak. This city has discovered pipes that have leaked for years in excavated and undermined properties that have become deep holes of concave

1 evidence; fail-safe systems that would allow us to
2 believe if excavation accidents happen with water
3 pipes, that you would be protected at your home, maybe
4 at the curb even with some sort of filter that would
5 extract carcinogenic metals dangerous to your health.
6 I would rather have seen in the feasibility study
7 a map of water supplies where they came into a 720,000
8 parts per million property and exited it, what the
9 potential of contaminating not only this area that
10 we've seen on these maps, but the entire city. Anybody
11 drinking that water would be drinking that pure arsenic
12 trioxide if it got into the pipe. Catastrophic, to say
13 the least, as far as health is concerned.
14 I wouldn't expect to see existing streets and
15 existing alleyways blocked off by this hideous
16 containment facility which is called in every other
17 text book that I've been able to get my hands on a
18 toxic waste dump, but an exemption would be given to
19 these people only because they are going through the
20 steps and through Ecology, who is doing the best they
21 possibly can.
22 I've seen the City kind of hide from this whole
23 thing. I want to see them get involved. They are
24 responsible for the health and welfare and the
25 protection of the average citizen. That is right in

1 the definition of what a city does. A city is
2 comprised of citizens. If you don't have a healthy
3 citizen, you don't have a healthy city.
4 I will also be including some written comments,
5 because there is no way I could cover everything
6 tonight nor could I cover it last time, but I would
7 like to thank anyone who has come along five years now
8 to this point and had the courage to object to the
9 treatment that they have been given, and that needs to
10 go on record, because it's a terrible strain on a
11 person's health, welfare, and basic existence.
12 We don't need a monument reminding of this
13 incident 100 years from now or 50 years now or this
14 weekend when we wanted to have a party out here.
15 I guess in conclusion, if any soils are left here
16 above seven parts per million, I would definitely want
17 to see some instituted control for the protection of
18 the citizen in the form of maybe a health insurance
19 policy, a title insurance policy, an escrow fund that
20 could be accessed by someone being beaten to a pulp
21 over having their plumbing excavated in their yard over
22 six inches, as indicated in the feasibility study.
23 It's an emotional thing, and I think all of us are
24 going to have to face up to the fact that we've got to
25 do something better than cover it up like a pile of dog

manure, because that is the mentality our animal uses when he dumps in our yard.

This stuff has been dumped here for -- what are we barking on -- about 90 years now. The best we can do is cover it up? I don't think so. So I believe in my heart that it needs to be taken away from here and dealt with in a facility that has been created for this purpose. Thank you very much.

MS. LEE: Thank you, Dave. Is there anybody else who would like to comment?

MS. ROBINSON: I have a brief statement by somebody else. May I read it?

My comments tonight were my second comments. I commented the last hearing. In the interest of time, I did not make that statement. I was so panicked by the seven-minute limit.

538. This statement was written by Louise Uriu, 4534 Seahurst Avenue, Everett 98203. She is the co-chair of the Harborview Seahurst Glenhaven Neighborhood Association and representative to the Council of Neighborhoods.

As an Everett resident and neighborhood leader, I am dismayed by the Asarco catastrophe currently being endured by the residents of the northeast neighborhood. The blameless homeowners are at great risk of losing

CITY OF EVERETT
PLANNING COMMISSION MINUTES
March 3, 1998

The meeting was called to order at 6:30 p.m. by Vice Chairperson Don Chase. Other Commissioners in attendance were C.J. Ebert and Drew Nielsen. City staff present were Paul Roberts, David Koenig, Bob Landles, Allan Giffen, and Sue Kimbler from the Planning Department, and Mark Soine, City Attorney.

Item #1: Update on ASARCO Area Environmental Mediation Process

Paul Roberts, Planning Director, explained that the City of Everett is participating in an environmental mediation process on the ASARCO site in north Everett, where dangerous levels of arsenic and other metals have been found. Besides the City, involvement includes ASARCO, the neighborhoods, businesses, the State of Washington Department of Ecology (DOE), the Everett Housing Authority, the County Health District, and the PUD. This workshop is the second related to developing a scoping notice for the environmental impact statement and review for the site remediation under the Model Toxic Control Act (MTCA). It is also intended as a briefing for the Planning Commission.

Under the MTCA, the State Department of Ecology has the lead responsibility to proscribe a clean-up action plan for the ASARCO site. The City of Everett has the responsibility of designating its land use. Different land uses require different clean-up levels; i.e., a clean-up level for a residential use is likely to be more stringent than a clean-up level for an industrial land use. Land use alternatives will be presented tonight; they represent concepts and are not final alternatives. The final land use recommendation and the clean-up method will comprise one document.

Following the issuance of the draft clean-up action plan, there will be another public comment period, during which DOE will hear comments on the clean-up action plan and the City will hear comments on land use alternatives for the site. Then DOE will issue the final clean-up action plan, and the Planning Commission will make its land use recommendation to City Council.

Dick Ramsey of Merritt and Pardini said his firm had been working with the subcommittee that was formed to discuss the in dealing with the site. Five goals were identified in planning for the site:

1. clean up and re-use the site
2. ensure that the use is compatible with adjacent uses
3. ensure that it has a positive impact on the neighborhood
4. provide economic improvement (provide jobs and taxes)
5. provide public access to the view

The fenced area is approx. 6 acres, and the homes in that area have been removed. Surrounding streets are Broadway and Marine View Drive; it is served by Butler Street on the south, Pilchuck Path runs up through the center of the site, and Hawthorne comes through the upper portion of the site. The site is sloping, with good views of the river valley. There is another area of approx. 5

acres to the south (going down to Butler Street), and this is called the south expansion area. There are also 3 homes to the west owned by ASARCO, and this is called the west expansion area.

Regarding adjacent land uses and trends, the Port of Everett now owns much of the Weyerhaeuser property below the subject area, where there are plans for redevelopment and new industrial and commercial uses. That will probably involve a new access road off Marine View Drive and reworking of the interchange and street. There have also been a number of new multi-family residential projects in the area. The current zoning of the site is single family residential, and much of the property around it is multi-family. There are also institutional uses (schools).

The committee agreed that the zoning may need to be changed - that perhaps single family is not the appropriate zoning for the future. There appears to be an opportunity to provide an open space amenity such as a park, and people also recognize that this is a gateway to Everett and the distinctive character of the site should be retained. The use of this site could complement activities taken by the Port of Everett; i.e., if there is an industrial user on the lowlands who has an office need, this could be a good site for view-oriented offices. It was also suggested that there may be a way that development on the site could benefit a non-profit or institutional user that wouldn't otherwise be able to afford such a site. Five general directions were identified for further discussion:

1. No action - leave the site as is after clean-up.
2. Fenced open space with no public access.
3. Park/open space with active or passive uses.
4. Office space with appropriate buffers for surrounding uses.
5. Mixed park and office space.

Regarding suggestions for a park, the City of Everett is not interested in owning/maintaining a park on this site. Its Comprehensive Park and Recreation Plan that does not include a neighborhood park on this site, and there are limited park funds available.

Port opportunities continue to emerge, and a point that continued to come up was that the traffic on Marine View Drive is likely to worsen, so the access to the site will be an issue.

Regarding the south expansion area, it seemed that if there were an office or institutional development, that would in turn suggest that the rest of the block down to Butler ought to evolve into similar kinds of uses, perhaps office or multi-family housing. Some component of residential use was felt to be desirable there as a transition between what is developed on the 6 acres and the expansion site.

Regarding the west expansion area, this could be a good location for some kind of park or open space amenity in conjunction with Hawthorne Street. It would be a good building site and is not a part of the site that would require extensive remediation, so it might make a good foundation for various things.

The consensus of the mediation group was that it is important to balance the amount of buildings and open space, maximize the views from the site, be concerned about views of the site in terms of this entry to Everett, and integrate the infrastructure with the clean-up. Three general concepts for site uses were arrived at 1) a park with a small institutional use; 2) an institutional user; and 3) an office use that supports a small view park. In each of those cases, discussions included what has to happen to take the next steps., i.e. finding a park operator, locating an institutional user, etc.

Answering questions about the timeframe, Paul Roberts explained that the clean-up action plan is expected to be issued in early 1999 and then the actual clean-up will take place. City staff will bring recommendations concerning land use to the Commission for public hearings sometime in the last part of 1998 or early in 1999.

Answering questions about clean-up for multi-family use, Mr. Ramsey stated that ASARCO owns the property and does not wish to have it develop with residential use because of the cost of remediation and because of having a potential environmental liability. If the site is cleaned and people move back onto it, they may bring claims against ASARCO for a perceived or real problem.

Paul Roberts noted that although ASARCO has indicated it is not interested in seeing residential uses on the site, it is fair that residential use be considered as an alternative, and the environmental trade-offs should be studied during this stage of the process.

CITIZEN COMMENTS

George Deane, 525 Hawthorne, Everett, stated that the residents of the Northeast Neighborhood would not be in favor of any of the five land use suggestions mentioned tonight. Regarding proposals for multi-family development, he said it is his understanding that the City has mandated that all new multi-family housing to be developed north of 19th Street, which seems to designate his neighborhood as less distinctive, less respectable, and less esteemed than other neighborhoods of Everett, as multi-family housing eventually slips into disrepair. Regarding commercial and institutional uses, including the proposal to extend the area to encompass the entire area south of Butler Street for future commercial expansion, these suggestions do not show concern for the people who live there. The neighborhood residents would propose the following:

- The removal and off-site disposal of contaminated soil within the fenced area to a depth of two feet and replaced with a cap of clean earth.

- Establish a low-maintenance viewpoint, picnic strip park on the east side of upper Hawthorne Street with parking on the west side.

- Return the remainder to the construction of single-family dwellings as in the past.

David Taylor, 538 East Marine View Drive, Everett, thanked Mr. Deane for describing how the residents feel. He said the neighborhood had been a quiet community until it was discovered that toxic waste was left behind. Residents have been intimidated out of their homes for the last eight years, without recognition from the City. According to ASARCO, the challenge of cleaning up the six acres is so great that the only solution is to cap it and convert the neighborhood to commercial property, but this is not the case. If it is cleaned up properly by professionals, the site can have any

use. The area across the street from this site is a railroad switching yard, which could easily take all the excavated soils from this site, leaving the residential neighborhood as it is. Although ASARCO assured the residents that it had no interest in commercializing the site for profit and that it would be up to the citizens to decide what land use they preferred, that does not seem to be the case, especially with ASARCO purchasing nearby areas that are not going to be cleaned up, an act that seems unrelated to the clean-up action. ASARCO has bought many nearby homes and rented them to low-income families, which seems at odds with their claims of being a health-conscious company. The area residents take pride in this neighborhood and enjoy its wonderful views. He asked that the City approve Mr. Deane's suggestions for the neighborhood.

Ann Black, 528 Hawthorne, said she was speaking as a neighbor and parent. In her four years in the neighborhood, she has appreciated the views and the sense of community. She said the area has historical value and is described as an entryway to Everett, and asked that the Planning Commission consider what the citizens want done there. One of the negative things occurring in the area is low income and multi-family housing, and renters don't always care for the property the way owners do. She does not want the Northwest Neighborhood to be the place for single family residents to live and the Northeast Neighborhood to be a commercial area and dumping ground for multi-units for renters. She asked that it not be rezoned.

Karl Yost, Wilder Construction Co., 1525 E. Marine View Drive, wondered if anyone has considered the cost of rendering the metals in these soils non-leachable so they can be used as fill on other waste sites. The cost might support that option more than some of these other proposals.

The public hearing was closed.

Paul Roberts said that regarding comments that City mandates new multi-family projects to the north of 19th, there is no such mandate. The City receives proposals for multi-family projects throughout the city where there is multi-family zoning.

Rick Huey, Department of Ecology, 31901 60th Avenue, Bellevue, stated that when the draft clean-up plan is completed, it will be available at the public library, the Department of Ecology in Bellevue, ASARCO Information Center, The Snohomish County Health District, and the City Planning Dept.

Dave Koenig informed those present that the Planning Commission's next meeting will be held on March 17, 1998, and the topics will be the draft multi-family design guidelines, Wireless Communication Facilities request for code amendments, and the Lane Annexation zoning.

The meeting was adjourned at 8:15 p.m.

Respectfully submitted,

_____

Paul A. Roberts, Secretary
Everett Planning Commission

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MAR 02 1998
DEPT. OF ECOLOGY

February 26, 1998

Everett Smelter Scoping Comments
Department of Ecology
Michael J. Gallagher
3190 160th Avenue SE
Bellevue, WA 98008-5452

Re: EIS for the Everett Smelter Site

Dear Sir,

1. All concentrations of arsenic over 760 p.p.m. (the State dangerous waste level) should be removed from the entire site -- including the fenced area that ASARCO owns. Removal of these high levels is the only permanent solution that is acceptable for contamination of this nature which is located in a residential neighborhood.

2. The fenced area that ASARCO owns should be actively developed into a use compatible with the community -- preferably a park. Removing everything over the dangerous waste level will help to further development.

Thank you for letting us respond.

Sincerely,

Clayton Couture

Marilyn Couture

Marilyn and Clayton Couture
291 Ehilani Street
Pukalani, HI 96768

(808) 572-3055

BARGREEN COFFEE COMPANY, INC.
2821 RUCKER AVENUE, EVERETT, WASHINGTON 98201
(425) 252 - 3161 FAX: (425) 259 - 4673 (800) 884 - 3161

2-18-98

TWIMC:

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FEB 18 1998
DEPT. OF ECOLOGY

Reg: Everett Smelter

My greatgrandpa had a boarding house at the smelter. My Dad told me about where it was. Also, that the tailings were used to make the R.R. bed up to Big 4. So the contaminates are along the highway to Granite Falls & beyond.

You can find out more information from old people that lived during the smelters operating time.

Howard Bargreen

RECEIVED
MAR 09 1998
DEPT. OF ECOLOGY

WASHINGTON STATE DEPARTMENT OF
Natural Resources

JENNIFER M BELCHER
Commissioner of Public Lands

March 6, 1998

Everett Smelter Scoping Comments
Department of Ecology
Michael J. Gallagher
3190 160th Ave. SE
Bellevue, WA 98008-5452

RE: Everett Smelter Cleanup

Dear Mr. Gallagher:

Washington State Department of Natural Resources (DNR) has reviewed the Determination of Significance and Request for Comments on Scope of EIS for the Everett Smelter. Washington State asserted ownership (through article XVII of the state constitution) to the "beds and shores of all navigable waters in the state . . .," except those sold according to law. The State of Washington owns its aquatic lands in fee, and abutting owners and others wishing to use state-owned aquatic lands must obtain prior authorization for use of the land from the state. DNR is concerned with any and all contamination or possible contamination that could affect this ownership.

DNR has the following comments concerning the Everett Smelter:

General Comments:

DNR is requesting to review any comments on the Everett Smelter monitoring study that would affect state owned aquatic lands.

DNR is requesting to review any comments on any area on the Snohomish River that would have been used for historical loading and unloading of ore.

DNR may require additional sampling to comprehensively delineate contaminated sediments as regulated by the sediment management standards-WAC 173.204.

Please call me at 360-856-3500 if you have any questions.

Sincerely,

JoAnn E. Gustafson

JoAnn E. Gustafson
Land Manager Snohomish and Island Counties
Northwest Region

c: Tom Munford, Celia Barton, Chad Unland

NORTHWEST REGION ▮ 919 N TOWNSHIP ST ▮ SEDRO-WOOLLEY, WA 98284-9395
FAX (360) 856-2150 ▮ TTY (360) 856-1371 ▮ TEL. (360) 856-3500

EXECUTIVE DIRECTOR
Allan L. White

Housing Authority of the City of Everett

COMMISSIONERS
David Dorsey
Lyle Ryan
Michael Sells
Barbara Yates

RECEIVED
MAR 12 1998
DEPT. OF ECOLOGY

March 11, 1998

Michael J. Gallagher
Section Manager
Department of Ecology
3190 - 160th Avenue SE
Bellevue, WA 98008-5452

Dear Mr. Gallagher:

RE: Everett Smelter Site
Comments on Proposed Scope of Environmental Impact Statement

The Housing Authority of the City of Everett desires to formally comment on the proposed scope of the Environmental Impact Statement for the Everett Smelter Site cleanup.

We object to the conclusion identified in Ecology's Request for Comments that "The approximate six-acre fenced area will undergo a change in land use." We also object to the failure of the proposed scope of the EIS to include an evaluation of the option of maintaining the site in residential use.

The "fenced area" is currently both zoned for residential use and identified as residential in the City's Comprehensive Plan. The surrounding area is also residential. There has been no action initiated (much less concluded) to change the legal land use designation for this area. It is therefore inappropriate to limit the land use options to be evaluated in the EIS to non-residential uses.

We appreciate this opportunity to comment on this matter.

Sincerely,

Allan L. White
Executive Director

cc: Paul Roberts, City of Everett Planning Director

document1

3107 COLBY•P.O. BOX 1547•EVERETT, WA 98206-1547•(425)258-9222•TDD/TTY (425)303-1111•FAX (425)303-1122

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Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

Having attended the February 23, 1998 PUD meeting and reviewed the choices of land use options presented for the fenced-in smelter area, I think I can say with confidence that if we, the community, were given a vote on which of the six or seven options we most preferred, including the "do nothing," the overwhelming majority would mark "none of the above," because none indicate any input from the community. Most would require rezoning from residential to commercial which would allow anyone to set up a business n his front yard or out of his garage. We don't want that or any other form of parcel rezoning. Nor do we have any desire to accept the indicated influx of commercial traffic through the neighborhood. Another presentation proposed the relocation of surface soil from "here," piling it "over there," and putting a cover over it, which we find completely unacceptable.

I'm told that the City of Everett has mandated that all new multiplex housing construction must be confined to the area north of Nineteenth Street. Does this mean our homes have less distinction, less respectability, are h in less esteem, our families inferior to the resident citizens on the other side of the line? More and more our neighborhood is being saturated with additional multiplex housing complexes. Sooner or later, one by one, these will slip into disrepair, deterioration and decline. Today's concentrated construction is building tomorrow's ghettos. This has already been proven true in other cities, so we reject the prospect of this eventuality as well.

Let's consider some basic, honest, facts: In the past one hundred years five generations have set out fruit trees, planted gardens, and raised children on this site. Your findings indicate only one, and a possible second, case of individual ingestion of toxic heavy metals, and neither case can be pinpointed to the slag site as the cause. Yet twenty-two families were dislocated, required to abandon their homes, many through intimidation and fear of death. I myself when first approached by ASARCO representatives, asked the question, "What if the soil tests indicate upper levels of PPM but I refuse your buyout offer? What then?" The answer, "Then you will be considered part of the problem and you will be billed."

Then came the tests, soil tests and repeated soil tests, carpet dust and entryway samplings, hair and urine sampling. All of which proved negative. I was then contacted by telephone and asked if I had reconsidered the buyout offer, and later given the "opportunity" to be retested.

Then came the studies, unending studies by a half-dozen private and public organizations, agencies and offices. We are now informed we are in the "coping" stage with still more studies pending. It probably has never occurred to any of you the degree of concern, worry, and stress all of this has placed upon us. One of your displays indicates extending the scope of the fenced area to encompass the entire area south of Butler Street for future commercial expansion without the slightest concern that people live there. Consequently rumors fly: Behind the scenes influence with an eye on the real estate, pulling strings, the Navy wants an antenna site, etc. You have succeeded in removing our neighbors from their homes and now propose to move in institutions and employers, occupying the grounds and sitting around in offices. I see little difference between this and people

playing in their yards and sitting around the kitchen table. It's the same real estate. What has been accomplished here?

Three years ago ASARCO removed and replaced my garden soil down to a depth of two feet. If this depth is considered adequate health protection in the growing of foodstuffs, surely it would provide adequate exposure protection for normal family habitation. At the February 18th neighborhood ASARCO meeting a representative said this was "not practical because years down the road the decision might be made for a more extensive removal." I suggest that during the one-hundred years since the smelter was in operation the contaminates have leached down to bedrock, and this is the only practical solution.

Mining and smeltering are sister industries. The laws governing surface strip mining require the land to be restored to its original condition. Reason follows that the same regulation should apply to abandoned smelter sites.

If the community had been given the opportunity to submit their addition to your multiple 4' x 8' visual aid displays it would indicate the following:

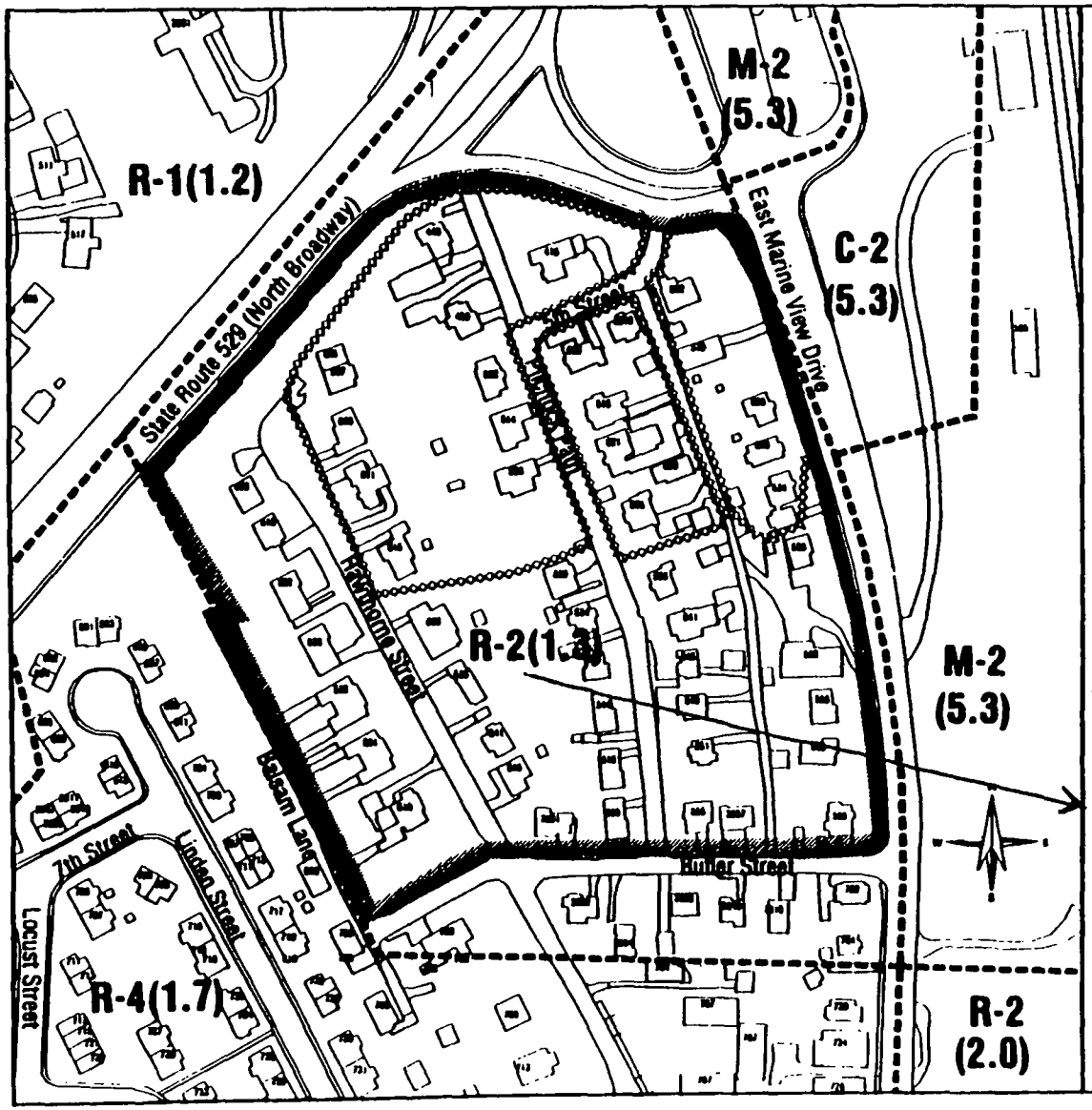
- The removal and off-site disposal of contaminated soil within the fenced area to a depth of two feet and replaced with a cap of clean earth.

- Establish a low-maintenance view point, picnic strip park on the east side of upper Hawthorne Street with parking on the west side (surely the Parks Department can work this in).

- Return the remainder to the construction of single-family dwellings as in the past.

To paraphrase a Ronald Reagan quotation: Mr. ASARCO, tear down this fence!" Give us back our community.

March 3, 1998
George C. Deane
525 Hawthorne
Everett, WA 98201



Everett Zoning & Comp. Plan Designations at ASARCO Site

Scale (In Feet)

150 0 150

Area subject to potential land use changes

Zoning Boundaries

M-2 Existing Zoning Designations

- R-1 Single Fam. Detached Low Density
- → R-2 Single Fam. Detached Med. Density
- R-4 Multiple Fam. High Density
- C-2 Heavy Commercial-Light Ind.
- M-2 Heavy Manufacturing

(5.3) Existing Comp. Plan Designations

- 1.2 Single Fam. Detached, 5-10 DU/Acre
- → 1.3 Single Fam. Detached, 10-12 DU/Acre
- 1.7 Multi-Fam., 30-50 DU/Acre
- 2.0 Parks
- 5.3 Light Industry

Map Date 1/26/98

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

Why are you people wasting your time and mine when we both know the toxic waste area needs to be cleaned up. There is no question about it. No one wants to live there the way it is. Would you buy a home if someone told you it had some kind of a toxic problem? I don't think so.

Date: 3/14/98

Name: Richard Coins

Address: 5728 92nd St.
Marysville, Wa
98270

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
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I strongly believe that the fenced area should be cleaned up (with the toxic waste being removed to a licensed facility) and returned to residential use. It is totally unacceptable to leave it as it is in a residential area. I have two small children that I would like to be sure that it is safe from at least that type of problem.

Date: March 15, 1998

Name: Kari Livermont

Address: 1101 E. Marine View Dr Everett, Wa 98201

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

I believe you should remove all the Arsenic from the soil and return the area to residential. You should treat the fenced area the same as the rest of the site. I don't think it would be a good idea to take the chance of seriously injuring or killing someone just because you dont feel like spending money to clean up a mess.

Date: March 15, 98

Name: Rachael Carpenter

Address: 1109 - b E. Marine Vw Dr.
Everett, WA, 98201

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

It has come to our attention that it is proposed that the land be left as it is (contaminated) and fenced off. This is an unacceptable solution to this problem. We would like to see it cleaned up and returned to the residential neighborhood, so it would benefit our neighborhood instead of hurting it. If it is left as it is it will never go away.

Date: 3-16-98

Name: Craig & Linda Tedrick

Address: 1107 E. Marine View Dr.
Everett, Wa 98201

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

Please restore the "fenced area" to residential use.
This will again put tax monies back into the tax base for the City. This will also ensure the community to never have this type of problem again

Mary B. Carpenter
P.O. Box 83
Silvana, Wash 98287

Date:

Name:

Address:

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

WHY ARE YOU EVEN CONSIDERING NOT CLEANING UP THE TOXIC WASTE SOIL. THIS IS NOT AN OPTION IT IS SOMETHING THAT NEEDS TO BE DONE. CONTAMINATION IS AIR BORN AND CAN BE CARRIED BY THE WIND. THIS PUTS THE NEIGHBORING HOMES IN DANGER. THIS CONTAMINED SOIL SHOULD BE TAKEN TO A LICENSED FACILITY THAT CAN DISPOSE OF IT PROPERLY.

AS FAR AS WHAT TO DO WITH THE CONTAMINATED AREA, THE PEOPLE OF EVERETT SHOULD DECIDE THAT.

Date: 3/13/98

Name: KAREN COINS

Address: 7520 47TH AVE N.E.
MARYSVILLE, WA
98270

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

I believe the contaminated soil should be cleaned up and the area be as it was - A Residential Area. Office buidings do not look good in a residential area.

The toxic soil should be cleaned up. Would you let your child play there? Toxic waste is harmful to everyone and everything

Date: 3/15/98

Name: Shawnna Failla

Address: 10123 SE 67th

Marysville, Wa

98271

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

Remove all contamination from Fenced area & place in licenced Landfill Facilities. High levels of arsenic do not belong in a residential area.
Return the fenced area to residental use to restore the community & the tax base.

Date: 3/15/98

Name: CATHERINE CARPENTER

Address: 1109-B E. MARINE VIEW DR
EVERETT WA 98201

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comments below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

I think that the arsenic Should be removed from the ground. Its not safe for the kids to play in contaminated grounds. All toxic materiels should be removed. Also the fenced area be returned to all residential streets

Date: March 15, 98

Name: Steve Ensign

Address: 1525 Virginia Ave.
Everett, WA, 98201

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

Clean up the fenced area the same as the rest of the site & return it to residential use.

Contamination does not belong in our neighborhoods
Get it out of there

Date: 3/16/98

Name: Meg Greenleaf

Address: 3001 76th Pl SW
Everett, WA 98204

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

I would like to see the contaminated area in our neighborhood cleaned up so it is safe for our neighborhood. It should be cleaned up and put into a licensed area. I would like to see it returned to our neighborhood and put into some use benefiting our neighborhood.

Date: 3-16-98

Name: MARVIN LIVERMONT

Address: 1101 E MARINA VW DR. EV. WA. 98201

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

This soil should be dealt with according to. Remove the contaminated soil and clean it up the right and responsible thing. Do it right

Date: 3-13-98

Name: R E Dixon Jr

Address: 1111 Walnut Ave
Everett WA
98201

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

It has come to our attention that the area in North Everett where the old ENSARCO plant once stood has become an eyesore to the community. Some of the homes have been torn down others have been vacant and fenced. This is the north approach to Everett and it is not an inviting sight to see. It is my understanding the people of Everett would like to maintain this land ~~as a public~~ for public use. As the northern approach to the city of Everett as it stand now it is an eyesore. My two youngest grand-children live in that area and I worry about their future mental capabilities due to the contamination in the soil. Please help the city of Everett, and the people that live in this area and yourself by cleaning it up

Date: March 15, 1998

Name: Ward & Carol Hughes

Address: 5679 Whitehorn Way
Blaine, Wa 98230

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

I THINK THAT IT'S IMPORTANT TO CLEAN UP ALL THE TOXIC MATERIAL & CONTAMINATED SOIL. ALSO WHY NOT SPEND A LITTLE TIME & EFFORT TO RESTORE THE NEIGHBORHOOD SO THERE'S MORE HOUSING WHERE IT IS NEEDED AND IT WILL BRING MONEY TO THE COMMUNITY AND CITY GOVERNMENT PLUS IT WOULD MAKE THE NORTH END LOOK NICER AND IMPROVE THE SCHOOLS.

PLEASE THINK LONG AND HARD ABOUT THIS DECISION AND MAKE THE RIGHT DECISION

THANK YOU

Date: 3-15-98

Name: JOHN M. CARPENTER

Address: 1525 VIRGINIA AVE
EVERETT WA
98201

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
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The fenced area needs to be restored to residential use.

This in turn will improve the tax base for the City of Everett. Lets get this taken care of once and for all.

Ray Carpenter
PO 153
SILVANA WA
98287

Date:

Name:

Address:

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
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I would like for the fenced area contaminated with arsnic to be totally cleaned up for the benifit of the neighborhood and future residential space. As a non-biodegradable substance it is a potential health hazard for future generations wishing to reside in this area.

Date: March 15th, 1998

Name: Karen Carpenter

Address: 1525 Virginia Ave #1
Everett, Wash
98201

s, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
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Toxic waste is harmful to your health. This is a proven fact. Clean up the soil. It's the right thing to do.
The area should also be left as a residential neighborhood. It started out as a business area and the people changed it to a residential area. That must of been what they wanted.

Date: 3/13/98

Name: Bill Coins

Address: 7520 47th Ave N.E.
Marysville, Wa 98270

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

Needs to be cleaned up because it is a health hazard and can cause harm to everyone. Clean up your act Everett and do the right things.

Date: 3/13/98

Name: Chrisy Grant

Address: 123 Armor Rd
Marysville, Wa
98270

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

Keep the [illegible] from the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Date: 3-14-98

Name: Roberta Reed

Address: [illegible] Norman Road
[illegible] WA [illegible]

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

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2) fold and mail it to the address on the back before March 16, 1998.

[illegible]

Date: [illegible] 1998

Name: [illegible] Neef

Address: [illegible] Norman Road
[illegible] WA 98292

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

The fenced in 6 acres should be used residentially, and returned to the neighborhood; rather than being used to dump toxic substances.

Date: 3/15/98

Name: Pamela Ensign

Address: 1525 Virginia Ave #1
Everett, WA 98201

Yes, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
1) give it to Ecology at the public meeting on February 23, 1998 or
2) fold and mail it to the address on the back before March 16, 1998.

I don't feel that leaving arsenic in the ground would be the best choice. I don't want me or anyone else to be killed from other people's choices. I don't feel this would be the best choice. Please remove the arsenic from the ground and save your people!!! Make it clean enough for people to live upon.

Date: 3/5/98

Name: Crystal Wilkerson

Address: 8915 Valhalla Dr.
Everett, WA 98208

Y[illegible], I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
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2) fold and mail it to the address on the back before March 16, 1998.

THE FENCED AREA EYE SORE is zoned Residential And Should be restored BACK TO BACKROUND levels of Arsnic, etc.... ASARCO prospered By Adding Polutants to this Area And therefore should Pay for Removal to A HAZardous waste facility. Once ASARCO folds then who is responsable?

Date: 3-10-98

Name: Michael A. Carpenter
MICHAEL A. CARPENITER

Address: 1109½ EAST MARINE VEIW DR.
Everett Wa. 98201

Yes. I would like to comment on the Scope of the Environmental Impact Statement for the E ett Smelter Site during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
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2) fold and mail it to the address on the back before March 16, 1998.

RECEIVED
MAR 1 0 1998
DEPT. OF ECOLOGY

Dear Ladies & Gentlemen:

The Everett Smelter Site would be forgotten, along with the devastation that industry run-amock can have on the environment, if you return the space to commercial advancement. As a memorial, I believe the land should be returned to the people, dedicated to people. An idea of mine is the creation of a memorial to the lives damaged by the abuses of power by people who knew what they were doing but did it anyway. The City needs another swimming pool and the spot would be perfect as it overlooks the bay. Also, the existence of a public City of Everett Pool would be helpful to the overall desireability of North Everett, which as been seriously compromised by the Everett Smelter Site.

Sincerely yours,

Rosemarie Dickson Cook

Date: March 17, 1998

Name Rosemarie Dickson Cook

Address: 842 Linden
Everett, WA 98201

(425) 252-8405
1-800-232-1457 work

s, I would like to comment on the Scope of the Environmental Impact Statement for the **Everett Smelter Site** during the comment period from February 12 through March 16, 1998.

Please write your comment below and either:
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2) fold and mail it to the address on the back before March 16, 1998.

Dear Ladies & Gentlemen:

The Everett Smelter Site would be forgotten, along with the devastation that industry run-amock can have on the environment, if you return the space to commercial advancement. As a memorial, I believe the land should be returned to the people, dedicated to people. An idea of mine is the creation of a memorial to the lives damaged by the abuses of power by people who knew what they were doing but did it anyway. The City needs another swimming pool and the spot would be perfect as it overlooks the bay. Also, the existence of a public City of Everett Pool would be helpful to the overall desireability of North Everett, which has been seriously compromised by the Everett Smelter Site.

Sincerely yours,

Rosemarie Dickson Cook

Date: March 17, 1998

Name: Rosemarie Dickson Cook

Address: 842 Linden
Everett, WA 98201

(425) 252-8405
1-800-232-1457 work

Everett Smelter Site
Integrated Final Cleanup Action Plan and Final Environment Impact Statement

Appendix B
Responsiveness Summary

Attachment B3
SEPA Scoping Comments and DCAP/DEIS Comments

Attachment

DCAP/DEIS Comments

Everett Smelter Site
Public Meeting Notes
2/11/99

90 1. What are the apprehensions that the city is going to have concerning citizens moving contaminated dirt?

91 2. So to your knowledge, the city is not going to deny citizens permits as long as people meet requirements?

92 3. Who would bear financial responsibility for disposing of contaminated soil?

93 4. Who pays extra costs of special equipment (tyvek, runoff control) needed when someone works in their yard?

94 5. Where does the soil in the barrel program go? Is it kept on site or sent somewhere? Will each barrel be tested for its contamination level?

95 6. Do you have plans for testing all of the peripheral area? Are we certain this is the proper boundary? Is everyone in boundary under the Institutional Controls?

96 +97 7. We were the first tested, and we are heavily contaminated. Are you going to test our neighbors? Are the first 8-10 homes around the fenced area?

99 8. How is this going to affect property values and if you are deemed "not contaminated" and not cleaned up, how will that affect property values?

100 9. What has been done or will be done about arsenic that is incorporated in the wood and concrete of homes that have been in the site area a long time? How much contamination would be spread around due to renovation/remodel activities?

101 10. Is there any way to get building material tested if contamination is suspected?

102 11. When commentor moved into his house, he power washed the brick and the brick changed color. Concerned about stirring up contamination.

103 12. What controls are going to be taken during cleanup to prevent surface water from being contaminated?

104 +105 13. What are the health effects of low levels of arsenic? 20-100 ppm? What shouldn't we do in our yards? What plants should we avoid planting? What health effects should we look for? Commentor has heard that poplars will act as siphons and take up arsenic and concentrate arsenic in the wood.

106 14. Commentor is aware that airborne particulates are a hazard. How hazardous is waterborne arsenic? Many neighbors have had problems with muddy water, iron

...

in water and work has been done on water mains. Are there measures to protect the water mains? What are the health effects of drinking water with high levels of arsenic? We've had water main breaks as a matter of record. Does it make sense to excavate the water mains in these areas and test the soil to see if it is contaminated? If it is, can you put some sort of protective liner around the main?

107 15. During cleanup, are there safeguards that will be undertaken to ensure that buried utilities, tanks and plants are not damaged? If you crack a buried oil tank, you could have thousands of gallons of oil leak out.

108 16. I'm a renter on property managed by a management company. Who are you going to work with during cleanup? The renter, the management company, or the owner?

109 17. How are vertical surfaces on properties going to be addressed? What about going horizontal by the alleys or retaining walls behind the houses?

110 18. You mentioned a cutoff trench above the fenced area. Would something similar be done to prevent surface water coming from an area that hasn't been cleaned up recontaminating a cleaned up area?

489 19. Other than the work being done on the 8-10 homes this summer and assuming the law suit with ASARCO continues, do you have any plans to do additional testing/remediation and when?

N/A 20. Thanks everyone for coming and thinks these meetings are beneficial.

490 21. Has a lawn that is in bad shape. It need to be torn out and redone. What do I have to do to get a permit? Will someone come in and tear it up? Will I be compensated for the cost if I do the work? Should I do it now or should I wait? If I wait, will the money be gone?

491 22. Because of the potential cleanup, some people have put off doing maintenance (painting, roofing). How will the cleanup impact these things?

EVERETT SMELTER SITE WORKSHOP
2/16/99 & 2/20/99

Questionnaire for Staff

1. To whom did you talk?

Name: Dr Darlene Castle

Address: 1616 83rd ave SE Everett 98205

Phone: 425-334-9199

2. Regarding which issues?

Water - drinking water
Health - effects of arsenic

3. Was he/she generally satisfied with the information provided? (Yes) (No)

4. What comment does he/she want to make for the record during this public comment period?

5. Do you have any comments/suggestions regarding this workshop?

Name: Susan Lee

Date: 2/20/99

EVERETT SMELTER SITE
WORKSHOP
2/16/99 & 2/20/99

Questionnaire for Staff

1. To whom did you talk?

Name: Bill Miller

Address: 3113 8th ST

Phone: 425-252-9037

2. Regarding which issues?

Results of sampling done by ASARCO last year, General Information on what we're doing. Explained what we are going to do this summer

3. Was he/she generally satisfied with the information provided? (Yes) (No)

4. What comment does he/she want to make for the record during this public comment period?

Access to adjacent property backyards is through his back yard. As long as he isn't inconvenienced, is willing to grant access. Question about how much cleanup happens under the house + air ducts.

5. Do you have any comments/suggestions regarding this workshop?

Name:

Date:

EVERETT SMELTER SITE
WORKSHOP
2/16/99 & 2/20/99

Questionnaire for Staff

1. To whom did you talk?

Name: Shellie & Mike Rowe
Address: 212 S Kyline
Phone: 425 - 339 - 2441

2. Regarding which issues?

Cleanup on my house this year?
No

3. Was he/she generally satisfied with the information provided? (Yes) (No)

4. What comment does he/she want to make for the record during this public comment period?

5. Do you have any comments/suggestions regarding this workshop?

Name: Susan Lee

Date: 2/20/99

B3-6

1.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

Dear Sir,

57 I am selling my property at 2117-5th St NE in Everett.
Is there anything the new buyers should be informed of about the property?
My property is on the south side of the Legion Park Golf Course.
58 Is the Golf Course contaminated and
59 is my place unsafe for human beings?
People continue to live in this neighborhood. Are they not in danger of contamination?
60 where exactly are the contaminated areas?

Date: 1-26-99

Name: LOIS E LOWERY

Address: 12343 - HIRAM PL NE
SEATTLE WA 98125

CONVERSATION RECORD	TIME 3:45pm	DATE 1/28/99

PE ☐ visit ☐ conference ☒ telephone ☐ incoming ☒ outgoing

Location of Visit/Conference

ROUTING

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU: Lois E. Lowery

ORGANIZATION TELEPHONE NO.: 206-365-0709

SUBJECT: Everett Smelter Site

SUMMARY: Ms. Lowery sent a comment to Ecology during the public comment period for the draft CAP/EIS for this site - received by Ecology 1/28/99.

Her first question was whether to inform new buyers of her home within the site area about the site. I looked up her phone number in the phone book to give an immediate answer of "yes!" She does need to disclose that information when selling a house. And told her that the real estate agent or new buyers could call us for the sample information we have to date on or near that property and what actions we may be taking.

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
Susan H. Lee		1/28/99

ION TAKEN: Returned phone call with info

SIGNATURE	TITLE	DATE
Susan H. Lee.	Public Involvement Specialist	1/28/99

B3-8

2.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

61 Thank you for all your efforts. Can this happen?-

62 Estimate cost of cleanup for my house @ $5000.00. I contract w/ a cleanup landscaping company and pay them $5,000.00 to do the cleanup and more. It would be much more expensive to do both jobs at one time.

Date: 1-26-1999

Name: OTTO CHASE

Address: 226 Alverson Blvd
Everett WA 98201

Lee, Susan

From: CEnberg366@aol.com
Sent: Saturday, January 30, 1999 5:56 PM
To: slee461@ecy.wa.gov
Subject: ASARCO cleanup

Dear Susan -We are in Arizona till May. We live at 2309-8th St. Everett, 98201. Just rec. the notice on the proposed cleanup. Is there anything we need to know, or do? We would like to have our soil tested. Will someone do that automatically, or do we have to request it? Any advice will be appreciated. Thanks, Connie and Enard Enberg. 63 64

B3-10

Lee, Susan

From: Lee, Susan
Sent: Wednesday, February 03, 1999 2:28 PM
To: 'CEnberg366@aol.com'
Subject: RE: ASARCO cleanup

Dear Connie and Enard,
Thank you for your email regarding the Everett Smelter cleanup. You email is being included as a comment during the comment period, and I will also try to respond to some of your concerns now.

There is nothing you need to do right now. The plans for cleaning up the site are draft. They will be finalized after the public comment period and may be changed somewhat based on the comments received.

Ecology plans to cleanup some of the most contaminated homes this summer. Those homes are located close to the fenced area on the site and around Medora Way and Whitehorse Trail, neither of which is close to your home. You will be contacted when your home is due to be sampled to see if your yard needs to be cleaned up. Again, you do not need to do anything right now.

If you have further questions, please email again or call at 425-649-7138. Otherwise, we will see you when you return to Everett. Enjoy the sun! It is very gray and rainy here.

Susan Lee, Ecology Public Involvement

—Original Message—
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B3-11 4.

Lee, Susan

From: Robert M Kahlor [killer266@juno.com]
Sent: Wednesday, February 10, 1999 9:43 AM
To: slee461@ecy.wa.gov
Subject: Asarco Smelter Site,

From: Robert Kahlor
To: Susan Lee
Re; Northeast Everett Neighborhood Cleanup Schedule.

Robert Kahlor
1015 Pine. St.
Everett, Wa 98201
(425)252-9383
E-Mail-killer 266@juno.com

I plan on reland sc aping my yard as soon as the weather gets better. I was wondering if the yard excavating will be in my area at all or if I should wait to do it.
That's my question? Please let me know before I get started.
Thank You,
Robert Kahlor

65

B3-12

Lee, Susan

To: Robert M Kahlor
ubject: RE: Asarco Smelter Site,

Robert,
Thank you for your email regarding the Everett Smelter Site. Your email is being included as a comment during the comment period on the draft Cleanup Action Plan and Environmental Impact Statement. I will also respond to you here, before you get started on the work in your yard.

First, please contact Ecology's Site Manager, David South, at 425-649-7200 or email him at **dsou461@ecy.wa.gov.** before you begin planning any work in the soils in your yard. He has information that you will want to consider.

Ecology is preparing to cleanup some of the most contaminated yards of homes on the Everett Smelter Site that are still occupied. Those homes are located close to the fenced area and around Medora Way and Whitehorse Trail, neither of which is close to your home. You will be contacted when your home is due to be sampled to see if your yard needs to be cleaned up. At this time, we are not considering your home for cleanup this spring.

You do not need to wait to work in your yard. You just need to take into account the practices that will keep you and your family safe as you come into contact with arsencic-contaminated soils. And you will need to dispose of extra soils and soil-laden vegetation through the Soil Disposal Program.

Thank you for requesting information before you started working in your yard.

Susan Lee, Ecology Public Involvement

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That's my question? Please let me know before I get started.
Thank You,
Robert Kahlor

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Wetlands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

1. Will all lots be tested, even at the edges of the "contaminated" area? 66

2. What will be the effect on property values during and after cleanup? And if a piece of property does not need to be cleaned up, would it still be in a bottom optimum area? 67

3. Why did you enlarge the "contaminated" area to include the golf course after they had spent a large amount of money to re-do it? 68

Comment: I have lived at the edge of the contaminated area for 32 years. My husband mowed our field and we all have eaten produce from the garden for 32 years. 69

Date: 2-11-99

Name: Sylvia Tewlon

Address: 2205 6th St.

6.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

Monitoring. Much additional sampling will be performed to design and monitor the effectiveness of cleanup actions. Soil sampling at peripheral area properties and the smelter fenced area will be performed to determine which soils will be excavated and replaced. A quality control program for clean backfill soils will be established. After cleaning inside homes, following soil removal and replacement, house dusts and carpet dusts will be sampled. Additional soil sampling over a larger area will be conducted to confirm or, if necessary, revise the site boundary. Long-term, periodic sampling of ground water, surface water, and storm drain sediments will be performed to evaluate the effectiveness of cleanup actions. Resampling of soils at selected remediated properties will be done during 5-year reviews of cleanup actions to assess whether recontamination is occurring. Air monitoring will be performed during cleanup actions to evaluate dust control measures.

Make your opinion count! Please send your comments to Ecology (you can use the bottom of this notice or a separate sheet of paper) at: Washington State Department of Ecology, Toxics Cleanup Program, Everett Smelter Site Cleanup, 3190 160th Avenue SE, Bellevue, WA 98008-5452. You can also turn in comments at the community Workshops on February 16th and 20th.

70 To a layperson, the planned procedures appear prudent, comprehensive and an acceptable minimum.

There are monitorings and samplings in the plans, for such vital aspects as water, air, soil, and 5 year reviews of cleanup actions and assessment of recontamination.

I support this plan.

Charlotte Beamer
1507 Fulton Ave
Everett, Wash. 98201

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71 This is a good plan & needs to be implemented. Thanks for coming up with plan.

Paige McKeague
4430 128th PL NE
Marysville, Wa 98271
360-659-4356

8.

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72 I support this action plan. Since arsenic is such a toxic substance these steps must be taken to insure safe neighborhoods for our children. This is a serious threat. Hooray for the Action Committee!

Laura J. Wilson
4228 S. 3rd Ave.
Everett, Wa 98203

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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73 I wish to express my appreciation for this plan to clean up the Smelter site. This is extremely important for the health of our community and especially the children.

It is important to follow the law closely so that the work can proceed without interruption.

Rita Durand
7129 Juniper Dr.
Everett, 98203

B3-18

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74 Every possible control measure should be taken until every inch of land has been made safe for Everett residents. To do less would be in serious danger to future generations in this area.

Evelyn B Stegath
2110 Nukeltes Blvd
Everett, WA 98203

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Ruth May Scougale
4904 College
Everett Wa. 98203

75 There should be a lot more publicity on the need/progress of this operation. Regular reporting as each stage proceeds.

B3-20

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76 This cleanup needs to be completed (by state standards) to make the community liveable. Don't let ASARCO drag this on or lower the standards.

Shirley Hoffart
416 - 8th St.
Mukilteo, WA 98275

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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77 I support cleaning the Everett Smelter Cleanup using state standards.
This matter needs urgent attention.

Gwen Anstis
2722 Larch Dr
Everett, Wa 98203

B3-22

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78 This matter has dragged on for too long. - It is a prolonged insult to Everett that action is so delayed. I urge your immediate action. Clean up the site now!

Adeline Minnick
2008 Grand Ave. 302
Everett, Wa. 98201

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79 + 80

I support clean up of Everett Smelter area as soon as possible. We need follow up - and active Citizen Advisory Committee

Hope Smith
1221 E. Casino Rd
Everett, Wa 98203

B3-24

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81 Please continue to enforce the
clean up standards!! Thank you
82 for this report and all the hard work.
83 We need to move ahead to continue
the clean up

Stacy Hamm
2223 48th st SW
Everett WA
98203

B3-25 17.

RECEIVED

FEB 17 1999

DEPT. OF ECOLOGY

Gloria Abbenhouse
23431 Maranatha Way
Arlington, WA 98223

Washington State Department of Ecology
Toxics Cleanup Program
Everett Smelter Site Cleanup
3190 160th Avenue SE
Bellevue, WA 98008-5452

To Ecology;

84 Having learned that the Everett smelter site is the second most contaminated site in the state of Washington, I am bound by conscience to write expressing my approval of the cleanup plan. I also want to express my abhorrence of the possibility that this plan might not be implemented.

86 As a long time supporter of the HEART OF AMERICA organization which tries to prevail upon the federal government to act responsibly in the cleanup of Hanford, I have thought long and hard about the obligation we have to future generations. Thus my appeal to you.

85 I am hopeful that the standards that Ecology has established for ppm for arsenic and lead in the soil at the Everett site will not be overridden for some other consideration or outside vested interests.

Very truly yours,

Gloria Abbenhouse

Gloria Abbenhouse

B3-26

RECEIVED 18.
FEB 18 1999
DEPT OF ECOLOGY

200 Priest Pt. Dr. N.W.
Marysville, WA 98271
February 17, 1999

Washington State Dept. of Ecology
Toxics Cleanup Program
3190 - 160th Ave. S.E.
Bellevue, WA 98008

Re: Everett Smelter Site Draft Cleanup Action Plan

87 I would like to express my support for the Draft Cleanup Action Plan. It appears to be a practical and science-based plan to protect the community.
88 It is particularly important that lone-term monitoring is assured.

89 I would also urge that some flexibility should exist to make any changes indicated by new scientific information.

Sincerely,

Julie Langabeer

Julie Langabeer

Congratulations!!!

The Draft Clean Up Action plan as presented seems to cover most considerations which will lead to a complete clean-up under current MTCA regulations.

111 The same clean-up standards and remediation levels seem to apply to the entire peripheral area regardless of current zoning or usage. The sampling design reflects this assumption. I feel that a clearly higher level might be applied to the commercial zone along Broadway with the possible exception of the current trailer court. The golf course could be given some higher remediation level considering its usage by adults on a lower-frequency level than residential properties. If the 1 in 400 sq ft sampling is used for the golf course, it seems it would be unreasonably expensive for ~~the~~ sampling costs. Perhaps the size of decision units should be reconsidered here.

112 The remediation levels are generally acceptable. However, the actual figures should be set by the State Department of Health figures.

as well as a cost/benefit analysis I believe 500 ppm. may be high to leave in areas near 24" from the health considerations of arsenic levels of that magnitude. Can a lower figure (150 ppm x 2 = 300 ppm) be used without significantly increasing soil to be removed? What is your estimate of difference in cubic yards and costs between 300 + 500 max

6.2.1.2

113 While I fully appreciate the desire to mark the depth of remediated soils, I am greatly concerned with the suggestion that coarse gravel be used in place of geofabric for such a marker. At depths of 24" or more it may be acceptable but should not be used over the wide area where excavations of 12" or less will be made. Over time, uncovering a layer of gravel will be much less apt to advise future property owners of a potential problem than a geofabric would be.

114 p. 87 ¶2 Asphalt + concrete must be upgraded by remediators or property owners?

115 ¶6 There should not be a possibility of paving over accessible soils without remediation.

116 Page 88 It is nice to have "clean" vegetable gardens to 18" but the term needs definition. Is it current garden or proposed? What constituted a "vegetable garden" as opposed to other kinds?

117 6.2.3 Interesting plan to clean crawl spaces! Who builds the "rat proof" door?

118 The specification for dirt used as clean backfill could specify a number less than just "not exceeding 20" to assure less risk of contamination. Homeowners should be consulted if 3 in 1 topsoils containing biosolids are proposed for use as replacement soils as they may have real concerns about health risks.

119 The disposal of soils deemed "hazardous waste" and lesser concentrations always specifies Arlington and Roosevelt. There should be some indication of support for any less expensive site which meets requirements.

120 The "hazardous waste" or >3000 ppm needs to be clear and not used interchangably. It is clear that ASARCO feels it can do a TCLP test and that the results would be

considerably higher. It is not acceptable to leave this door open and potentially leave higher concentrations in the fenced area. We do not feel that any concentration over 3000 should be at any dump

121 These levels are assumed to be eventually compliant with ground and surface water. There is necessarily some time for self remediation after all soils are removed. The figures from EV4 (below the till) lead to questions about the complete effectiveness of till as the bottom layer which will prevent ground water problems. Plan should address contingent actions in case the water problem is not solved.

122 In plan for the fenced area, there is no discussion of existing streets. Will these be vacated and fenced area left as a smooth hill or will they be rebuilt? This is of great interest to immediate neighbors and in the long run for redevelopment.

123 Can there be some suggestion that if scheduling allows, cleanest peripheral soils should go in fenced area? It costs no more to truck 2900 ppm

than to truck 29 ppm and the "clean up" would certainly be better in the long run.

Institutional Controls

124 Covers the field but generally lack specificity!

125 I understand the "Deed Covenant" section to apply only to ASARCO and not to community residents. Is this correct? If so, I approve.

126 The effectiveness evaluation section should be much more specific. "Selective" soil resampling does not define scope, range of a true reevaluation of clean up effectiveness.

127 The financial assurances section assumes only that ASARCO will be doing the complete cleanup. There are other possibilities - we hope not to have to consider them, but they are possible, and the assurances will be just as necessary.

128 The testing of soil samples specifies using test with detection limit of <18 ppm. Does <18 default to 18 for averaging? Could a test to lower limits be used economically? This section needs to be more specific.

How will you get 10 soil samples in "maintenance areas not normally occupied" and to what depth? Crawl spaces are often dry, compacted and with restricted access and head room.

1 As has been communicated repeatedly, the residents feel the need to have the boundary more reasonably defined as soon as possible. Consideration must be given to developing a reasonable plan to address this need.

2 The sampling protocol for the fenced area seems complicated. The requirement that samples be collected from soil borings in 6" intervals to 3' beyond excavations seems to infer there will be unexcavated areas within the fence. Although current tests are not sufficient, I cannot believe there will be areas requiring no remediation - but if so, what about materials below that spot? Were the smelter area investigation tests sufficient to characterize the whole area for safe cleanup? I seriously question the assumption of debris-free area around

the buildings. There are several spots in fenced area where old buildings are apparent at surface.

(7)

3 The long term institutional controls requires resampling at remediated properties. This is a good idea but currently does not define how many samples, where in yard, how deep, etc. Are you assuming the same plan as cleanup or something less costly? How will properties be chosen? Same ones at 5, 10, 15 years?

4 (Note) page 87 pp1 - There are very apt to be "permanent structures" in this area which may have not been built under city permit. (advice from some residents) Perhaps this should be rephrased.

5 All in all this Draft is a good starting place but needs specificity and clarification before appearing as a document seeking legal approval for enforcement. I am hopeful the current ambitious time table can be adhered to and that the real cleanup for all the area can finally take place.

6 The current Draft shows no time table for the Cleanup for rather obvious reasons. The neighborhoods that have waited so long for action deserve a reasonably speedy cleanup when action is finally begun. If ASARCO is assumed to be doing the cleanup, there must be some criteria such as number of properties per year (or percentage of site, or...) which would assure a cleanup balancing disruption, stress of waiting for your property's turn, cost to the liable party and similar considerations. A 5 year span seems reasonable with possible addition of another year for sampling (some cleanup should be done in all years). The suggestion in EIS p.A4-42 that the area could be remediated in 3 years seems high — Isn't Ruston doing 125 homes/year? It would be wonderful if we could do this in three years but it hardly seems possible, especially if the CPM boundary stretches south with further testing. Since there seems to be no question of ASARCO ownership and liability for the fenced property, can they be required to begin cleaning ASAP to get the process started?

7 Finally in regard to the ultimate use of the fenced area as driven by cleanup characteristics and discussed in the EIS, the community interests lie clearly on the side of restoring the property to its original use as single family housing. Of course this would require a much more stringent cleanup of the fenced area than is currently proposed with little opportunity for increased soil consolidation which changes the grade and eliminates access. Multi-family use may provide slightly better control of recontamination than single family as proposed in EIS but it is still residential usage with contamination of 3000 ppm below in depths where water mains would have to be installed and maintained. Our feeling is that the community would best be served by removal of the greatest amount possible and consolidation of the least contaminated peripheral soils.

Miji M. Ryan
302 Bridgeway
Everett WA 98201-1158

Miji M. Ryan

20.

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Sirs:

292 Children are at risk! Please do not delay the clean-up of contaminated areas in north Everett. Arsenic does not just go away by itself. I am very concerned about the children growing up in that area.

Pat Wiggins
3201-108th St. SE
Everett, WA 98208

21.
B3-37

To: Washington State Department of Ecology
Toxics Cleanup Program
Everett Smelter Site Cleanup
From: Anne Robison, NECO Representative Anne Robison
Date: February 16, 1999

8 This draft Cleanup Action Plan is truly a milestone in a long effort to get some actual remediation done on the Everett site. I commend the staff members who worked on it so diligently and I go on record as substantially supporting it as written. It does a good job of meeting the expectations of the citizens, although in this case I speak principally for myself. I hope others in the two neighborhoods will have their own comments. I really appreciate Ecology's plans to start removing and replacing contaminated soils at about 10 residences this summer.

9 I believe Ecology is correct in holding to the 20 ppm arsenic at the surface and the other levels specified further down. The idea of relaxing that standard is very risky, because of the higher levels of toxins that could be brought to the surface years ahead with normal soil disturbance activities. It would be possible over time to seriously recontaminate the area. Then who would be responsible, and who would pay for remediation, if any were to be done? We want the job done right and we want it to last.

10 We in the community have been opposed from the first to an on-site containment facility, but I personally can support a consolidation of contaminated soils from the peripheral area that do not exceed 3000 ppm arsenic. (We interpret 3000 as a firm number, and need to be informed if there is any flexibility about it.) This consolidation would be within the fenced area and would be capped by a protective cover. I believe this is the way to go in view of the tremendous cost of removing such soil from the area.

11 Regarding "clean" fill dirt for yards - some persons may not consider biosolids to be clean, and I believe their concerns should be honored. The whole point of this exercise is to put people's fears to rest, not substitute new ones.

12 I would like to see soil sampling beyond the Community Protection Measures boundary to find out just how far out contamination goes. It would be regrettable to have homeowners find out years from now that their soils are unacceptable, when all along they thought they were beyond any area of concern. What recourse would they have?

Some further comments about the draft CAP follow:

13 PERIPHERAL AREA. I support further sampling of the properties to be remediated and the site-specific approach to cleanup. This of course must be done with the cooperation of the property owner, but I have some fears that people will balk at the process when face-to-face with it, despite all the reassurances they can be given.

I am thinking now of the 10 homes to be cleaned up this summer. It would be very regrettable, if it occurs, and public education will play a key role in staving off such a contingency. I hope I am unduly anxious. Up until now we have been a long way from the "shovels" and I hope that after people have seen what the process involves - that it is not a long disruption at any one house - it would be less threatening.

14 I like the idea of the "Disturbance Coordinator." No matter how smoothly the operation proceeds, people are going to feel much better if there is a real, visible person to whom they can turn with questions and concerns.

15 The option of paving unpaved driveways on cleanup properties as an alternative to removing contaminated soil bothers me. We want to remove contamination, not cover more of it up. Even if the homeowner wants it done, I would prefer to take the long view and be more protective for future generations. Perhaps there is a reason for this option that I do not know.

16 I wish the plan spelled out the schedule for further sampling throughout the peripheral area. For too long people have lived with uncertainty as to whether they are "in" or "out," and if they are "in," when they could expect to be remediated. Presumably testing will be required regardless of the outcome of litigation. I would like to see some kind of a projected time line.

17 SMELTER FENCED AREA. The sooner we get the highly contaminated soils out of the area, the better. Asarco owns the property. Could they not be ordered to remove those soils in the next construction season? There is no real question there of a 20 ppm arsenic level. Surely that action is a MUST at some point, and the court case should have little bearing on it. We know that material will have to go to Arlington, OR. A temporary cover might be needed for the depression until peripheral soils can be excavated to fill it. But at least it would be a visible step in the right direction, and those soils could not continue to pose a threat to ground and surface waters. People have waited long enough for some real "action."

18 INSTITUTIONAL CONTROLS. The citizens have long been suspicious of institutional controls as a really long-term answer to protectiveness from contamination left on site. I wish I could imagine a viable alternative, but I cannot. The City of Everett and the Snohomish Health District will be responsible for maintaining these controls, presumably, and it is hard to foresee what those entities will be a thousand years from now. I believe we will just have to accept these measures, because it is not possible to remove all of the contamination. The IC's delineated in the CAP would appear to be the best that can be devised. I am strongly supportive of an on-going Citizens Advisory Committee. Financial assurance for the implementation of all of the IC's is also very important. Without support money guaranteed into the future the controls could easily disappear. I like, too, the idea of stone markers that will

not erode over time.

19 We need more clarification of the IC's. The details need to be spelled out so there will be more certainty as time goes on. The citizens should be involved in the process of drafting these details.

20 MONITORING. The monitoring described in the CAP is excellent and I support it strongly. We cannot assume that "clean" is "clean" without objective data. And I really like the idea of finishing up at each property with a thorough house-cleaning.

21 We, the citizens, also want to be involved when further details on the sampling and monitoring are formulated. We need clarification, too, of sampling plans for the park and other non-residential areas.

I personally wish to be as helpful as possible in bringing about resolutions to questions I have raised and to support the professional staff in the next phases of the long process ahead.

Robinson 4

Further comments on the DCAP: (I would have preferred to revise my original document, but ran into a computer problem.)

22 The fenced area needs more testing. There may be other pockets of contamination besides those found at the edges of the old buildings. I would prefer to have more, rather than less, contaminated soil removed from the fenced area. We do not want to have to do more remediation later.

23 If the cleanup process is far enough along to fill the depression left by removing the highly contaminated soils with peripheral soils, that would be the preferred action. It would, I believe, save several million dollars over putting in clean soils. Certainly the "hole" cannot simply be left there for long. It would need at least a temporary cap, and that would be costly and not a solution in the long run.

24 Regarding the 3000 ppm arsenic to be left in the consolidation area, that number must be firm, and not dependent on TCLP testing, which might allow a higher number.

25 Street abandonment is an important issue. Access for residents and emergency vehicles is needed. Pilchuck Path needs to be dealt with in the EIS. The utility lines should be rerouted.

26 Groundwater monitoring is of paramount importance, because of the proximity of the river and the salmon restoration efforts ahead. The deep groundwater already shows contamination and it will take a long time for it to cleanse.

27 From the beginning the citizens have wanted their neighborhood restored to its single family status. It would be preferable to have the fenced area cleaned up enough to support at least some kind of residential use, such as condos. If that cannot be done, we prefer not to have a fence, but instead to have those six acreas covered with lawn that is kept up.

28 Regarding the 500 ppm maximum figure in the peripheral area, would it be much more expensive to make that figure 300? This needs to be quantified.

29 The golf course would not need to be as clean further down as a residential area.

30 It is possible that the community would accept a slower pace for cleanup as time goes on (slower as compared to the Ruston operation), if it would mean less disruption in their neighborhood. Perhaps this is something that can be assessed later on.

31 Owners will, I understand, be involved in the work done on their property. This is important. Maybe there should be a buyout option if contamination is so deep that shoring of a foundation is required.

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293 I support this plan. This must be resolved.

Mrs. H. Kauffman
1502 Lakes Ave.
Everett, Wa.

23.

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294 I fully support the plan as outlined.

Com: Greg Kauffman
Chairman - NECO
2-16-99

1502 Rainier Ave
Everett Wa 98201
425-252-3146

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295 | Keep up the battle! I support this plan.

Janie Arens
1609 Baker Ave
Everett, WA 98201

25.

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296 I support this plan!

Carmen Lystad
1607 Virginia Ave.
Everett, WA 98201

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297 I feel this a good and comphresive plan that will serve our neighbors needs now and in the future.

DeVon Ogurkow
1607 Virginia Ave.
Everett WA 98201

27.

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298 Yes I'm in favor of this

James E. Clark
2605-15th St Apt #310
Everett, WA. 98201
(425) 252-0177

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299 I fully support this cleanup program from Dept of Ecology!
Get it done!!

John [illegible]
1609 Baker
Everett WA
98201-2103
425-303-8293

29.

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300 I support this plan.

Jacqueline A. Aiken
2605 15th Street #105
Everett, WA 98201

NE Everett Community Organization

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Rus Henderson 1815 Fulton st 98201

301 I would support this plan to cleanup toxic waste and dispose of it properly

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Feb 16th, 1999

302 This plan seems to be feasible + workable. Therefore, I support it.

Pat Blaine
1828 Highland Ave.
Everett, WA 98201
(425) 259-3362

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303 | I support this plan.

Betty J Emberton
1602 Rainier
Everett, Wa 98201

33.

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304 | I support this plan.

Annette Kraus
1322 McDougall
Everett WA 98201

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305 I support this Draft

Joe Trautman
1421 Rainie Ave.
Everett Wash 98201

35.

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I, Bessie B. Neighbors support the above (this Plan).
1317 Poplar Street [redacted]
Everett, Washington 98201-1823 Ph#(425) (252-0205)

306 I pray you will honor our request to resolve this important matter here in our Northeast Neighborhood.

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307 I support this clean up draft 100 per cent

Robert E. Pettibone
2703 16th St.
Everett, Wa. 98201

37.

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308 I own a chiropractic office in this section of Everett and am very concerned about peoples health - This seems to be a very good plan I think the D.O.E. should be very concerned also.

Dr. James D. Surface
1725 E. Marine View Dr.
Everett, Wa 98201
425-252-5552

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AL PIGNATARO 2605 19th STREET
EVERETT WA
98201

309 "Support This Cleanup Action"

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310 I am in support of this cleanup plan.

JoAnn Joseph
1421 RAINIER AVE
EVERETT, WA 98201

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311 I agree with this solution to our problem of cleaning up project.

Anita H McKee
1818 Pine St
Everett WA 98201

41.

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312 I support the above plan

Ellyn Getty
1822 Pine
Everett, Wa. 98201
(425) 252 5385

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313 The cleanup plan introduced in "Smelter Fence Area" seems reasonable and a good faith effort to provide the citizens of NE Everett with a safe environment.

Please accept these guidelines!

Greg Benson
1522 Rainier Ave.
Everett WA 98201

43.

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314 I like this plan. Sherri Smith 2702 16th 98201
Everett

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315 I support the above statement!

Marilyn E. Smith
2702 16th St
Everett, WA 98201
(425) 303-0587 Marilyn E. Smith

45.

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316 I SUPPORT THE ABOVE STATEMENT!
WILLIAM V. SMYTH 2702 16TH ST EVERETT WA 98201
425-303-0557

46.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established. B3-65

Monitoring. Much additional sampling will be performed to design and monitor the effectiveness of cleanup actions. Soil sampling at peripheral area properties and the smelter fenced area will be performed to determine which soils will be excavated and replaced. A quality control program for clean backfill soils will be established. After cleaning inside homes, following soil removal and replacement, house dusts and carpet dusts will be sampled. Additional soil sampling over a larger area will be conducted to confirm or, if necessary, revise the site boundary. Long-term, periodic sampling of ground water, surface water, and storm drain sediments will be performed to evaluate the effectiveness of cleanup actions. Resampling of soils at selected remediated properties will be done during 5-year reviews of cleanup actions to assess whether recontamination is occurring. Air monitoring will be performed during cleanup actions to evaluate dust control measures.

Make your opinion count! Please send your comments to Ecology (you can use the bottom of this notice or a separate sheet of paper) at: Washington State Department of Ecology, Toxics Cleanup Program, Everett Smelter Site Cleanup, 3190 160th Avenue SE, Bellevue, WA 98008-5452. You can also turn in comments at the community Workshops on February 16th and 20th.

B17 I whole heartedly agree with any plan solving a "disaster waiting to happen" with as stringent replacement of soils as possible

Patrick A. Case
2816 18th St
Everett Wa 98201
425 252 5717

47.

B3-66

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February 24, 1999

Everett Smelter Site Cleanup
Toxics Cleanup Program
Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008 - 5452

Ms. Susan Lee
Mr. David South

Dear Ms. Susan Lee and Mr. David South:

Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area

We have been following the developments of the cleanup effort at the Everett Smelter site for several years now, and we are pleased that the Washington State Department of Ecology has made a commitment to clean up.

During the planning stages for site clean up, we have had a number of discussions with Mr. Steve Thompson, Mr. Jim Gilley, Mr. Tom Aldridge, and Mr. Bob Miller of Hydrometrics. We verified that our ChemTech soil treatment process can clean the Smelter site soil and that this approach offers significant benefits versus landfilling soil.

Shortcomings of Landfilling Soil

318 We believe that a "Commitment to Cleanup" as highlighted by the Washington State Department of Ecology implies a commitment to a renewed environmental stewardship. The proposed action of sending contaminated soil to another landfill off site in some ways repeats the problematic site history of which ASARCO was part, where contaminated soils were buried as a means of disposal.

While we have not had the opportunity to review the entire document trail which chronicles the lengthy process of environmental decision making of the site, we have concern that the dismissal as non-feasible of options other than landfilling soil does not stand up to critical scrutiny. We believe that the ChemTech soil treatment process could be effective to protect both human health and the environment at the Smelter site.

Treatability Testing of Everett Smelter Site Soil

We have first hand experience with a version of soil washing of the Everett Smelter site soils. Using the ChemTech soil treatment process, developed and patented by our

Klohn-Crippen Consultants Ltd., 10200 Shellbridge Way, Richmond, B.C., Canada, V6X 2W7 • Tel. (604) 273-0311 • Fax (604) 279-4300

consulting firm, we have confirmed the ability to remove both the total as well as the leachable concentrations of lead and arsenic from the Everettt Smelter Site soil samples, obtained from Hydrometrics. A description of the ChemTech process is attached to this letter.

Following discussions with Steve Thompson, Jim Gilley, Tom Aldridge, and Bob Miller of Hydrometrics, we received soil samples for the purpose of treatability testing. In August 1996, we identified hot alkaline treatment as effective to reduce the concentration of arsenic and lead in the soil samples, numbered for identification by Hydrometrics as 520 and 523. At that time, the objectives for testing were to reduce arsenic concentrations to less than 1,000 mg/kg and TCLP levels to less than 5 mg/L.

As Table 1 illustrates, the treatability testing results easily met the treatment objectives in place at the time. Since this testing, we have implemented a number of process improvements to result in even better performance.

Table 1: Treatability Testing Results for Everett Smelter Site Soils

Soil Sample Number	Arsenic		Lead	
	Total (mg/kg)	TCLP (mg/L)	Total (mg/kg)	TCLP (mg/L)
No. 520:				
Feed Soil	3,903	-	580	-
Treated Soil	419	0.60	231	0.10
% Removal	89%		60%	
No. 523:				
Feed Soil	34,753	-	1,429	-
Treated Soil	779	2.38	341	0.10
% Reduction	98%		76%	

Proposal for Renewed Treatability Testing

The clean up objectives have tightened since our previous work. Therefore, we wish to obtain representative soil samples to conduct a renewed program of treatability testing. Within one month, we would enable us to verify the usefulness of ChemTech for clean up at the smelter site for all contaminants of concern (arsenic, lead, cadmium, antimony, mercury, and thallium). ***We would be pleased to conduct such treatability testing on representative soil samples at our cost in exchange for consideration of our process for site clean up.***

Benefits of the ChemTech Soil Treatment Process

We anticipate that the ChemTech soil treatment process can be effective at the Everett Smelter site to treat all contaminated soil on site. This would satisfy two important requirements:

1. enable the return of the treated soil which meets the cleanup objectives back to the excavation site; and

2. by stabilizing (rendering non-leachable) the soil, enable the off site landfill disposal of any soil with total metals concentrations (arsenic, lead, cadmium, antimony, mercury, and thallium) which exceed the project cleanup criteria.

The ChemTech process is an environmentally responsible method to protect human health and the environment at lowest possible cost in many instances. We believe that the process merits consideration for use at the Everett Smelter site for the following reasons:

1. Our treatment process removes the contaminants from the soil instead of relocating the entire quantity of contaminated soil to valuable landfill space. The comparatively small volume of concentrate of the contaminants which is generated by the ChemTech process is inherently non-leachable, and consequently, it poses a significantly smaller risk to the environment.

2. On site treatment of soil returns the treated soil but not the contaminants back to the excavation site. This is of benefit because transportation of large volumes of hazardous materials is avoided, minimizing further risks to human health and the environment.

3. We remove soil contaminants simply, effectively, quickly, and therefore relatively cheaply. The costs to implement this approach are expected to be significantly less than the costs to landfill the soil.

The general effect of soil type and cleanup objective on the costs for a 375 TPD operation is illustrated in Figure 1. For a site the scale of the Everett Smelter site, we fully anticipate that the cost savings for the project could be substantial. This could enable either fewer dollars to be spent on cleaning up the same quantity of soil or larger quantities of soil to be treated to better protect the water quality of surface water and groundwater.

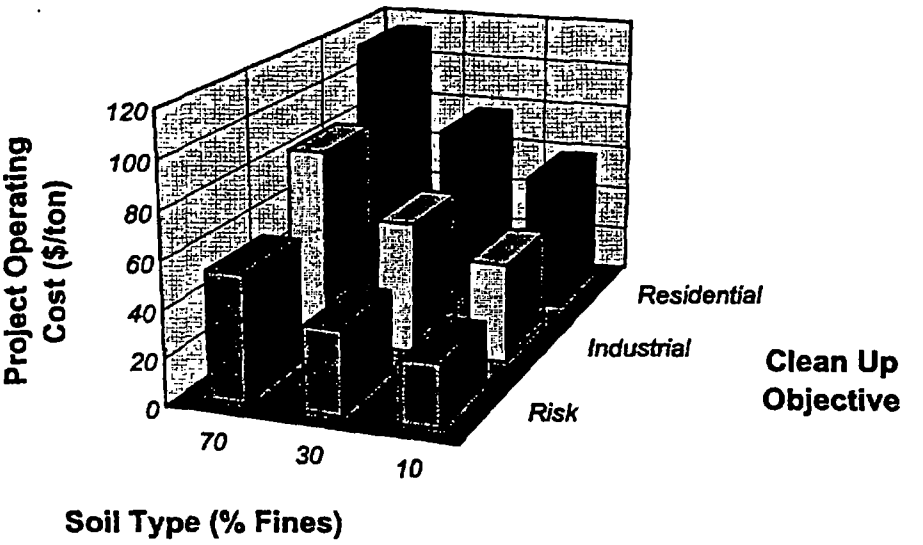


Figure 1: Effect Of Soil Type And Clean Up Objective On Cleanup Cost

Status of Technology Development

Pilot plant demonstrations in North Vancouver, British Columbia in 1996, and to the US Navy at Hunter's Point in San Francisco in 1997 confirmed the effectiveness of the fluidized bed and solids handling system to remove oil, creosote, arsenic, chromium, copper, lead, and zinc from a variety of soils, marine sediments, and sandblasting grit. Non-leachable (TCLP) levels were achieved for the soils and solids residuals, and the treated water was suitable for discharge to sewer. Regulatory approval for the demonstrations was received in both Canada and the US. Operating and capital costs were calculated based upon the documented performance. This work has been supported by Environment Canada, the BC Ministry of the Environment, the Science Council of BC, and the National Research Council of Canada.

We presently are prepared to construct a 375 TPD mobile plant for operation at the Everett Smelter Site. The plant would be ready for commissioning on site six months following approval to proceed.

We would like to meet with you to present our ChemTech process and for us to better understand the cleanup issues at the Smelter site. I will be calling you next week to arrange a suitable time to meet.

Yours truly,

KLOHN-CRIPPEN CONSULTANTS LTD.

Rob Stephenson, Ph.D.
Senior Chemical Engineer

RJS:vj

encl.

CHEMTECH TECHNOLOGY

Performance

Removal of Petroleum Hydrocarbons from Soils

CONTAMINANT	CONCENTRATION (mg/kg) FEED	TREATED	% REMOVAL
Diesel	41,000	170	99
Kerosene	1,340	20	99
Motor Oil	213,170	1,350	99
PAH	1,620	80	95
Creosote	44,500	4,780	93

5 minute treatment at pH 12, 80-90°C

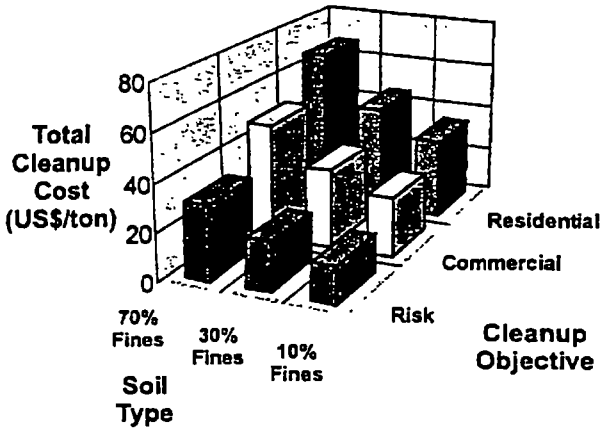
Clean Up of Metal Contaminated Soils

CONTAMINANT	CONCENTRATION (mg/kg) FEED	TREATED	% REMOVAL
Antimony	91	21	77
Arsenic	37,000	740	98
Barium	2,015	750	63
Cadmium	12.0	1.5	88
Chromium	267	122	54
Copper	505	46	91
Manganese	1,875	525	72
Nickel	133	48	64
Lead	1,450	200	86
Strontium	1,538	269	83
Zinc	6,525	802	88

5-10 minute treatment at pH 1, 80-90°C

Clean Up Cost

Effect of Soil Type and Cleanup Objective on Total Cleanup Cost



Cost Depends on:

- Nature of contaminated soil
- Size of the project
- Cleanup objective

Environmentally Friendly

- Minimize discharge to environment - Recycle process air and water
- Non-leachable solid residuals

Regulatory Approval

- On-site soil treatment
- No incineration or hazardous chemicals

Applicability

Soil Type	Contaminant Type: Metals – Dispersed	Metals – Particulate	Hydrocarbons – Light	Hydrocarbons – Heavy	Combined Metals and Hydrocarbons
Predominantly Sand	★★★	★★	★★★	★★★	★★
Predominantly Clay or Silt	★★	★	★★	★	★

★★★ Superior Performance ★★ Competitive Performance ★ Marginal Performance

The compatibility of these physical and chemical systems promises a unique ability to remediate contaminated soils rapidly and effectively, resulting in lower cleanup costs.

Resources and Support

Financial:

- Science Council of BC
- Environment Canada
- National Research Council
- ChemTech Analysis Inc.

Technical:

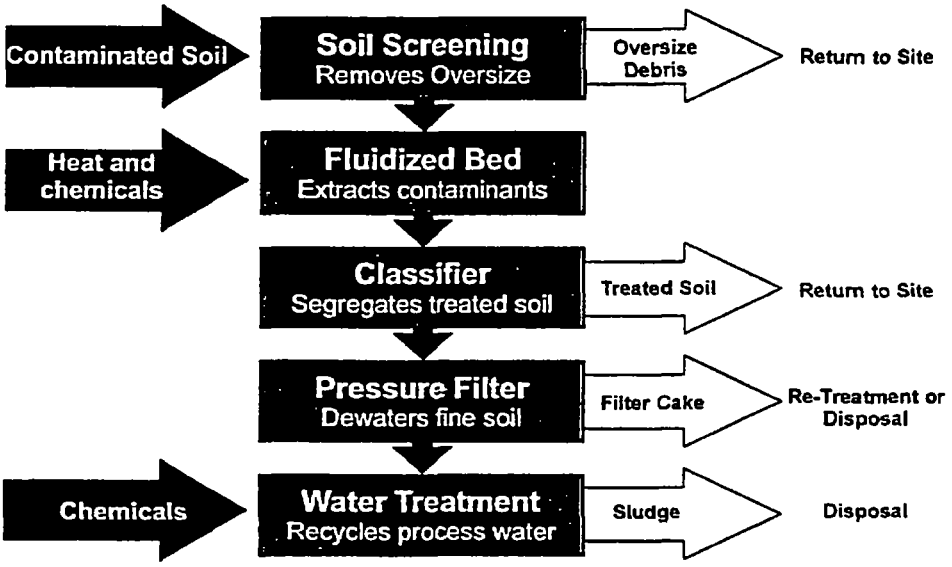
- ChemTech engineering team
- R&D capability at pilot and bench-scale
- In-house laboratory testing
- Expertise from Chemical Engineering, UBC

KLOHN-CRIPPEN

Contact
Rob Stephenson
Tel: 604 279 4432
Fax: 604 279 4300
E-mail. stephenr@rnd klohn com

CHEMTECH SOIL TREATMENT PROCESS TO CLEAN UP METAL AND HYDROCARBON CONTAMINATED SOILS

- Mobile, on-site and ex-situ *second generation* soil washing technology
- Effective and rapid removal of hydrocarbons and heavy metals in soils
- Low cost
- Environmental friendly process meets regulatory approvals
- Proven and demonstrated at:
  - a shipyard in North Vancouver, Canada
  - US Navy base in San Francisco, USA
  - Patented Canadian Technology (US, Canadian and European Patents)



Flow Diagram of ChemTech Soil Treatment Process

Why the ChemTech Process is Better

- Innovative process engineering: faster, better, cheaper
- Aggressive physical and chemical treatment
- Mobile high capacity system
- Adaptable to varying field conditions
- Simple and reliable
- Environmentally friendly:
  - Closed air and water circuits
  - Non-leachable soil, fines, and water treatment sludge

KLOHN-CRIPPEN

TechData Sheet

Naval Facilities Engineering Service Center
Port Hueneme, California 93043-4370

TDS-2049-ENV March 1998

Removal of Metals and Hydrocarbons from Contaminated Soils at Hunter's Point Shipyard

A Demonstration of the ChemTech Soil Treatment System

Conducted by:

Klohn-Crippen Consultants Ltd., Vancouver, British Columbia, Canada

In cooperation with:

Bay Area Defense Conversion Action Team Environmental Technology Partnership

Introduction

Many military and industrial installations face the problem of cleaning up soils contaminated with heavy metals and hydrocarbons. Past remediation efforts have involved on-site stabilization or excavation and disposal of the soil in a secure landfill. With these remedies, the contaminants remain with the soil and therefore the potential for future long-term liability persists. Thermal desorption is one alternative for separating hydrocarbon contaminants from the soil. However, most heavy metals are not affected by conventional thermal desorption. Recently, soil washing technology has emerged as a potentially viable alternative for treatment of soils containing heavy metals, hydrocarbons, or both. Soil washing technology uses a variety of physical separation and chemical leaching techniques to separate the contaminants from the soil. Often, the treated soil can be returned to the site and the recovered contaminants can be separately disposed, treated, or recycled.

The Bay Area Defense Conversion Action Team (BADCAT) Environmental Technology Partnership (ETP) Project is a public-private partnership of the Bay Area Economic Forum, Bay Area Regional Technology Alliance, California Environmental Protection Agency, U. S. Environmental Protection Agency, U. S. Navy, Chevron Research and Technology Company, San Francisco State University Center for Public Environmental Oversight, and other technical experts working to expedite the cleanup and conversion of Bay Area closing bases through the application of new environmental technologies.

In mid-1996, BADCAT ETP approved a proposal by Klohn-Crippen Consultants Ltd to conduct a pilot-scale demonstration of an innovative soil washing system patented by ChemTech Analysis, Inc. (see Figure 1). The demonstration was conducted on site at Hunter's Point Shipyard, San Francisco, California in January 1997. Soil containing heavy metals and hydrocarbons was treated by this technology. In addition, bench-scale treatability testing was conducted on a number of soil samples from the Bay Area.

Figure 1. The Soil Washing Pilot Plant Demonstrated at Hunter's Point

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Purpose of Demonstration

The purpose of the pilot-scale demonstration was to determine if the ChemTech soil treatment process could be used to remove metals from soil to meet regulatory or risk-based levels and to estimate the costs of doing so at a commercial scale. A supplemental objective was to evaluate the applicability of the ChemTech process on a variety of Bay Area soils through bench-scale treatability testing.

Advantages of the ChemTech Soil Treatment Process

- Potential to remove heavy metals and hydrocarbons from soil to meet regulatory or risk-based criteria.
- Restoration of site for a broad range of beneficial uses because contaminants are removed from the soil.
- Potential for significant volume reduction of contamination, which reduces the potential for future liability.
- Potential to recover separated heavy metals for recycling at an off-site facility.
- Relatively low projected cleanup costs at larger sites for meeting RCRA-driven criteria for leachable (Toxicity Characteristic Leaching Procedure [TCLP]) metals, and industrial criteria for total metals and total petroleum hydrocarbons.

Limitations of the ChemTech Soil Treatment Process

- Because a full-scale system is currently not available, site managers may be hesitant to consider this technology as a remedial option.
- Requires relatively complex equipment and specialized operator training compared to landfilling or stabilization.
- Relatively longer processing time to achieve the required contaminant-reagent contact compared to stabilization, especially when significant fine soil or fine particulate metals are present.
- Space is needed on site for stockpiling pre- and post-treatment soil and residuals.
- Additional processing and cost may be necessary in order to meet stringent state or residential criteria. Also, residuals may require additional treatment for disposal.

Applicability

The most suitable match between the ChemTech process and contaminated soil is under conditions where the soil is coarse and contaminated either by metals and light hydrocarbons or by heavy hydrocarbons.

Technical Description

The ChemTech soil treatment system is different from conventional soil washing in that it uses an innovative fluidized bed/classifier to supply physical scouring and rapid kinetics chemical leaching, aggressive chemical conditions, and tight process engineering to recycle all process air and process water. Figure 2 shows the unit operations of the ChemTech soil treatment system.

The ChemTech plant used at Hunter's Point in San Francisco consisted of physical separation and chemical leaching unit processes. The fluidized bed and classifier are the ma separation/leaching elements of the system. The three-pha fluidized bed is an enclosed vessel that blasts air through a hot acid or hot alkaline slurry of soil. In the classifier, fine particles are separated from coarse settleable particles by pumping process solution in an upflow direction. The fine soil particles, which are expected to contain most of the adsorbed contamination, are carried upward by the flow. In both the fluidized bed and classifier, a physical scouring action separates fine and coarse particles, as well as promotes removal of surface contamination from the soil particles. The hot process solution in these unit operations contains appropriate chemicals that leach out the contaminants into solution. The process solution is heated to approximately 80°C. The near-boiling temperatures and surfactants are used for solubilization of petroleum hydrocarbons, and pH adjustment (with acid or base) is used for solubilization of heavy metals.

The wet treated (coarse) soil may be returned to the site after verification of contaminant reduction to acceptable levels. The fine soil is separated from the process solution by dewatering in a pressure filter. The nonleachable fine solids may be retreated or disposed of in a secured landfill. The process solution is treated by adding precipitants and flocculants and is then recycled back to the system. The nonleachable precipitate sludge is the residual stream that contains some of the contamination and may need to be disposed of in a secured landfill.

Hunter's Point Shipyard Demonstration

At Hunter's Point, the soil contained antimony, copp chromium, lead, zinc, and hydrocarbons. The pilot plant (see Figure 3) was operated at 80°C, a pH of 1.0 (with 75:25 hydrochloric and sulfuric acid mixed fluid), and a solids residence time in the fluidized bed of less than 5 minutes. The pilot plant was capable of processing 0.5 to 1 ton/day of screened soil. Eleven test runs were completed during the 7-day plant operation, processing a total of 2 tons of soil.

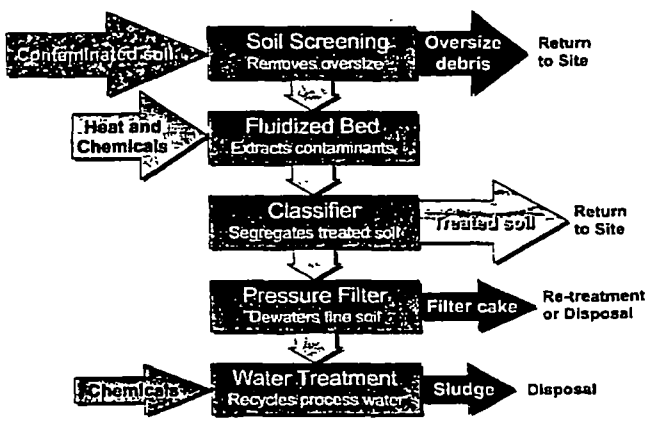

Figure 2. Soil Washing Unit Operations for Treating Heavy Metals and Hydrocarbons at Hunter's Point

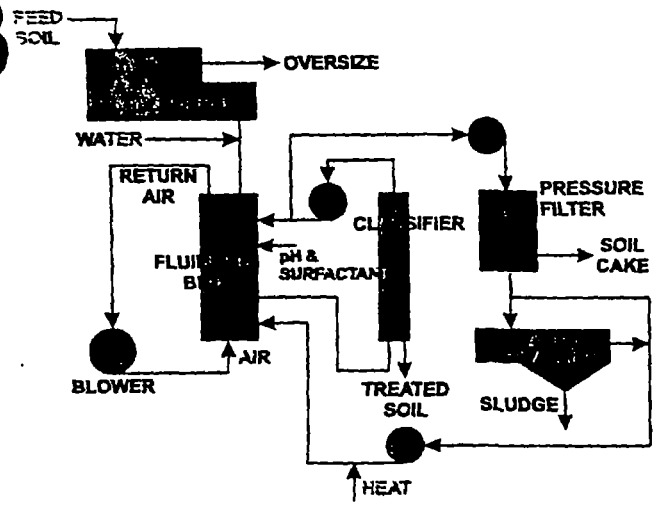

Figure 3. Pilot Plant Process Flow Diagram

Treatment Results

Table 1 shows the results of the pilot-scale treatment at Hunter's Point. Total metal concentrations were reduced for each of the five metals, up to 89% reduction for copper. Lead was reduced from above the industrial preliminary remediation goal (PRG) to below the PRG. Chromium was reduced from above the residential PRG to below the PRG. Leachable levels of chromium and zinc, as measured by the TCLP test, were reduced. Residential levels for lead and antimony were not obtained during the pilot test due to the presence of particulate metals from sources such as sand blasting grit, lead battery casings, and wire debris. Bench-scale testing showed that increasing the residence time to 15 minutes would help the soil meet residential criteria. Increasing the residence time would lower plant throughput and increase processing cost. Also, if relatively coarse (greater than about 150 microns) metal particulates are present in the soil, the residence time required may be even longer. Alternatively, a variety of mining industry equipment would be needed to physically separate out particulate metals before leaching. This would add to the processing complexity and cost, but has been done successfully at some sites.

Total recoverable petroleum hydrocarbon (TRPH) levels in the untreated soil were relatively low (363 mg/kg), but were reduced further to 159 mg/kg by the hot acid conditions used in the pilot test. In bench-scale testing on an oily soil from Mare Island, alkaline treatment was able to reduce TRPH from 17,000 mg/kg to less than 2,000 mg/kg after 10 minutes of washing.

The mass percentage of total solids for the Hunter's Point demonstration is as follows: 41% oversize debris (greater than 0.5 inch), 47% treated soil from the 4-inch and 12-inch classifiers, and 12% residuals.

Residuals

The soil treatment process concentrates contaminants into three residual streams: the pressure filter soil cake, water treatment sludge, and process water.

The characteristics of the solid residuals at Hunter's Point are shown in Table 2. Both the lime/metals water treatment sludge and the pressure filter soil cake had elevated levels of metals, but both met TCLP criteria and were disposed of in a secured landfill. Residual process water met all U.S. National Guidelines except for phenol. The phenol could be addressed by alum or activated carbon treatment.

Site Preparation Requirements

Most pilot plant equipment, except the pressure filter, was mounted on an 8-ft x 16-ft trailer. Utilities required for the pilot plant operation included 62 kW of power and 1 gpm of water. A bermed asphalt pad is generally required to house the plant and store the soil and residuals. The bermed asphalt pad acts as a secondary containment to handle inevitable spills and leaks that arise in this type of wet processing.

Table 1. ChemTech Soil Treatment System Performance

Description	Performance					
	Antimony	Copper	Chromium	Lead	Zinc	TRPH
Average Total Concentration of Contaminant (mg/kg)						
Untreated Soil[a]	87	2,270	267	2,407	2,773	363
Treated Soil[b]	84	256	122	789	768	159
Percent Removal	3	89	54	67	72	56
Contaminant Leachable Concentrations (mg/kg)						
Feed Soil TCLP	0.10	<0.02	3.7	<1	22	—
Treated Soil TCLP	<0.05	<0.01	0.21	<0.2	0.38	—
Average Percent Reduction	—	—	94	—	98	—
TCLP Target	—	—	5	5	—	—
US EPA Region 9 PRGs (mg/kg)						
Residential	31	2,800	210	400	4,100	—
Industrial	680	63,000	450	1,000	100,000	—
Comparison with PRGs						
Residential	No	Yes	Yes	No	Yes	—
Industrial	Yes	Yes	Yes	Yes	Yes	—

(a) Mean value of three pretreatment samples obtained during two optimized test runs at Hunter's Point.
(b) Mean value of eight posttreatment samples obtained during two optimized test runs at Hunter's Point.
TCLP = Toxicity Characteristic Leaching Procedure.
TRPH = Total recoverable petroleum hydrocarbons.

Table 2. Characteristics of Solid Residuals

Parameter	Total Metal Concentration (mg/kg) Cal. Haz. Waste TTLC	Total Metal Concentration (mg/kg) Results	Leachable Metal Concentration TCLP (mg/L) TCLP Targets	Leachable Metal Concentration TCLP (mg/L) Results
Pressure Filter Soil Cake				
Antimony	500	89	—	—
Chromium	2,500	1,375	5.0	<0.02
Copper	2,500	[illegible]	—	0.05
Lead	1,000	[illegible]	5.0	1.95
Zinc	5,000	[illegible]	—	200
TRPH	—	85	—	—
Water Treatment Sludge				
Antimony	500	47	—	—
Chromium	2,500	972	5.0	0.08
Copper	2,500	2,190	—	0.74
Lead	1,000	[illegible]	5.0	0.65
Zinc	5,000	4,240	—	200
TRPH	—	<20	—	—

Note: Shaded areas denote TTLC exceedance.
TCLP = Toxicity Characteristic Leaching Procedure.
TTLC = Total Threshold Limit Concentration.
TRPH = Total Recoverable Petroleum Hydrocarbons.

In general, the ChemTech soil treatment process is a promising alternative to off-site landfilling or on-site stabilization and has the potential to provide significant benefits in terms of removing contaminants from the site and reducing both contaminant volume and potential for future liability.

Cost

The cost for cleanup by means of the ChemTech process depends on the cleanup objective, the soil type, the types and concentrations of contaminants, and how the contaminants associate with the soil. These factors dictate the operating conditions, process kinetics, quantity of residuals, and cleanup cost. Excavation costs also will vary, depending on the depth and volume of the contaminated soil.

Figure 4 illustrates cleanup costs projected by Klohn-Crippen Consultants using the ChemTech system for metal-contaminated soil. Costs are based on treatment of 15,000 tons of soil in 41 days at a 375-ton/day plant. Costs could be higher at smaller sites, and could vary based on the type and level of contamination.

Included in these costs are treatability testing and analysis, mobilization, soil treatment, posttreatment and disposal of residuals, and a report. Not included are the cost of ownership and indirect costs.

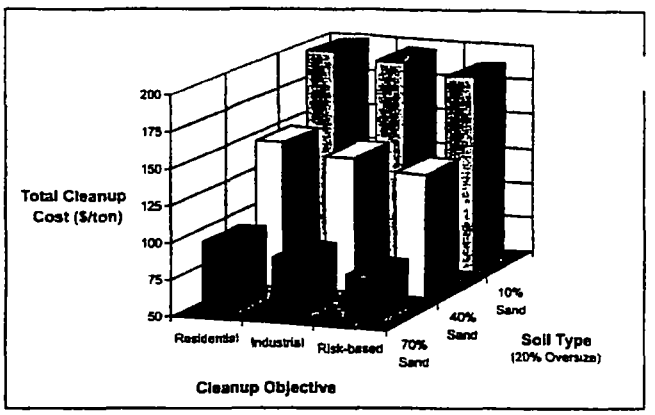

Figure 4. Projected Cleanup Costs for the ChemTech Soil Treatment System Based on Treatment of 15,000 Tons of Soil

For more information on ***soil washing*** or ***BADCAT ETP***, contact:

Naval Facilities Engineering Service Center
Karla Jenkins
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Rob Stephenson
Ph. (604) 273-0311
Internet: stephenr@rmd.klohn.com

Bay Area Defense Conversion Action Team
Amber Evans
Ph. (510) 628-8330
Internet: badcat@badcat.org

BADCAT ETP Cost and Performance Review Board

Jeff Heath, Naval Facilities Engineering Service Center
Karla Jenkins, Naval Facilities Engineering Service Center
Sean Hogan, U.S. Environmental Protection Agency
Marlon Mezquita, U.S. Environmental Protection Agency
John Wesnousky, California Environmental Protection Agency
Tom Peargin, Chevron Research and Technology Company
Norman Goldstein, Lawrence Berkeley National Laboratory
Michael Pound, SW Div, NAVFAC Engineering Command

This document is for informational purposes only and is not an endorsement. Applicability for remediation must be evaluated on a site-specific basis.

48.

B3-77

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

RECEIVED

FEB 25 1999

DEPT OF ECOLOGY

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

319 I support the Everett Smelter Site Integrated Draft Cleanup Action Plan.

Date: 2/23/99

Name: JEANNE WOHL

Address: 1325 LOMBARD
EVERETT 98201

49.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

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2) fold and mail it to the address on the back.

320 I SUPPORT THE CURRENT CLEAN UP PLAN FOR THE EVERETT SMELTER PLANT.

Date: 2-23-99

Name: ROBERT J. WOHL

Address: 1325 LOMBARD AVE.
EVERETT, WA.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

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2) fold and mail it to the address on the back.

321 I strongly support the arsenic clean-up plans outlined in the draft environmental impact statement.

— Tim

Date: February 23, 1999

Name: Timothy Kropf

Address: 932 Lockmore Ave.
Everett, WA 98201

51.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

322 I support the draft Cleanup Action Plan.

Drew Nielsen

Date: 2/23/99

Name: DREW NIELSEN

Address: 1311 HOYT AVE
EVERETT, WA 98201

52.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

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1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

323 I support the Dept. of ECOLOGY proposal to clean up the ASARCO site in North Everett

John Lindstrom

Date: 2/23/99

Name: JOHN LINDSTROM

Address:

1211 Rucker 98201

53.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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Make your opinion count! Please send your comments to Ecology (you can use the bottom of this notice or a separate sheet of paper) at: Washington State Department of Ecology, Toxics Cleanup Program, Everett Smelter Site Cleanup, 3190 160th Avenue SE, Bellevue, WA 98008-5452. You can also turn in comments at the community Workshops on February 16th and 20th.

186 I support the above proposal.

Nancy Hecht
1330 Lombard
Everett WA 98201

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

187 I support the Draft Cleanup Action Plan issued by Washington State Dept. of Ecology for the Everett Smelter Site

Date: 2/23/99

Name: Jim Altice

Address: 810 Rucker Ave
Everett WA 98201

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
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2) fold and mail it to the address on the back.

188 I support the ~~[illegible]~~ Everett Smelter Site Integrated draft cleanup action Plan.

Date: 2/23/99

Name: Tom Martino

Address: 1802 Colby Ave. Everett WA. 98201.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
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2) fold and mail it to the address on the back.

189 I support the Draft Cleanup Action Plan.

Date: 2 · 23 · 99

Name: Anne Marie Hugel

Address: 1802 Colby, Everett 98201

57.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

190 I SUPPORT THE PLAN FOR THE ASARCO SITE CLEANUP.

Date: 2-23-99

Name: GREGORY M. LICHNECKERT

Address: 1802 LOMBARD AVE EVERETT WA 98201

58.

B3-87

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the plands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

191 I feel home owners should enjoy a safe land area where they're currently living as free of land pollution as is possible within reasonable limits.

Date: 2-23-99

Name: Noel Madelin Jones

Address: 1311 Buckeye Ave.
City 98201

59.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

192 I feel the participants have worked very hard in arriving at this plan to make the community arsenic-free. I feel their work plan should be implemented.

Date: 2/23/99

Name: Crystal A. Johanson

Address: 1301 Rucker Ave.
Everett, WA 98201-1613

60.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
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193 I support the Everett Smelter Site clean-up action plan with the hope that the health, safety, and welfare of the citizens directly effected be at the height of your decision making. All decisions should regard a permanent solution for decades to Come.

Date: 2-23-99

Name: Marsha Cogdill

Address: 526 Alverson Blvd.

61.

Yes, I would like to comment on the **Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area** during the comment period from **January 26, 1999 through February 26, 1999.**

Please write your comment below and either:
1) give it to Ecology at the public meeting held during the comment period or
2) fold and mail it to the address on the back.

194 I approve of the Draft Cleanup Action Plan However I would hope that continued negotiation between ASARCO, Dept of Ecology and the City of Everett would continue in regards to long term property resolution.

Date: 2/23/99

Name: Jeff Harry

Address: 1432 Wetmore
Everett, WA 98201

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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195 I support the Above Idea

1208 Colby Ave
Everett WA 98201

KEVIN NAER

63.

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I David W. Adams Phonecall — (425)-252-9873
1602 Virginia Ave.
Everett, Wa. 98201,

196 | I support the above written smelter cleanup plan

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Feb 2, 1999

97 To Whom It May Concern,

I, Jessie J. Roebuck, have lived here in the Northeast Neighborhood & have belonged to the Northeast Neighborhood Organization for many years.

I have attended all meetings & have heard all the pro & cons of the matter for all these years & this matter has been brought out to the public.

I, support all the actions major components of the proposed smelter cleanup plan stated on this notice from the human & the law side of it for our Northeast Neighborhood & all concerned.

Sincerely,

Jessie J. Roebuck
1312 Poplar Street
Everett, Washington
98201-1824

AREA Code 425
Phone # 339-0953

65.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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Phone # (425) 252-3664
D, Elvera E Hansen
1318 Poplar
Everett, Wash
98201-1824,

198 support the above statements of North East Everett Commiety smelter clean up draft action plan

I have been a resident of North East Everett since Feb 1964. I would like the commiteity restored to a reasonable living condition.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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I Richard W. Adams Phone# (425) 252-9873)
1602 Virginia Ave
Everett Wa 98201

199 I agree and Support the Above written Smelter cleanup plan And hope that in the future the public and City of Everett will not Allow Our Community to become a Contamination dumping Area.

67.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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200 I AGREE with the Smelter Clean up plan 2/21/99

John O Trill

1708 Baker Ave

Everett WA.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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201 I am in total agreement that clean up and monitoring of this situation is needed.

Dawn Gaver
1622 Chestnut Apt 2
Everett, WA 98201
425-252-5923

69.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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202 I am in total agreement of the Smelter Cleanup of plan and monitoring of this situation is needed

Thomas A Bradburn
1418 Fir street
Everett Wash - 98201

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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203 I am in Total ~~[illegible]~~ Agreement ~~[illegible]~~ of the Smelter cleanup plan of Ecology, Toxics Cleanup Program!

Raymond M.J. Bradburn
1418 FIR STREET.
EVERETT. WASHINGTON.
98201

71.

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I, Doris J. Cuneo Phone # (425) 259-3414
1230 Poplar St.
Everett, Wa. 98201-1822,

204 I support the draft cleanup action plan issued by ecology for the Everett clean up site (entire smelter area).
I have lived in the Northwest area for 23 years. I would like to see the whole area cleaned up.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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I Maywanter Olu Phone # (425) 2593978
1323 Poplar st Everett
Wa. 98201,

205 I agree and support the above written, cleanup smelter plan, and hope in the future that they clean up the entire Eurelle area, that has been contaminated.

73.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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206 1) I Howard H Brown - do support the movement to finally get the clean up of the asarco are underway But lets don't waste any more time.

2) Howard H Brown can be called at (425) 339 4143 -

I live at 2605 - 15th apt #3 (113) Everett Wt 98201

207 3) also I'd like to know if our area at my address has any contamination, we use to have gardens in this area.

Howard H Brown

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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I. Henio C. Trance (425) 252-9873
2605 15th St. #513
Everett, WA 98201

208 I agree and support the statements and Plan as stated in the above Draft. I also hope that in the future, Government and Industry listen to the people and to their wants and their welfare above those of industry.

H. C. Trance

75.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

Monitoring. Much additional sampling will be performed to design and monitor the effectiveness of cleanup actions. Soil sampling at peripheral area properties and the smelter fenced area will be performed to determine which soils will be excavated and replaced. A quality control program for clean backfill soils will be established. After cleaning inside homes, following soil removal and replacement, house dusts and carpet dusts will be sampled. Additional soil sampling over a larger area will be conducted to confirm or, if necessary, revise the site boundary. Long-term, periodic sampling of ground water, surface water, and storm drain sediments will be performed to evaluate the effectiveness of cleanup actions. Resampling of soils at selected remediated properties will be done during 5-year reviews of cleanup actions to assess whether recontamination is occurring. Air monitoring will be performed during cleanup actions to evaluate dust control measures.

Make your opinion count! Please send your comments to Ecology (you can use the bottom of this notice or a separate sheet of paper) at: Washington State Department of Ecology, Toxics Cleanup Program, Everett Smelter Site Cleanup, 3190 160th Avenue SE, Bellevue, WA 98008-5452. You can also turn in comments at the community Workshops on February 16th and 20th.

I Judith Ann Schofield
2605 15th #519
Everett, wa 98201 Phone # (425) 252-8217

209 I support the above written letter and I would like to see it cleanup.

A provider of quality water, power and service at a competitive price that our customers value.

February 24, 1999

Everett Smelter Site Cleanup
Toxics Cleanup Program
Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008-5452

Re: Draft Cleanup Action Plan ("CAP") Comment

Dear Sir:

Public Utility District No. 1 of Snohomish County, Washington (the "District"), has been a participant in activities associated with the Smelter Site for several years. Representatives first attended the neighborhood meetings when residents had questions regarding electric utility soil excavation practices and worker safety. Later, the District participated in a major utility relocation project involving excavations for new poles and trimming or removal of vegetation. Most recently, the District was a participant in the mediation process. It is clear from the Draft CAP that information and work from the mediation process were not wasted because their influence is reflected appropriately throughout. Because we believe Ecology has very carefully considered its approach in this case, we are in agreement with its recommended approach, and have only limited suggestions.

32 In its utility relocation project, the District "generated" a moderate quantity of soils exceeding MTCA cleanup levels from pole excavations. The District also discovered that much of the vegetation removed to accommodate new line construction, such as branches from tree trimming, also contained arsenic at levels exceeding MTCA. ASARCO refused to take or dispose of the materials, and the District was forced to obtain its own contractor for their lawful disposal. We recommend the CAP expand on the scope in section 2.4 and address the extent of contamination associated with vegetation or indicate how this will be addressed in the future. The District has already commented on the earlier draft "Large Soil Disposal Management Program" and will not repeat all of its comments here, except to say that the information in sections 6.7.5 and 6.7.6 appears to provide the outline of a viable and common-sense approach. We would suggest, however, that in both sections the scope become broadened to include soils and other materials, including slag, vegetation and other debris, which exceed MTCA cleanup levels for the smelter contaminants of concern.

2320 California Street • Everett, WA • 98201 / *Mailing Address:* P.O. Box 1107 • Everett, WA • 98206-1107
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B3-106

33 We were gratified to see provision for a long-term worker protection program to inform employers of required health and safety measures.

34 As a part of Section 6.7, we would suggest the addition of a soil testing program to provide information to employers, workers and homeowners planning soil excavation and vegetation removal (including tree trimming and removal) projects to be undertaken within the study area. The program should provide the means for gathering information on an interim basis until all required cleanup studies and work have been completed, and afterward as necessary and appropriate if all of the data desirable to assure worker safety and proper disposal practices for a specific project are not available.

35 Our last comment concerns the discussion of offsite slag in section 2.4.2. It is likely that there will be numerous instances in which N. E. Everett residents will encounter slag deposits upon their property. In order to assure that such materials are properly disposed of, there must be a program put in place to afford such persons the opportunity to utilize one of the soil and other contaminated material disposal programs. Perhaps the qualification for use of such program would be a chemical analysis, which confirms that such materials are similar to those existing upon the site. An informal "separate action" process could be utilized to avoid penalizing persons discovering such materials and searching for a way to accomplish lawful disposal.

Please contact me if you have any questions regarding the District's comments.

Sincerely,

Christoph Enderlein

Christoph Enderlein
Senior Manager, Environmental Affairs

removed and modestly contaminated soils will be allowed to remain at depths below 12 inches (based on evaluations balancing cleanup costs and impacts against the benefits of more complete soil cleanup). A number of long4erm institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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Make your opinion count! Please send your comments to Ecology you can use the bottom of this notice or a separate sheet of paper) at Washington State Department of Ecology, Toxics Cleanup Program, Everett Smelter Site Cleanup, 3190 160th Avenue SE, Bellevue, WA 98008-5452. You can also turn in comments at the community Workshops on February 16th and 20th.

210 I WHOLEHEARTEDLY SUPPORT THE PROVISIONS. I WOULD, HOWEVER, LIKE STRONGER ACTION REGARDING THE POSSIBILITIES IN THE FUTURE. WHAT IF, AFTER THE DUST SETTLES & THE LAWYERS HAVE GONE HOME, WE DISCOVER NEW CONTAMINATION ON OR NEAR THE SITE? I AM NOT SURE THE PLAN IS TOTALLY ADEQUATE IN THAT REGARD. EXCELLENT JOB IN MOST OTHER REGARDS, THOUGH.

MANY THANKS

ADRIAN R. MAGNUSON-WHITE
1611 VIRGINIA AVENUE
EVERETT, WA 98201

B3-108 A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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Make your opinion count! Please send your comments to Ecology (you can use the bottom of this notice or a separate sheet of paper) at: Washington State Department of Ecology, Toxics Cleanup Program, Everett Smelter Site Cleanup, 3190 160th Avenue SE, Bellevue, WA 98008-5452. You can also turn in comments at the community Workshops on February 16th and 20th.

211 I am an 83 year old widow living alone at 1115 E Marine View Dr. Everett Wash 98201
I would not be able to pay for soil testing but if you feel its necessary its OK. I feel we are farther away from the Contaminated Site but see we are included on the list.

Thank you
Sincerely
Rae I. Hubert

EHA
EXECUTIVE DIRECTOR
Allan L. White

Housing Authority of the City of Everett

B3-109
COMMISSIONERS
David Dorsey
George Perez, Jr.
Lyle Ryan
Michael Sells
Barbara Yates

79.

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Februrary 23, 1999

Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008-5452

ATTN: Everett Smelter Site Public Comments

I am pleased to offer the following comments on the Draft Cleanup Action Plan (DCAP) and Draft Environmental Impact Statement (DEIA) for the Everett Smelter Site. The Everett Housing Authority is one of the largest land owners within the Community Protection Measures Area and has a unique responsibility and position given its status as the *landlord for approximately 300 families within the CPM Area as well as another 250 families within 100 yards of the current CPM boundary.* Our primary concern throughout the lengthy process that has been followed since the discovery of the contamination eight years and four months ago has been for the safety of the families living in our properties and for the safety of our employees who serve them. Our second concern has been to support the maintenance of a quality neighborhood in which our property is located. Our final main concern has been to protect the investment the citizens of this country have made in our housing over the course of nearly sixty years.

36 **We first want to indicate our appreciation for the commitment Ecology is now showing for moving the decision process along.** Despite its status as Ecology's most important residential contamination site in the state, this site and the residents of this community have been left dangling through eight-plus years of inaction.

37 **We also want to strongly support the proposed immediate cleanup of the highly contaminated homes within the footprint of the former smelter.** These homes ought to have been cleaned up long ago and certainly warrant the attention they will now be receiving.

38 Unfortuneately, this leads directly to our first objection to the DCAP: the Washington Administrative Code governing draft cleanup action plans requires that a draft plan include "The schedule for implementation of the cleanup action plan including, if known, the restoration time frame. . ." [WAC173-340-360 (10)(a)(iv)] ***The DCAP fails to include any type of implementation schedule despite the WAC requirement for one.*** We are left, therefore, with the unreasonable task of commenting on a draft plan with no reference to timing, certainly one of the critical elements to any action plan, and especially critical to a plan dealing with removal of toxic substances from a residential area. It is, in fact, a reasonable conclusion from the DCAP that the homes in our community will still be contaminated after another eight years, or even double or triple that time. The final CAP must include a specific implementation schedule and a corresponding financing plan. There must be a schedule that provides for every property owner to have a reasonable idea of the level of contamination in his/her yard in the very near future. Secondly, there must be a schedule for determining the final boundary for the

3107 COLBY•P.O. BOX 1547•EVERETT, WA 98206-1547•(425)258-9222•TDD/TTY (425)303-1111•FAX (425)303-1122

cleanuup. It is unacceptable to think that there may be scores if not hundreds of Everett citizens who will be affected by this CAP but who are unaware of that fact because they have accepted the maps Ecology has publicized for years. Finally, the CAP must include a detailed schedule showing the order of actions and a general timeline for full cleanup.

39 The cleanup action level proposed in the DCAP needs to be recognized as an extreme standard, eleven times lower than that being applied to homes sixty miles to the south of our community under an Ecology-approved plan. ***It is not possible to accept Ecology's contention that the 20PPM is essential for the safety of the residents of this community, when the Department has already permitted young children to live with levels many times higher for over eight years and has no schedule for ending this situation.*** The DCAP pursues a "perfect" solution despite the fact that the result may well be no cleanup. The result is that our community fails to get a "good" cleanup that would leave it safe, because Ecology is pursuing a perfect cleanup.

40 **Application of the 20PPM standard to property in residential use is unnecessary; application of the same standard to non-residential uses is unreasonable.** There is no basis for applying the 20 PPM standard to commercial, park or institutional uses. The 20 PPM standard is based upon daily exposure by a young child for six years. Surely this is not relevant to land under a commercial parking lot or to the golf course. Yet, the DCAP will require every commercial property on Broadway, for example, to be cleaned up to the 20 PPM standard when the time comes that new construction or remodelling exposes soil. Given the permanent nature of the enforcement action, that time will come; it's just a matter of when.

41 **The DCAP and DEIS fail to consider the option of maintaining the Smelter Site itself (referred to as the Former Arsenic Trioxide Processing Area) in the use for which it is zoned and which is provided for by the City's Growth Management Comprehensive Plan Land Use Map for the surrounding area, namely single family residential.** The land has been in single family residential use for over 60 years. It is zoned for single family residential use. The surrounding area is designated single family residential in the Comprehensive Plan. Despite these facts, single family use is not even looked at as an option. We fail to understand the basis for this decision by Ecology, for which no explanation is provided. It is true that alternative land uses were considered during discussions held as part of the Mediation Process. However, the context of those discussions is such that they are irrelevant to the DCAP and DEIS.

42 Related to this concern is the DCAP's proposal that soils with contaminants as high as 3000 PPM be left at the Smelter Site. In fact, the DCAP is unclear as to whether levels even higher than 3000 PPM might be permissible, depending upon the results of TCLP testing. **The DCAP, in essence, calls for the Smelter Site to be the dumping ground for lower level contaminants being removed from throughout north Everett.** This decision necessitates the abandonment of the smelter site as a wasteland in the midst of our neighborhood. Ecology acknowledges this in one of the DCAP's more inappropriate sections which states:

> *If no use has a planned construction start date within one year of closure, an aesthetically pleasing fence which meets the approval of citizens will be constructed. The fence will not incorporate cyclone fencing, barbed wire, razor wire, or any other similar fencing materials. If agreement with citizens cannot be reached, an Ecology-approved design with a natural stone foundation made of granite or other durable stone (not limestone or other rock susceptible to chemical weathering) and wrought iron fencing will be constructed.* [Page 93]

While we are grateful that the barbed wire will come down, we cannot agree that the Smelter Site can be left in a condition such that Ecology insists that it be fenced off. If the proposed Consolidation Facilty is safe and will withstand storms and earthquakes for hundreds of years, why is it not safe for children to play on? Why must it be fenced off and sit as an eyesore within this residential area?

In conclusion, we greatly appreciate the effort Ecology has put into developing the DCAP since it terminated the Mediation Process. For the first time since it was identified, we feel the Department is giving this site the attention it warrants. Unfortunately, the DCAP does not go nearly far enough in moving this cleanup along. We strongly encourage Ecology to revise the DCAP as outlined above:

- Include a specific implementation schedule and financing plan.
- Provide for a more reasonable cleanup level in the periforal residential areas.
- Provide separate cleanup levels for residential and non-residential uses.
- Provide for the cleanup of the Smelter Site to the same level as other residential areas.
- Include single family residential in the DEIS as an optional land use for the smelter area.

Sincerely,

Allan L. White

Allan L. White
Executive Director

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B3-113 80.

ASARCO

February 25, 1999

Thomas L. Aldrich
Site Manager
Tacoma Plant

Mr. David South
Senior Engineer, Toxics Cleanup Program
Northwest Regional Office
Washington Department of Ecology
3190 - 160th Ave. SE
Bellevue, WA 98008-5452

RE: Comments on the Everett Smelter Site Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands

Dear Dave:

The attached submittal provides Asarco's comments on the above referenced document and its attachments. We are providing both general and detailed comments. The general comments address the fundamental decisions implied by the Integrated Draft Cleanup Action Plan (draft CAP) and Draft Environmental Impact Statement (draft EIS). The detailed comments address specific portions of the document and provide additional supporting information and logic for the general comments.

Asarco is currently in litigation with the Department of Ecology in ASARCO Incorporated v. State of Washington Department of Ecology, et al., Thurston County Superior Court No. 98-2-01729-2. That lawsuit concerns, among other issues, the legality and constitutionality of any application of MTCA against Asarco. By submitting this response to Ecology's draft CAP and draft EIS, Asarco does not concede the validity of any application of MTCA against it, nor does it make any other concession with respect to its liability under that statute or with respect to the validity of Ecology's MTCA regulations.

A3 Asarco previously provided detailed comments and analysis to Ecology on the appropriateness of a 20 ppm arsenic and a 250 ppm lead residential soil cleanup level (HEWM, July 1998 "new science" submittal). At that time a cleanup action plan had not been identified by Ecology. Unfortunately, it is now clear that Asarco's comments and supporting submittal of new science were not appropriately considered by Ecology prior to the department identifying the same cleanup levels for arsenic and a similar lead cleanup level in the draft CAP. The information in the new science submittal is even more pertinent given that Ecology would have selected a remediation level well above 20 ppm arsenic for residential soil removal if the documents had been adequately reviewed and considered. For this reason, Asarco has attached the prior new science submittal, and is providing a response to Ecology's Review of Asarco's

ASARCO Incorporated P.O. Box 1677 Tacoma, WA 98401 (206) 756-0201 Fax: (206) 756-0250
INFORMATION CENTER (206) 756-5436 FAX (206) 756-7414

New Science Submittal Regarding Arsenic and Lead. Comments on Ecology's other referenced supporting documents have also been included. Asarco's complete comment package contains the following:

A. General Comments on Draft Cleanup Action Plan
B. Detailed Comments on Draft Cleanup Action Plan
C. General Comments on Draft Environmental Impact Statement
D. Detailed Comments on Draft Environmental Impact Statement
E. General Comments on Ecology's "Review of Asarco's New Science Submittals" with Statements by Asarco's Experts included
F. Comments on "Hazards of Short-Term Exposure to Arsenic-Contaminated Soil" Paper From Department of Health and on Ecology's "Decision Memorandum," dated January 26, 1999
G. Significant Omissions in the Draft Cleanup Action Plan and Environmental Impact Statement
H. Attachments
   1. Cost Estimate
   2. Substantial and Disproportionate Analysis
   3. Method C and Additional Regulatory Flexibility
   4. Analysis of Background Levels and Other Information
   5. Traffic Analysis
   6. "New Science" Submittal

Asarco requests that Ecology fully consider the above-listed comments and attachments prior to issuing the final Cleanup Action Plan.

The transmitted comments were prepared with the assistance of several individuals who have had direct experience with the Everett Smelter Site and numerous other smelter cleanup programs around the country. In many instances the comments were provided by the same individuals responsible for collecting and reporting the information Ecology relied on in the development of the draft CAP. It should be emphasized that the logic and supporting information utilized in Ecology's decision-making process was not clearly presented in the draft CAP and related documents. Much information was summarized, but the relationship of this information to the decisions reached was not provided, and is not otherwise apparent.

405 In reviewing the draft CAP, it is immediately apparent that there are significant differences between the remedial actions proposed for Everett and those being implemented at the nearby Ruston/North Tacoma Site. Although the environmental and human health issues at the two sites are identical, and Ecology itself notes that the two sites are very similar, Ecology has chosen to ignore the logical relationship between these sites in preparing the Everett draft CAP.

Ecology is heavily involved in the ongoing implementation of the Ruston/North Tacoma Site remedy, and concurred with EPA as to the protectiveness of that remedy. However, the draft CAP does not acknowledge Ecology's support of the Ruston/North Tacoma Site Record of

Decision, nor does it justify the inconsistency between Ecology's plans for Everett and their decisions at Ruston/North Tacoma. Further, the draft CAP fails to recognize that the Ruston/North Tacoma remedy is effective in meeting Ecology's threshold requirement of protection of human health and the environment. In developing the Cleanup Action Plan for the Everett Smelter Site, Ecology should fully consider the record for Ruston/North Tacoma and the logical application of that decision to Everett.

At several locations within the draft CAP, references to Asarco's responsibility for cleanup of the Everett Smelter Site are made or implied. It is important for Ecology to understand and recognize that, if Asarco, as one of several former owner/operators of the smelter, has any responsibility for implementing the final Cleanup Action Plan, that responsibility must be shared with current owners of land within the Site, others who have contributed to the deposition or movement of arsenic and lead at the site, in addition to other prior owners and operators.

406 Ecology describes Everett as a "quintessential cleanup site." One would hope not. The draft CAP evidences a rigid adherence by Ecology to outdated modes of analysis reflected in regulations that were adopted in 1991 but which were based on EPA Guidelines set out in 1986. Those Guidelines are now more than 13 years old, and were rejected by EPA in 1996 when it published new proposed Risk Assessment Guidelines because the old Guidelines were no longer consistent with current scientific knowledge about carcinogenicity. Similarly, scientific knowledge about arsenic has evolved substantially since EPA published its cancer slope factor in 1988.

The draft CAP is a function of an application of outdated regulations to an rapidly evolving scientific issue, with total disregard for recent and on-going scientific developments. This is not the time for precipitous action. Last summer, EPA declined to promulgate a health-based criterion for arsenic in surface water. It noted the number of issues and uncertainties about the health effects of arsenic arising from issues about arsenic exposure evaluation, metabolism and detoxification processes, analytical methods and effects at low doses. It announced that "EPA has determined that these issues and uncertainties are sufficiently significant to necessitate a careful evaluation of the risks of arsenic exposure before the Agency promulgates water quality criteria for arsenic ... ." 62 Fed. Reg. 42179 (Aug. 5, 1997).

Ecology should exercise similar restraint, consult with EPA and its Science Advisory Board (SAB), and consider the new science on its merits to ensure that a scientifically-sound remedy is selected, rather than rejecting the new science as a matter of "policy." Consistent with
407 its own regulations, it must also evaluate the cost of this cleanup relative to the marginal reduction in health risk, and consider the adverse effects of this extraordinary remediation itself on public health.

Asarco trusts that the enclosed comments will be helpful to Ecology in preparing a final version of the draft CAP and supporting documents. If you would like to discuss any of these comments, please contact me directly.

Yours very truly,

Thomas L. Aldrich by M

Thomas L. Aldrich
ASARCO Incorporated

Enclosure

A. General Comments on Cleanup Action Plan

44

- The general body of information on the significance of a residential soil exposure pathway and specific information on arsenic toxicity do not support the Ecology-identified 20 ppm soil cleanup level for arsenic.

408

Arsenic toxicity is not a new field of study. Arsenic is a trace element that occurs naturally in water, rock, soil and living organisms. Arsenic occurs naturally in many foods which often contain substantial amounts of inorganic arsenic. Knowledge of arsenic toxicity goes back to ancient times, as does its history of beneficial use as both a medicine and as a pesticide and herbicide. Because of its many historical uses, arsenic can often be found at elevated levels in soils. However, the most significant intake of inorganic arsenic typically is through food consumption. Drinking water is also an important source. Therefore, from a practical perspective, a fundamental issue for the Everett Smelter Site is how much additional arsenic intake might occur from ingesting soil, and at what level the additional exposure realistically would be a concern.

409

In order to begin to evaluate this issue for Everett residential areas, three primary components of the standard equation for estimating potential risk must first be thoughtfully considered:

- The amount of residential yard soil routinely ingested.
- The amount of arsenic in the ingested soil that is actually available for absorption into human tissue (bioavailability).
- The levels at which available arsenic may have negative effects on human health.

First, with regard to the potential to ingest soil, Asarco has provided Ecology with a number of recent studies which indicate that ingestion of soil from yards is not nearly as substantial as Ecology assumes, particularly on a year-round long-term basis.

Second, Asarco has also provided Ecology with studies in the "New Science" submittal in which arsenic bioavailability has been evaluated. See Attachment H-6. Several of those studies were recently conducted at other smelter sites and show that the bioavailability of arsenic in those soils is well below the values utilized by Ecology in its calculations for the Everett site.

Third, once ingested, the next question is what level of available arsenic has toxic effects. Again, Asarco has provided Ecology with recent studies that reflect an increased understanding of arsenic toxicity and carcinogenicity. These studies point out that findings of elevated risks of cancer from high concentrations of arsenic in drinking water cannot be linearly extrapolated downward to predict cancer risk from soil ingestion at near-background levels, as Ecology has

done. Nor is it appropriate to simply assume, without supporting evidence, that arsenic will have effects at low dose that are proportional to effects at high dose.

410 Both the inappropriateness of attempting to extrapolate high-level effects to very low levels and the inability of a simple linear equation to define risk are evident in Ecology's response to Asarco's new science documents. On page 14 of its response, Ecology identifies 0.67 ppm arsenic (based on 100% bioavailability) or 1.67 ppm arsenic (based on 40% bioavailability), as the actual residential soil concentrations above which the method B risk equation defines concern. These concentrations are well below the USGS published mean value concentration of 5.5 ppm arsenic for soils across the western United States.[1] According to Ecology's method B calculation of risk, therefore, the entire western United States contains soil concentrations that pose an unacceptable threat that is as high as roughly ten times Ecology's acceptable level. Essentially, Ecology's reliance on these calculated soil concentration values provides an operating assumption that the presence of <u>any</u> arsenic, even at natural levels, in soil is unacceptable. The body of science, as well as common sense, tells us that this is not the case.

411 Ecology arrives at this entirely unrealistic assessment of risk by taking the most conservative position on the three variables identified above, along with other conservative assumptions. The net effect of each conservative assumption is multiplied in the simplistic linear equation used to calculate risk. (Ecology's regulation assumes that <u>one</u> formula is appropriate for <u>all</u> carcinogens, regardless of the biological mechanism through which they work.) Ecology's conservative assumptions on soil ingestion rates and bioavailability contribute to the generation of such unrealistic values; however, they are not nearly as important as the third variable, the level at which such negative effects supposedly occur.

412 The critical flaw in Ecology's logic is the assumption that the method B equation is still valid even though the cancer potency factor is based on an inappropriate direct downward extrapolation of high concentration effects. Ecology assumes it can measure such effects from a generalized Taiwanese study that involved very high concentrations of arsenic in drinking water even though the study did not provide specific data on actual dose response relationships. Ecology relies on a flawed EPA attempt to <u>estimate</u> dose response to predict effects from exposure to near-background arsenic concentrations in residential soils.[2] It does so even though EPA itself warns of the flaws and uncertainties in its arsenic analysis. Ecology should recognize that introducing the extrapolated toxicity values into the above described method B calculations inappropriately influences the output of the equation to such a degree that modification of the other parameters has little effect. Instead, Ecology simply assumes, without supporting evidence, that their calculations of risk are representative for low concentrations of arsenic in residential soils.

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[1] Shacklette, H.T., J.G. Boerngen, 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States, U.S. Geological Survey Professional Paper 1270, Washington, D.C.

[2] Brown, Guo, Kuo, and Greene, Skin Cancer and Inorganic Arsenic: Uncertainty Status of Risk, 17 Risk Analysis No. 1 (1997); <u>see</u> Brown Declaration at ¶ 17 in Section E.

413 It appears that Ecology must have understood that using the extrapolated cancer potency values in the method B equation has a similar effect to introducing zero as a multiple; no matter what reasonable adjustments are made to the other variables, the outcome of the equation remains the same. As shown by Ecology's calculations, reducing the bioavailability of arsenic in soils from 100% to 40% only results in a 1 ppm change in the acceptable arsenic concentration: 0.67 ppm versus 1.67 ppm, respectively. However, instead of addressing this issue, Ecology appears conveniently to ignore this logic in order to use the unrealistic method B calculated values of 0.67 and 1.67 to justify selection of the similarly low residential soil cleanup level of 20 ppm arsenic.

414 Furthermore, Ecology appears to have decided that these remediation levels should be applied to commercial and adult recreational settings (e.g., golf course), even though residential child-based exposure scenarios on which its calculations are based are not appropriate for these land uses. In using the method B values as a spring board to a 20 ppm "background" based value, Ecology perpetuates the same flaws in logic and compounds those flaws by not recognizing the larger difference in potential for exposure between the different settings.

415 At the many sites like Everett that exist around the country, the agencies responsible for making cleanup decisions recognize the limitations of a risk assessment process based exclusively on a linear extrapolation and use calculated estimates of risk along with other relevant information to make decisions about remedial activities. At the nearby Ruston/North Tacoma Site in Ruston, Washington, where estimates of risk were appropriately considered along with other project factors, a residential soil removal and replacement remediation level of 230 ppm arsenic was coupled with institutional controls for soils with concentrations of arsenic between 20 ppm and 230 ppm. Ecology accepted this value as protective of human health and, by necessary implication, as consistent with MTCA. (In fact, Ecology also notes in its Review of New Science that the Ruston Site is similar to Everett.) At the Bunker Hill Superfund Site in northern Idaho, where exhaustive evaluations of risk were conducted, a value of 100 ppm arsenic was selected not as a soil removal level, but as the acceptable arsenic concentration for clean soils being brought into the site to replace contaminated soils. At both of these sites, and many others, the full body of information on metals toxicity was examined and complemented by new information from those sites. In addition, the results of detailed risk assessments were considered along with the other fundamental factors discussed below to make risk-management decisions bearing on the selection of remediation levels and appropriate cleanup actions. Additional comments on those other important aspects of the remedy selection process are provided in the subsequent general comments.

416
- The proposed 20 ppm arsenic cleanup level and corresponding sampling program for residential soils are inappropriately conservative and do not consider the potential for other urban sources of arsenic to influence residential soil concentrations.

417 As part of Asarco's prior new science submittal, an analysis of Ecology's published soil background concentrations for the Puget Sound was conducted. This analysis, along with other information, was provided to point out two problems:

1. Other influences on urban soils may result in exceedance of a 20 ppm arsenic concentration.

2. Sampling methodology and corresponding decision rules, which are important for any remediation program, become extremely important when the cleanup or remediation level is set at or near background concentrations.

418 In response to that portion of the new science submittal, Ecology points out that although the data used by Asarco were identified as representative of background in Ecology's study, the data set was in fact flawed due to inclusion of data points influenced by the Tacoma Smelter. Ecology may be correct in indicating its own background data set is flawed, if the intent for that study was to identify arsenic concentrations in native soils uninfluenced by urbanization. However, when setting soil cleanup and remediation levels and developing the sampling methodology and decision rules to determine the need for residential soil removal and replacement, Ecology should weigh the potential for other urban sources of arsenic to influence the decision-making process. It has not done so.

419 During mediation, Asarco provided Ecology with information identifying some significant non-smelter influences that could affect arsenic concentrations in Everett residential soils. This information is summarized in the detailed comments, attached. These sources include:

- Use of locally-purchased gravel by the city and homeowners that contains naturally occurring concentrations of arsenic (measured range up to 161 ppm; Ecology Press Release 98-068, May 6, 1998).

- Use of soil nutrient amendments that have been documented to contain up to 4,500 ppm arsenic. Ecology estimated that just one year's use of Ironite at the manufacturer's stated application rate could raise arsenic levels in soil above the 20 ppm arsenic cleanup level (Ecology Press Release 98-092, June 5, 1998).

- Historical use of pesticides and herbicides, containing both arsenic and lead at intentionally toxic concentrations (up to 520,000 ppm arsenic).

- Use of landscaping and decking timbers and wood chips treated with an arsenic-based preservative (up to 30,000 ppm in wood).

Even though Ecology has indicated that the higher background data set values could be linked to the Tacoma Smelter, it is still important for Ecology to consider the potential for the above-listed sources of arsenic to influence soil concentrations at Everett.

420 In the new science submittal, the effect of Ecology's standard three-part decision rule was evaluated relative to the Ecology background data set. In that analysis, the significance of the following three components of the decision rule were individually evaluated.

1. Comparison of the 95% upper confidence limit (UCL) of a sampling data set mean to the cleanup or remediation level.

2. No more than 10% of the data set can exceed the cleanup or remediation level (i.e., less than one in ten samples above cleanup or remediation level).

3. No single value greater than two times (2x) the cleanup or remediation level (i.e., with a cleanup level of 20 ppm, no single sample value above 40 ppm).

421 The decision component with the greatest effect is the 2x rule. This is due to several values from the background data set exceeding 40 ppm. Ecology's intended use of the three-part decision rule, in post-remediation compliance monitoring, is not clear from the draft CAP. Ecology does, however, incorporate the 2x part of the three-part decision rule for their initial determination of the need to remove and replace soil in the top 12 inches.

422 It appears that Ecology is proposing initially to sample all residential properties within the current CPM (approximately 595 properties) on a front yard/back yard basis on six-inch depth increments down to a depth of four feet. According to the draft CAP, at a minimum, ten sample locations will be selected within the front yard and ten within the back yard. Individual samples will then be collected from each depth interval at each of the ten locations within a front yard or back yard. For example, ten locations in the front yard times eight six-inch sampling intervals to a depth of four feet, results in the collection and analysis of 80 individual samples for that front yard.

It is our understanding from the draft CAP that the results from the sampling effort will be used to calculate a geometric mean for each 6-inch depth interval, and, if the average exceeds 20 ppm arsenic for either the 0-6 or 6-12-inch interval, those soils will be removed and replaced. Also included in the draft CAP is the decision rule that, if a single value in the top foot exceeds 40 ppm (the 2x component of Ecology's three-part decision rule), the entire front and/or back yard will require soil removal and replacement to the depth of exceedance even if the average concentration is less than 20 ppm. Based on the draft CAP, the same fundamental averaging approach is also applied over the 1- to 4-foot depth interval, with increasing allowed average and maximum remediation values with greater depth. However, given that the main influence of

smelter deposition and other urban arsenic sources appear to be in the top foot of soil, we are focusing on that portion of Ecology's draft CAP.

423 Given the prescribed sampling approach and decision rules, any and all of the above listed common urban sources of arsenic have the potential to result in contributions to urban soil that would result in exceedance of the 20 ppm remediation level and the 40 ppm single maximum value decision rule. As an example, a front yard may have sample results for the 0- to 6-inch or the 6- to 12-inch interval where all but one of the individual values were at 19 ppm and a single value of 35 results in a geometric mean concentration of 20.2 ppm that exceeds the 20 ppm remediation level. Another example is a yard where nine of the ten sample values are at nondetectable concentrations with a single value over the maximum allowed value of 40 ppm. Both of these scenarios could be caused by any number of non-smelter-related influences and would result in the entire front or back yard soil being removed and replaced. Ecology, however, failed to consider that influences from the above-identified non-smelter, urban sources of arsenic could easily result in exceedance of both the average (20 ppm) and maximum (40 ppm) arsenic cleanup and remediation levels for the top foot of soil. Nor does it acknowledge that in an older urban area such as Everett, peeling lead-based paint could easily cause exceedance of the lead remediation level of 353 ppm established for the top one foot. (See Section B for a more detailed discussion of the appropriateness of a 353 ppm soil lead remediation level.)

424 The draft CAP should also recognize that the relationship of non-smelter influences to remediation levels, sampling approach, and decision rules are of greatest importance with distance from the smelter source. In general, as distance from the Everett Smelter increases, the level of airborne deposition decreases. With less influence from smelter deposition, the relative contribution from the other identified sources becomes more significant. For this reason, the sampling approach and decision rules will have great influence not only on an individual property basis but also on defining the overall extent of the planned soil removal activities. From the draft CAP it is apparent that Ecology has not considered the important relationship between non-smelter influences and remediation levels, sampling approach, and decision rules with regard to the extent of the required cleanup beyond the current CPM boundary. Because of the very low cleanup and remediation levels and the proposed sampling approach, the outermost extent of the cleanup area could not be estimated. Without first considering these issues and estimating the extent of the required cleanup, Ecology cannot evaluate many of the criteria required under their integrated CAP/EIS processes, such as the extent and duration of impacts to the community and the estimated cost.

425 Another important consideration when developing an approach for residential soil sampling is the concentration at which the cleanup or remediation level is set. As noted previously, the draft CAP identifies a default background concentration of 20 ppm as the level at which residential soil will be excavated and replaced with "clean" soil. Not only does this standard lack any reasonable relationship to protecting human health, but the proximity of the 20 ppm cleanup level to background raises additional problems as well. As noted above, because the 20 ppm value is so low, it is highly likely that a majority of the residential properties within the CPM, as well as a large number outside the CPM, will require remediation. Because exceedance of an arsenic cleanup or remediation level can be predicted for a large portion of the

Site, based on existing data, a relatively simple and correspondingly inexpensive sampling approach would be the most appropriate for confirming the obvious in these areas.

426 The fact that the removal level has been set far below the levels at which any observed effects from arsenic in soil have been documented is also an important consideration. Because the draft CAP cleanup and remediation levels are so low, the consequences of missing a small amount of contamination near those levels are minimal. Again, this perspective favors the development of a simple, but efficient, sampling methodology, rather than the costly and involved sampling approach provided in the draft CAP. (This is not to suggest, of course, that the 20 ppm cleanup level is appropriate.)

427 As noted above, Ecology should have considered the potential for other influences on soil arsenic and lead concentrations when establishing soil cleanup and remediation levels. Ecology should also consider the potential effects of its proposed sampling approach and decision rules relative to the proposed cleanup and remediation levels and the potential for other influences. The results of Ecology's consideration of these issues should be further evaluated within the larger decision-making process including the draft EIS and, as discussed in the following comment, the cost of the proposed cleanup.

428 46 • <u>The cost of proposed actions relative to benefit to the environment and community were not appropriately considered.</u>

As noted in the prior comments, Ecology is taking inappropriate and unscientific positions with regard to selecting cleanup and remediation levels, proposed actions at those levels, and the sampling methodology to determine the need for action and to confirm that remediation goals are achieved. However, the social, environmental and financial consequences of these decisions are given only superficial consideration. Ecology should not make fundamental decisions regarding cleanup of the Everett Smelter Site without first considering the extent and duration of the construction-related impacts on the neighborhoods along with the potential benefits and the cost of the planned actions. Nor can citizens, city and county government, and others can make informed decisions without this information. Specifically, with regard to the cost of implementing the draft CAP, no new information is provided, and only a portion of the existing cost information is referenced.

429 As noted in the preceding general comment, the draft CAP does not describe the anticipated extent of the planned cleanup activities. Also, as noted, it is highly likely that, given the very low cleanup level, the removal and replacement of the top foot or more of residential soils will extend well beyond the existing CPM boundary. In addition, the application of the 20 ppm arsenic and 353 ppm lead remediation levels to commercial and public areas will have further cost ramifications both within and outside of the current CPM. None of these issues appear to have been considered by Ecology in developing the draft CAP.

430 The draft CAP refers to the substantial and disproportionate cost analysis conducted in the feasibility study (FS) to support decisions on selection of remediation levels. However, it

ignores that even with the limited data available at the time of the FS, the prior substantial and disproportionate cost analysis does not support selection of an arsenic cleanup level of 20 ppm. The FS analysis clearly indicated a higher remediation level would be required. The FS findings are consistent with a subsequent analysis of the FS conducted by Ecology in 1997, "Determination of Total and Accessible Soil Volumes and Associated Cleanup Costs at the Everett Smelter Site." That Ecology analysis also indicated a substantial and disproportionate cost premium for a 20 ppm arsenic cleanup level. Both of these analyses, even though limited to the immediate area around the former smelter site, support selection of arsenic remediation level much higher than 20 ppm. More importantly, the disproportionality identified in these reports becomes far greater when the more recent distant data points are included in projections of the extent of soil removal and replacement (see Attachment H-2).

431 Ecology also refers to cost estimates produced during mediation by the Technical Work Group, implying a relationship to the cost of implementing the draft CAP. During mediation, several example cleanup alternatives were developed and the potential costs of each estimated. As noted in the draft CAP, mediation alternative B has components similar to those identified in the draft CAP and was estimated to have costs of approximately $86,000,000. However, consistent with the earlier FS and Ecology cost estimates, it was acknowledged that the extent of soil removal and replacement beyond the CPM boundary, although required under alternative B, could not be projected; therefore, only limited assumptions were made about the cost of cleanup outside the current CPM boundary. In addition, as discussed in the detailed comments, there are many other components of the draft CAP that will be more costly to implement than those contemplated during mediation discussions as part of alternative B (e.g., more involved institutional controls).

432 In order to better understand the costs of implementing the draft CAP, Asarco has conducted a preliminary analysis of project costs. The estimate addresses both the near-term capital and long-term O&M costs associated with the draft CAP. Asarco's preliminary estimate of project costs is over $96,000,000 (assuming backfill soils with arsenic concentrations up to 20 ppm may be used). (See discussion below.) The portion of costs addressing peripheral area soil removal and replacement is estimated to be over $70,000,000. Although analysis indicates that the extent of the cleanup may go well beyond the current CPM boundary, the attached preliminary estimate allows for only 46 residential properties outside the current CPM boundary being remediated. It is thus an underestimate of cost.

433 Further examination of the attached cost estimate shows that a very large portion of the peripheral area costs are associated with the removal and replacement of soils very near 20 ppm arsenic. The draft CAP is not clear on the proposed requirements for replacement soil used to backfill excavated areas, providing two possible interpretations: arsenic levels below 0.67 ppm or below 20 ppm. As discussed above, the typical arsenic concentration in soils in the Western U.S. is 5 ppm. Even if soils with arsenic concentrations below 0.67 ppm and with suitable physical characteristics could be found, the cost would be extraordinary. On the other hand, if the requirement for backfill is to have arsenic concentrations with less than the background value of 20 ppm arsenic, the Ecology approach would allow for removal of soils with 21 ppm arsenic and backfilling with soil containing 19 ppm arsenic. The limited practical benefit of this type of

remedial action is obvious. The attached estimates show the large potential expenditures associated with aspects of the draft CAP that have essentially no practical value.

434 It should also be noted that it has been Asarco's experience in implementing remedies at several other residential smelter sites, that the estimated extent of soil removal and replacement activities is always well below the actual extent of cleanup required. This experience is based on sites where the remediation levels are well above background concentrations and are also high enough to minimize the potential for influence from other urban sources of metals. Given the very low remediation levels prescribed by the draft CAP, it is likely that all estimates of project scope and cost will turn out to be low.

435 Ecology should consider the likely extent and corresponding cost of cleanup activities along with the ramifications of removing and replacing soil with arsenic concentrations slightly above 20 ppm from large portions of northeast Everett. The consideration should weigh the likely harm from the extensive protracted construction activity and truck traffic with the real benefit of lowering the average soil arsenic concentration by a few ppm. In its new science submittal, Asarco has provided information that should be considered by Ecology when weighing these important issues.

436 • Ecology misinterpreted and misapplied its solid waste and dangerous waste regulations.

In at least two instances, Ecology premised its cleanup action decisions on patently incorrect legal conclusions. In the draft CAP, Ecology concluded that provisions of WAC 173-304 and WAC 173-303 were relevant and appropriate legal requirements applicable to the Everett Smelter Site. In both cases, however, these provisions, by their own terms, do not apply to the cleanup activities prescribed for the Everett Smelter Site in the draft CAP.

437 With regard to WAC 173-304, Ecology states that two of the landfilling standards set forth in WAC 173-304-460 are "requirements" that are applicable, relevant and appropriate to creation of a "problem waste" consolidation facility in the Former Arsenic Trioxide Processing Area. This statement is completely incorrect: the regulations themselves specifically exempt "problem waste" from the landfilling standards of WAC 173-304-460 (See WAC 173-304-400: "The standards of WAC 174-304-405 through 173-304-490 [inclusive of 460] . . . apply to all solid waste handling facilities except for: . . . (d) Problem wastes as defined in WAC 173-304-100") (emphasis added). Thus, all of the landfilling standards of Section 460 of Ch. 173-304 that are imposed by Ecology in the draft CAP are founded on a misapplication of the law and are not legally supportable.

438 Similarly, Ecology bases its decision to disallow an on-site containment facility (OCF) in the Former Arsenic Trioxide Processing Area on the incorrect legal conclusion that the siting criteria of the Dangerous Waste Regulations, WAC 173-303-282, are applicable, relevant and appropriate "requirements" governing the cleanup at the Everett Smelter Site. This conclusion again ignores the express provision of the regulations themselves that exempts on-site cleanup

activities being conducted under MTCA from the siting criteria of WAC 173-303-282 (See WAC 173-303-282(b): "This section does not does not apply to: . . . (iii) Persons at facilities conducting on-site cleanup of sites under . . . chapter 70.105D RCW [MTCA] provided the cleanup activities are being conducted under a consent decree, agreed order or enforcement order or is being conducted by the department [of Ecology].") (emphasis added). As a result, all of Ecology's decisions in the draft CAP that are premised on the alleged failure of an OCF to meet the siting criteria of WAC 173-303-282 cannot stand because they are based on a patently incorrect application of the law.

439 As stated in greater detail in Section B of this comment letter, the unambiguous exemptions from WAC 173-304-460 and WAC 173-303-282 for problem waste and cleanup activities, respectively, are both explicit and logical in light of other regulatory provisions and policies (including Ecology's Area of Contamination Policy) that are applicable to the cleanup of the Everett Smelter Site. Ecology cannot choose to ignore the prerequisite that, for a regulatory provision to be relevant or appropriate, it must be a legally applicable requirement. Where a regulatory provision by its express terms is exempt and does not apply to a situation, Ecology cannot disregard the law and impose the provision as a binding requirement in that situation.

440

- Ecology did not follow its owns regulations and guidance in developing the Cleanup Action Plan.

The MTCA regulation, and guidance documents prepared by Ecology interpreting it, establish a process for investigating a site and selecting a remedy if it is determined that there is a threat to human health or the environment from the presence of a hazardous substance at the site. In selecting a remedy, there are several factors that Ecology is directed to consider. In preparing the draft CAP containing the proposed remedy for Everett, Ecology has ignored these factors in direct contravention of its own regulation. Its entire analysis is premised on an assumption that 20 ppm as a cleanup and removal level is a "threshold" requirement that must be met regardless of cost, scientific validity, and whether or not it results in a net benefit to protecting human health. In fact, the threshold requirement of protecting human health and the environment can be met at a remediation and removal level well above 20 ppm arsenic.

441 Once a potential "site" is discovered, a remedial investigation/feasibility study (RI/FS) is performed, Ecology evaluates the RI/FS, establishes cleanup levels, or remediation levels where appropriate, selects cleanup standards in accordance with the procedures in WAC 173-340-700 through -760, and selects a cleanup action or remedy that protects human health and the environment and that will meet the other requirements of WAC 173-340-360. WAC 173-340-120(4)(b). The regulation provides flexibility as well as opportunities, and in some cases requirements, to consider site-specific information. The final cleanup action that is selected may consist of several cleanup technologies, including, for example, on-site containment, soil removal, and institutional controls, that are triggered by the cleanup levels and remediation levels. WAC 173-340-700(2) - (4).

Once a cleanup level is selected (20 ppm arsenic in the draft CAP), the next step is the determination of the cleanup standard. Establishing cleanup standards for a site requires selection of the cleanup level ("hazardous substance concentrations that protect human health and the environment"),or remediation levels,[3] points of compliance ("locations on the site where those cleanup levels must be met"), and any additional regulatory requirements that may apply at the site because of the type of action to be taken and/or the location of the site ("ARARs"). WAC 173-340-700(2)(a). One of these additional regulatory requirements is found in the soil cleanup standards section, WAC 173-340-740(1)(a): "In the event of a release of a hazardous substance, treatment, removal, and/or containment measures shall be implemented for those soils with hazardous substance concentrations which exceed soil cleanup levels based on this [residential] use... ."

Ecology, however, has ignored that other provisions of MTCA, Part VII - Cleanup Standards not only qualify this sentence but establish equally applicable requirements that must be followed in setting the cleanup standard and selecting the appropriate cleanup action. WAC 173-340-700(2)(a), for example, sets the stage for determining how, for example, the soil cleanup standards section, WAC 173-340-740(1)(a), should be used:

> This part provides uniform methods state-wide for identifying cleanup standards and requires that all cleanups under the Act meet these standards. <u>The actual degree of cleanup may vary from site to site and will be determined by the cleanup action alternative selected under WAC 173-340-360.</u> (Emphasis added.)

Thus, although the cleanup standards provisions prescribe rules of general applicability, they are not absolutes. Instead, they are subject to site-specific factors and the cleanup action selection process. Further, WAC 173-340-700(7)(a) states that Part VII "shall be used in combination with" Section 360 - selection of cleanup actions. Although Method A may be used to establish cleanup levels, the regulations state, "Exceedances of the values in these tables do not necessarily trigger requirements for cleanup action under this chapter." WAC 173-340-704(4). Other provisions in Part VII establish "additional regulatory requirements" that go into the setting of the cleanup standard:

- At most sites, several cleanup technologies or combinations of cleanup technologies may be used to comply with cleanup standards (WAC 173-340-700(2)(b)). It is appropriate to consider a representative range of technologies, as well as different combinations of technologies, "to accomplish the overall site cleanup." (WAC 173-340-700(7)(g)).

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[3] Ecology discusses the concept of remediation levels in the draft CAP. A remediation level "may be based upon the concentration of a hazardous substance, upon the location of the hazardous substance, and often both." Further, according to Ecology, "there are often multiple remediation levels, e.g., one for removal and treatment/disposal and one for what material may be contained on-site." Draft CAP at 33-34.

- Other parts of this rule govern the process for planning and deciding on the cleanup action to be taken - requiring the identification of cleanup action alternatives in the FS and that WAC 173-340-360 specifies the criteria for selecting the preferred alternative. (WAC 173-340-700(2)(b)).

- While cost is not a factor in determining the cleanup level, it may be appropriate for certain determinations related to cleanup standards and shall be considered when selecting an appropriate cleanup action. (WAC 173-340-700(7)(f)).

- A remedy that leaves hazardous substances on a site in excess of cleanup levels may qualify as a cleanup action as long as certain conditions are met (WAC 173-340-700(7)(i)).

- Institutional controls shall be required whenever a cleanup action results in residual concentrations of hazardous substances which exceed methods A or B cleanup levels. (WAC 173-340-702(4)).

Thus, while WAC 173-340-740(1)(a), regarding cleanup standards for residential areas, is a requirement, it is conditioned by site-specific factors, other portions of Part VII, and WAC 173-340-360, the selection of cleanup actions provision. It is also part of a regulatory process. WAC 173-340-740(1)(a) does not "trump" other provisions of the regulation - particularly WAC 173-340-360. Indeed, the regulations require that Section 700, the remainder of Part VII and WAC 173-340-360 "shall be used in combination." WAC 173-340-700(7)(a).

WAC 173-340-360 sets forth the requirements for selecting cleanup actions. It is a comprehensive section:

> It specifies the criteria for approving cleanup actions, the order of preference for cleanup technologies, policies for permanent solutions, the application of these criteria to particular situations, and the process for making these decisions. This section is intended to be used in conjunction with the cleanup standards defined in WAC 173-340-700 through 173-340-760 and the administrative principles for the overall cleanup process (WAC 173-340-130). (WAC 173-340-360(1)).

(Emphasis added.)

Pursuant to WAC 173-340-360, cleanup actions must: protect human health and the environment; comply with cleanup standards; comply with applicable state and federal laws; provide for compliance monitoring; use permanent solutions to the maximum extent practicable; provide for a reasonable restoration time frame; and, consider public concerns.

WAC 173-340-740(1)(a) is part of the cleanup standard requirement; however, it is subject to modification on a site-specific basis both as a result of the language in Part VII itself (as outlined above) and by WAC 173-340-360. In particular, the use of "permanent solutions"

such as treatment and removal, while a preference in this rule, "may not be practicable for all sites" and is limited to "permanent solutions to the maximum extent practicable." Seven criteria are used to determine "permanent to the maximum extent practicable": overall protectiveness; long-term effectiveness; short-term effectiveness; permanent reduction of toxicity, mobility and volume of the hazardous substance; implementability; the degree to which community concerns are addressed; and, cleanup cost. These are not a hierarchy, but merely criteria to be considered in determining whether a remedy is permanent. Specifically, "a cleanup action shall not be considered practicable if the incremental cost of the cleanup action is substantial and disproportionate to the incremental degree of protection it would achieve over a lower preference cleanup action." The requirement in WAC 173-340-740(1)(a) is, therefore, subject to the site-specific criteria established in WAC 173-340-360(5), including the cleanup cost test.

Reading Part VII and Section 360 "in combination" and "in conjunction," it is evident that the regulations allow flexibility on a site-specific basis for selecting a range of cleanup actions and technologies for varying levels of arsenic concentrations, in this case, above the selected cleanup level. Assuming that all of the criteria in WAC 173-340-360(5) are met, as well as the rest of WAC 173-340-360, the MTCA regulations would allow soil removal to be triggered by a level higher than the cleanup level (i.e., a remediation level), and would allow for the use of other cleanup technologies from WAC 173-340-360(4) for remaining soils above the cleanup level. This conclusion is supported not only by the language of Section 360 but also by the provisions in Part VII referenced above, including those that specify that a combination of technologies may be used and that a remedy that leaves hazardous substances on a site in excess of cleanup levels may qualify as a cleanup action.

443

In preparing the draft CAP, Ecology should have followed the process outlined above. However, Ecology did not utilize its own regulations and guidance available for selecting a remedy at Everett. The draft CAP contains numerous examples of this failure by Ecology, including the following:

- Ecology defines the policies and principles that Ecology is to utilize "to ensure that cleanup standards...are established and implemented in a scientifically and technically sound manner," at WAC 173-340-702. One of these principles is that Ecology shall consider "new scientific information" when establishing cleanup levels for a site. WAC 173-340-702(6). However, in spite of this directive in its own regulation, Ecology has failed to appropriately consider any new science as the basis for selecting a remediation level for the 0 to 12 inch depth interval at the site. It also ignored the relevant scientific information in setting cleanup levels for soils below 12 inches. See Sections E and F.

- A remedy may not be practicable if a substantial and disproportionate cost analysis demonstrates that a lower cost alternative is equally protective. However, Ecology selected a remedy without performing a comprehensive substantial and disproportionate analysis of the proposed cleanup action. In fact, there is no substantive discussion of overall cost to be found anywhere in the draft CAP.

Ecology has ignored its own regulatory requirement to consider the cost of a remedy. See Section B and Attachments H-1 and H-2.

Ecology concluded that selection of a 20 ppm arsenic cleanup level is a threshold requirement that must be met in the 0 to 12 inch depth interval even if implementation of the remedy of digging and hauling all soils with concentrations of arsenic above 20 ppm would lead to a net increase in human health risk. WAC 173-340-706 allows the use of Method C cleanup levels in lieu of Method A or B when attainment of Method A or B has the potential for creating a significantly greater overall threat to human health than attainment of Method C levels. Ecology's own data demonstrates that attainment of a 20 ppm arsenic cleanup level will cause a net increase in human health risk, yet Ecology has failed to apply the flexibility its own regulation permits. See Attachment H-3.

B. Detailed Comments on Draft Cleanup Action Plan

The following specific comments on the draft CAP are organized by section as they occur in the document.

1. Introduction.

47 Section 1.3 Applicability, page 4

This section introduces the concept of "remediation levels" which are protective of human health even though they do not equate to MTCA numerical "cleanup levels." This is a useful concept; unfortunately, Ecology has determined that this concept cannot be used in the upper 12 inches of soils even when a remediation level above 20 ppm for arsenic can be demonstrated to be protective of human health and the environment. Remediation levels should be selected for all remediation depth levels.

2. Summary of RI/FS.

48 Section 2.1 Background, page 9

The draft CAP incorrectly implies that Asarco operations were largely responsible for releases of arsenic into the environment via air emissions from the smelter stacks. The history section should be expanded to reflect that Asarco operations were conducted only after an arsenic extraction facility was built at the smelter. Air emissions were much reduced during all of Asarco's operations because of the installation of a system of flues and other facilities and equipment designed to capture arsenic for resale rather than allowing it to escape into the environment.

49 Section 2.4.1 Soil Contamination, pages 15-16

The discussion of soil contamination in 2.4.1 refers specifically to only one arsenic soil concentration--a single measurement of 727,000 ppm. It does acknowledge that levels of arsenic diminish with distance from the smelter area, but for a more balanced and accurate description, the draft CAP should acknowledge that in the peripheral area arsenic levels are much lower and that much of the contamination the draft CAP addresses is in the 20 to 230 ppm range, i.e., below levels that required remediation at the Ruston/North Tacoma site.

50 This section implies that all contamination, including low levels of arsenic in the peripheral area, is entirely due to the former smelter stack. It appears that Ecology has not considered other urban sources of arsenic, which may contribute to levels in soils above background. These sources include:

- The use of locally-purchased gravel which contain naturally-occurring concentrations above 20 ppm,

- The use of pressure treated lumber with arsenic-based preservatives in landscaping features, play equipment, home building material or telephone poles, and

- The use of pesticides and herbicides which contain arsenic at intentionally toxic concentrations.

Effects of the use of these potential arsenic source materials are discussed in detail below.

Use of Gravel

As discussed in Ecology's press release of May 6, 1998, samples of crushed rock used by the City of Everett in road projects were found to contain arsenic up to 161 ppm, with seven of nine samples containing arsenic above the 20 ppm cleanup level. See Attachment H-4.

Use of Pressure Treated Lumber

One of the most commonly used preservatives for pressure treated lumber is chromated copper arsenate (CCA). Arsenic concentrations in lumber currently treated with CCA typically range from 0.15% (1,500 ppm) to 3% (30,000 ppm). Studies have found that arsenic leaches from CCA treated lumber to the immediately underlying and adjacent soil. In general, an initial surge of leaching can occur during the first rainy season followed by a more gradual release over time. In addition to leaching, arsenic may migrate from the wood to the underlying soils through disintegration of the treated lumber caused by weathering. The relatively high levels of arsenic in CCA pressure treated lumber (roughly 0.6 pounds per cubic foot) indicate that the material is capable of introducing a significant amount of arsenic to the surficial soils. See Attachment H-4.

Use of Pesticides and Herbicides

Arsenical pesticides and herbicides were used in the U.S. as early as 1890 and gained widespread use through the 1970s. Early pesticides included lead arsenate and calcium arsenate. Sodium arsenite came into wide use during the 1920s and 1930s as a pesticide bait as well as for crab grass control. Historically, pesticides/herbicides contained sodium arsenite in concentrations up to 52% (520,000 ppm). Based on typical application rates (Herbicide Handbook, 1967 and 1974), the residual arsenic concentration in a residential yard treated with sodium arsenite twice per year for twenty years would be approximately 570 ppm, assuming all the chemical is retained in the upper two inch soil horizon. Retention of the chemical in the surficial soil horizon is consistent with observations that vertical migration of arsenic compounds is limited. Due to concerns regarding accidental poisoning by sodium arsenite, in the late 1960s the USDA began restricting the sodium arsenite content in household products to 2% (20,000 ppm). This level is still high enough to affect urban background levels of arsenic.

Other arsenical pesticides used during this period included ant powders and syrups containing arsenic trioxide and sodium arsenate. Historically, ant syrups contained up to 0.9% (9,000 ppm) sodium arsenate or up to 45% (450,000 ppm) arsenic trioxide. However, around 1970 the USDA restricted the arsenic trioxide content in household products to 1.5% (15,000 ppm). Currently, active registered ant products may typically contain up to 0.5% (5,000 ppm) arsenic trioxide. See Attachment H-4.

The use of organic arsenical herbicides grew rapidly during the 1970s. These herbicides consisted of monosodium methanearsonate (MSMA), disodium methanearsonate (DSMA) and cacodylic acid or sodium cacodylate. Commercially available herbicides have historically been formulated with an MSMA content of up to 26% (260,000 ppm). MSMA continues to be widely used. It was the sixth most commonly used pesticide for industrial/commercial/government applications in 1994/95 with an estimated use of 3 - 4 million pounds (USEPA, 1997). Herbicides containing DSMA have typically been formulated with concentrations of up to 23% (230,000 ppm) while herbicides formulated with cacodylic acid and/or sodium cacodylate at concentrations of up to 33% (330,000 ppm). Based on typical application rates, residual arsenic concentrations in yards treated with MSMA, DSMA or cacodylic acid would be estimated to range up to 80 ppm, 70 ppm or 270 ppm, respectively, using the approach and assumptions described above.

In June 1998, Ecology issued a press release addressing a fertilizer product containing Ironite, sold to consumers to "green" lawns and plants. According to Ecology, Ironite contains the highest concentration of arsenic found in any of the more than 50 fertilizers tested, 4,460 ppm. As Ecology's Director Fitzsimmons stated, "It makes no sense to spend millions of dollars cleaning up arsenic-contaminated sites in some parts of the state while homeowners unknowingly contaminate their yards elsewhere." See Attachment H-4.

At a recently proposed Superfund Site in Denver Colorado, arsenic herbicides appear to be the principal source of arsenic concentrations in residential surface soils containing up to 1,200 ppm in isolated areas.

51 Section 2.4.2 Slag, page 16

Asarco disagrees that there is any need to separately address slag on the upland area, particularly in the absence of any demonstration of adverse health effects. If it is to be considered, the draft CAP should reflect that the City of Everett purchased and removed some of the slag for roadbed material and other uses.

52 Section 2.4.3 Surface Water Contamination, page 17

The description of surface water contamination should acknowledge that there is no indication that runoff causes any exceedance of water quality standards in the Snohomish River.

53 Section 2.4.4 Ground Water Contamination, pages 17-22

The discussion of groundwater sampling puts undue emphasis on one groundwater sample taken in 1993, and fails to note that groundwater is not used for human consumption. The single sample is not a sufficient basis to conclude that there are "impacts to both the Fill/Till and the Advance Outwash hydrogeological units."

Ecology's characterizations of impacts to groundwater in the Fill/Till and the Advance Outwash are misleading in that the observed effects are located only at the eastern edge of the Upland Area. These effects were addressed in the Supplemental Investigation of the Lowland Area (Hydrometrics, July 1996) and are being evaluated in more detail in the ongoing studies of groundwater conditions at the Site.

54 Section 2.5 Feasibility Study, pages 22-24

Ecology's description of the Feasibility Study is misleading and incomplete. Most importantly, the FS did not merely conclude that an action level between 76 and 100 ppm was more cost effective, but rather that use of a 20 ppm cleanup level would violate Ecology regulations because the cost is clearly disproportionate to the benefit. See WAC 173-340-360(5)(d)(vi).

55 Asarco disagrees with Ecology's conclusion that the Sediment Cleanup Standard Users Manual is inappropriate for use in soil cleanups involving human health. The referenced guidance provides a method to evaluate whether cost differences between cleanup projects are significant and is applicable to the general evaluation process not just impacts to the target organism. The method has applicability to the Everett Smelter Site in that it suggests that a cost difference is significant for large projects if the costs differ by a factor of 10%. Certainly the Everett project is a large project and the method of comparing alternatives is appropriate for soil cleanups such as the Everett Smelter Site as well as sediment cleanups.

56 Section 2.7 Mediation Process, page 26

The description of the mediation process should include a description of Asarco's detailed written and oral presentations that Ecology's arsenic and lead cleanup levels are not consistent with current science and violated provisions of Ecology's own regulations. The draft CAP also fails to note that Ecology terminated the mediation after it concluded that it was unwilling to discuss alternative cleanup levels or further evaluate the continued viability of its cleanup standards promulgated in 1991.

The draft CAP should also note that subsequent to public comment, Asarco proposed a "Framework to Solution" before entering into mediation.

3. Regulatory Requirements.

130 Section 3.1 MTCA Requirements, pages 31-34

The discussion of MTCA regulatory requirements is both inaccurate and incomplete. Significant omissions include:

a. failure to note that Ecology must consider new scientific information when setting cleanup levels, WAC 173-340-703(6) and should consult with EPA and the SAB[4] when appropriate;

b. failure to note that Ecology should use Method C when human health impacts from the using Method A or B cleanup levels will result in significantly greater threats to human health;

c. failure to note that Ecology is in breach of the statutory and regulatory command to update its cleanup standards no less frequently than every five years; and

d. failure to note that Ecology should not approve cleanups where the cost is substantial and disproportionate to the incremental degree of protection achieved. WAC 173-340-360(d)(vi).

131 In addition, a more detailed analysis of cleanup costs should be included in this discussion because consideration of the cost of cleanup is required by WAC 173-340-360. Asarco's own cost estimate indicates that this cleanup will cost in excess of $96 million.

132 Section 3.2 Waste Classification, pages 34-37

In the first bullet on page 37, the draft CAP refers to analytical site data to conclude that 3,000 ppm is the concentration at which soil fails the TCLP test. However, 3,000 ppm is not an exact number. Instead, it is a conservative estimate based on the 95% UCL. Characterization of excavated materials should be based on the TCLP test as performed on the excavated soil. Soils with concentrations higher than 3,000 ppm may not fail the TCLP standard for arsenic and, if not, would not designate as dangerous waste.

133 In the second bullet on page 37, the draft CAP inaccurately paraphrases the definition of "problem waste" set forth in WAC 173-304-100 by stating that "soils containing arsenic

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444 [4] While Ecology states that it consulted with the SAB and EPA about the lead soil cleanup level, Ecology has apparently failed to consult with EPA and SAB concerning arsenic. This failure is striking because EPA is now in the process of a national arsenic re-evaluation that will include setting of new arsenic drinking water standards. There is no valid reason to ignore the body of information being developed by EPA as Ecology has done. Ecology's own SAB also would provide valuable peer review of Ecology's decisions regarding arsenic risk in soil.

concentrations between the cleanup level for soil (20 ppm), and the dangerous waste concentration (3,000 ppm), are **problem waste** if removed during the cleanup (WAC 173-304-100)." It is incorrect to suggest that the cleanup level is the basis for determining a problem waste. There is no mention of "cleanup level" in the definition of problem waste. Instead, problem waste is defined in relevant part as "(a) Soils removed during the cleanup of a remedial action site . . . and which contain harmful substances but are not designated dangerous wastes. . . ." (emphasis added).

The soil cleanup level established under the MTCA regulations is not synonymous with soil containing a harmful substance. This is particularly the case when the cleanup level is set at the background level (the level at which people live without effect). Indeed, even the MTCA regulations themselves indicate that cleanup is not necessarily triggered by the presence of substances in soil with concentrations above the Method A cleanup level (suggesting that substances at the Method A cleanup level are not *per se* "harmful"). See WAC 173-340-704(4). As shown elsewhere in these comments and attachments, arsenic in soil at levels of 20 ppm is not a "harmful substance." Soil removed during the cleanup will not constitute "problem waste" until the concentration of arsenic in the excavated soil constitutes a harmful substance. The soil with arsenic concentrations below a level that constitutes a harmful substance is not regulated under Washington law.

Section 3.3 Applicable, Relevant and Appropriate, and Local Permitting Requirements, pages 37-42

Section 3.3 purports to "discuss applicable or relevant and appropriate requirements from state, federal and local laws with regard to the Everett Smelter Site." Draft CAP at page 38 (emphasis added). However, in both Sections 3.3.1 and 3.3.2 of the draft CAP, the provisions of the regulations cited are not "requirements" with regard to the Everett Smelter Site because, by the express terms of these regulations themselves, they do not apply to the cleanup action proposed for the Everett Smelter Site.

134 Section 3.3.1 of the draft CAP states that the section "discusses selected requirements from the Minimum Functional Standards for Solid Waste Handling, Ch. 173-304 WAC . . . ." As noted above, however, only soil that contains "harmful substances" is a "problem waste" regulated by Ch. 173-304 WAC. To the extent that soil contains arsenic at the cleanup level (background level) or other non-harmful levels, the soil is not subject to WAC 173-304 or any other Washington State statute or regulation. Since such non-harmful soil is unregulated and not subject to WAC 173-304, the provisions of the Minimum Functional Standards do not apply and therefore are not "requirements" for the Everett Smelter Site.

135 In addition, at whatever arsenic concentration the soil is found to contain harmful substances and therefore constitutes a "problem waste," the Minimum Functional Standards that do apply and thus are "requirements" under WAC 173-304 are not those provisions cited in the draft CAP. The draft CAP states that WAC 173-304-460 provides the minimum functional standards that govern the landfill requirements for the soil at issue at the Everett Smelter Site. However, to the extent that soils at the Everett Smelter Site are a "problem waste" as defined in

WAC 173-304-100, Section 460 specifically does not apply. The regulations specify that "[t]he standards of WAC 174-304-405 through 173-304-490 [inclusive of 460] . . . apply to all solid waste handling facilities except for: . . . (d) Problem wastes as defined in WAC 173-304-100" (emphasis added). Therefore, the draft CAP incorrectly references certain sections of the WAC as requirements when the WAC itself unambiguously and explicitly states that these are not requirements for problem waste.[5]

The exclusion of problem waste from the provisions and requirements of WAC 173-304-405 through 490 is logical when read in the context of the remainder of the Minimum Functional Standards. First, as noted above, problem waste is defined in relevant part as including only soil removed during a cleanup. Soil is not a putrescible or liquid waste and therefore does not present liquid, leachate or gas generation problems associated with other types of solid waste. Moreover, the Minimum Functional Standards contains a separate section designated "Problem waste landfills" (WAC 173-304-463). Although this section of the regulations is reserved and no specific requirements have yet been promulgated by Ecology, it is clear that the regulations distinguish between and regulate differently problem waste landfills and other solid waste landfills. Thus, although some engineering and closure plans likely will be required to the extent that a problem waste landfill is created at the Everett Smelter Site,[6] the provisions of WAC 173-304-460 cited in the draft CAP are not "requirements" and thus cannot be deemed to be applicable, relevant or appropriate to soil at the Everett Smelter Site.

136 Section 3.3.2 of the draft CAP, like its preceding section, incorrectly interprets and applies state law; in this case with respect to WAC 173-303-282, the siting criteria pertaining to dangerous waste management facilities. As in the Minimum Functional Standards, the Dangerous Waste Regulations contain an express statement as to when the siting criteria do not apply: WAC 173-303-282 (the siting criteria section) "does not apply to: . . . (iii) Persons at facilities conducting on-site cleanup of sites under . . . chapter 70.105D RCW [MTCA] provided the cleanup activities are being conducted under a consent decree, agreed order, or enforcement order, or is being conducted by the department [of Ecology]." WAC 173-303-282(2)(b). This exception, like the exception for problem waste contained in the Minimum Functional Standards, not only is explicit and unambiguous but also is logical in that a containment facility containing dangerous waste that is created as part of a cleanup and is permanently closed upon completion

445 [5] In addition, the draft CAP selectively applies only certain of the requirements of WAC 173-304-460. This section of the regulations requires solid waste facilities (excluding, among other things, problem waste landfills) to comply with a number of landfilling design and operational standards, including those relating to minimization of liquids, leachate control, gas control, and other standards unique to operating landfills, such as requirements relating to weighing waste on scales, hours the site is open for public use, and full-time employee facilities. The draft CAP suggests that only the liner and closure requirements of Section 460 apply to the Everett Smelter Site. This selective application of the regulations appears to recognize the fact that a landfill created as part of a cleanup that will contain only problem waste and will be permanently closed upon completion of the cleanup is not analogous to an operating solid waste landfill. This recognition is consistent with the exception contained in WAC 173-304-400 which specifies that Section 460 does not apply to problem waste.

[6] See WAC 173-304-470.

of the cleanup is not analogous to and does not present the risks and concerns associated with an active, operating landfill designed and maintained for the ongoing management of dangerous waste for an extended period of time.[7]

137 Each of the locational restrictions of WAC 173-303-282 that are cited in section 3.3.2 of the draft CAP, by the terms of the regulations themselves, do not apply to and, thus, are not "requirements" governing the dangerous waste at the Everett Smelter Site (as opposed to an operating dangerous waste management facility). And since the siting criteria in WAC 173-303-282 are not requirements, they cannot be found to be applicable or relevant to the creation of a remedial action on-site containment facility at the Everett Smelter Site. This conclusion is supported by Ecology's own Area of Contamination (AOC) Policy which is applicable to, and was designed to address situations like, the cleanup at the Everett Smelter Site. The AOC Policy pertains specifically to the handling and consolidation of dangerous waste in a single area in the context of a remedial action. This is contrasted with the siting criteria of the Dangerous Waste Regulations which explicitly do not apply to cleanup actions which, by their nature, do not present the same concerns as a long-term, active landfill designed for ongoing operations management of dangerous wastes.

While the draft CAP correctly recites 173-340-710 on page 38 for the "criteria that Ecology evaluates when determining whether certain requirements are relevant and appropriate for a cleanup," the prerequisite that must first be met is that the regulatory provisions must be, in fact, "requirements." Ecology cannot ignore this prerequisite and apply the criteria of WAC 173-340-710 to regulatory provisions that, by their own terms, do not apply and thus are not requirements. Since the provisions of WAC 173-304-460 and WAC 173-303-282 are not requirements for the Everett Smelter Site, they cannot be deemed by Ecology to be relevant, appropriate or applicable.

4. Cleanup Standards.

Section 4.1.1 Method for Setting Cleanup Standards, pages 43-44

138 Asarco agrees with Ecology that Ecology's Method A lead level of 250 ppm is not appropriate and that the IEUBK model provides a superior approach. However, rather than collecting the necessary data, Ecology has approved the use of default values in the model to reach a cleanup level of 353 ppm. Instead, Ecology should collect the necessary data, and calculate a specific lead soil cleanup level that is specific and health-protective for this site. In fact, Ecology's default level is lower than EPA's lead screening level of 400 ppm, the level below which lead in soil need not be addressed or investigated further.

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446 [7] Both the Dangerous Waste Regulations and the draft CAP note that "the purpose of the siting criteria is to immediately disqualify proposed dangerous waste facility sites in locations considered unsuitable or inappropriate for the management of dangerous wastes." (emphasis added). In light of the exception for cleanup activities, this purpose clearly is intended to address matters relating to active, ongoing management activities as opposed to one-time consolidation of dangerous waste.

447 With respect to arsenic, the use of regulatory defaults rather than the use of site-specific information will result in lead cleanup levels that are unduly expensive and bear no reasonable relation to protection of human health risk.

Section 4.1.2 Soil, pages 44-45

139 a. Ecology has failed to consider new scientific information in selecting a residential soil cleanup level for arsenic.

Ecology's selection of a soil cleanup level of 20 ppm for residential soils is based on a studied refusal to consider new scientific information widely available in the peer-reviewed literature. This information shows definitively that remediation to soil background levels bears no reasonable or rational relation to protecting human health from any plausible cancer risk.

Rather than conducting a scientific evaluation of actual human health risk, Ecology simply uses a single formula, the Method B formula set out in WAC 173-340-740(3)(a)(ii)(B), to determine cleanup levels for all residential properties and all carcinogens. (Method B drives selection of the cleanup level for arsenic because the formula yields a value below background, and Ecology defaults to background in that circumstance. Ecology's regulation sets 20 ppm as background for Washington soils). This cleanup level for arsenic is inconsistent with current scientific knowledge.

448 In particular, with respect to arsenic, Asarco made a detailed submission in July 1998 that:

1) Ecology's formula is based on EPA's 1986 cancer risk assessment guidelines which EPA has now rejected as no longer consistent with current science. The default assumptions of low dose linearity and of the lack of a threshold below which no effects occur is appropriate only for a limited class of carcinogens, called initiators that directly cause inheritable DNA damage. Arsenic is not such a chemical.

2) Arsenic is not a cancer initiator and does not cause inheritable DNA damage. There is no known biological mechanism by which arsenic could have the linear no-threshold effect that Ecology and the Method B formula assume. Therefore, there is no plausible biological basis for the assumptions used.

3) EPA's 1988 cancer slope factor for arsenic is unreliable and cannot be used for quantitative risk assessment. The assumed levels of exposure and rate of cancer incidence are now understood to be inconsistent with actual exposures and cancer incidence experienced among the Taiwanese population on which the calculations are based. The cancer slope factor used in Ecology's formula bears no reasonable relation to arsenic's actual cancer potency and both overstates the risk at low dose and understates the risk at high dose, rendering its use in the Ecology formula inappropriate. (EPA's IRIS database now discloses the uncertainty about use of the cancer slope factor.) In addition, the database indicates that the Taiwan data is likely inapplicable to the U.S.

448 cont.

population because of differences in diet between the populations and exposure to other chemicals in Taiwanese drinking water.

4) Arsenic is a demonstrated essential element in animals and there is strong evidence that it is likely essential to humans as well. Ecology's Method B formula postulates that unacceptable risks to human health occur from daily exposure to levels that are less than the likely essential dose required to maintain good health. This conclusion is not rational. Moreover, Ecology completely ignores recent evidence that indicates that arsenic can act as an anti-carcinogen.

5) Humans methylate inorganic arsenic to organic forms that are quickly excreted through urine. Current science views this as a de-toxifying mechanism that is inconsistent with the view that any arsenic exposure is potentially harmful, the assumption built into the Method B formula. This also indicates that there is likely a threshold below which arsenic does not increase cancer risk.

6) Recent studies demonstrate that at levels below 250 ppm or higher, arsenic in soil does not appreciably affect urinary arsenic levels in residents compared to levels attributable to natural sources of arsenic such as diet and drinking water. This includes data collected by ATSDR at Everett indicating that urinary arsenic levels among children exposed to existing levels are not elevated above normal. Urinary arsenic is recognized as a valid biomarker of arsenic exposure, and Ecology has never demonstrated excessive exposure to arsenic is occurring at Everett based on such data.

7) Ecology's soil ingestion rate is inapplicable both in terms of quantity of soil ingested, and in the assumption that such ingestion occurs daily for six years. Moreover, Ecology initially assumed that 40% of the arsenic in soil was bioavailable and then, in the draft CAP, changed the assumption to 100% bioavailability. Neither figure has any adequate scientific basis and Ecology provides none in the draft CAP or in its Review of "New Science." Recent studies indicate that a better estimate of the bioavailability of arsenic in soil is approximately 20%.

8) Lifetime exposures to arsenic from soil at levels documented in the peripheral area at Everett are trivial compared to the "background" exposure to arsenic in diet and drinking water, both of which contain levels of naturally occurring arsenic that are much more bioavailable than arsenic in soil.

9) Arsenic is a late stage carcinogen, and not a cancer initiator. The assumption built into the Method B formula that a six year exposure in childhood creates a proportional lifetime risk of cancer is false as applied to arsenic. Since children have been exposed to fewer carcinogens, they have fewer genetically damaged cells on which arsenic, or any other late stage carcinogen could act. More generally, it is inappropriate to use a single formula to calculate risk from all carcinogens, whether they are initiators, promoters or progressors.

448 cont.

10) A uniform cancer risk level of 1 in 1,000,000 for all carcinogens is inappropriate particularly for chemicals, like arsenic, that are not cancer initiators. The human health risk postulated by Ecology is entirely a function of its assumptions. There is no evidence that low levels of arsenic in soil, or indeed any level of arsenic in soil, can cause cancer.

11) Excavation and transportation of the large volumes of soil that exceed 20 ppm will create a greater real and statistical risk to human health than exposure to arsenic in soil. Remediation to 20 ppm will also cause a substantial and disproportionate increase in cost compared to any theoretical benefit to human health.

These issues were addressed at great length in Asarco's July 1998 submission to Ecology on the new science. That submission included declarations from six toxicologists, copies of 119 peer-reviewed scientific articles, and technical information from several EPA sites in which much higher soil cleanup levels for arsenic have been approved as protective of human health. A copy of this submission is attached (see Attachment H-5) and incorporated by reference in these comments.

Ecology responded in a document entitled Review of Asarco's "New Science" Submittals Regarding Arsenic and Lead. Ecology admits that its regulations may be "overly protective" but it justifies its continued use of its original assumptions and methodology on the ground that it "will and should err on the side of protectiveness." Review at 3. It also claims that its decision as to the methodology used to evaluate arsenic risk "is a policy decision" not reviewable as a scientific issue. Section E provides Asarco's detailed response. This includes statements from Drs. Rodricks, Tsuji, Schoof and Beck concerning errors in the Ecology Review as well as additional articles substantiating further Asarco's points that have been published in the literature after Asarco's July 1998 submittal.

139 cont.

Continued use of outmoded assumptions and analysis cannot be defended as a "policy decision." Use of bad science is not only unlawful under the provisions of MTCA and the State Administrative Procedures Act, but it is also inconsistent with the command of Ecology's own regulations that it consider new scientific information when setting cleanup levels. WAC 173-340-702(6). The regulations encourages Ecology to consult with EPA and the SAB in determining "how to use this new information." Ecology has failed to do so. The regulation does not authorize Ecology to reject new scientific information based on a "policy decision" that it is preferable to "err" on the side of caution. Protection of human health may provide justification for appropriate use of "conservative" assumptions, but neither that rationale, nor MTCA itself, sanction use of <u>false</u> assumptions.

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b. Arsenic cleanup level of 20 ppm is inconsistent with Ecology's evaluation of State-wide risk from drinking water.

For the Ecology cleanup levels of 20 ppm for residential soils and their default ingestion assumptions, the expected daily ingested dose of arsenic from soil would be 4 micrograms. However, Ecology also notes that the average drinking water concentration of arsenic in this state

140 cont. is 2 µg/L ("Review of New Science" at 29), which would provide daily adult dose of 4 micrograms, using a standard assumed consumption of two liters/day. Obviously, the State does not regard this level as problematic. Moreover, the current Washington (and federal) drinking water standard for arsenic is 50 µg/L. The daily arsenic dose from drinking water with that concentration would be 100 micrograms.

Ecology cannot logically regard any exposure to arsenic in soil above 20 ppm to be a human health concern when it leads to an assumed arsenic ingestion that is no larger than the amount of arsenic the average State resident consumes from drinking water alone on a daily basis. Moreover, the MTCA groundwater standard is 5 ppb. If consumed as drinking water, this would lead to a daily dose of 10 micrograms, 2.5 times higher. Further, the State arsenic drinking water standard is 50 ppb, which would lead to exposure levels 25 times higher, i.e., 100 micrograms/day. The claim that any level of arsenic in soil above 20 ppm creates unacceptable health risk is inconsistent with Ecology's evaluation of risk from drinking water.

141 c. The selection of residential remediation levels for commercial areas is unrealistic and fails to consider actual exposure scenarios, and current and future land use as controlled by zoning restrictions.

Ecology states that for commercial land uses at the site, specifically the Community Business Zone identified on Figure 2-2, "it is practicable to establish soil cleanup levels in the Community Business Zone in accordance with residential use, as any cleanup actions at these properties would be the same as for residential properties." It is patently absurd to justify the use of residential soil cleanup levels in commercial areas. The potential exposures are totally dissimilar.

First, under the Method B formula the soil cleanup level is calculated to protect the hypothetical RME child who consumes 200 mg of soil each day for six years. In order to satisfy minimal requirements of rationality, there must be a basis to conclude the assumed ingestions of 200 mg of soil each day could occur in the locations where Ecology has determined the 20 ppm cleanup levels will be applied. For the current commercial land use, it is unreasonable to assume that children are present and ingesting the amount of soil assumed by the Method B calculation each day for a period of six years.

142 Secondly, institutional controls (which the draft CAP relies on after excavation of soils, but not in evaluating the benefit of performing the excavation of surface soils) are already in place in the business district in the form of zoning restrictions, which prevent residential development. Maintenance of these controls would be a minor component of the overall cleanup action.

In addition, the draft CAP is internally inconsistent with respect to the role of institutional controls in the overall remedy. Page 75 contains the following statement, "Ecology has no confidence that institutional controls will adequately prevent exposure to elevated concentrations of contaminants." This position is used to support the draft CAP's position that surface soils

142 cont.

with arsenic above 20 ppm must be excavated in all areas including commercial and recreational. However, on page 95 the draft CAP states, "Institutional controls are a critical component of the cleanup action plan at the Everett Smelter Site." The reality is that even the cleanup proposed by Ecology has a fundamental reliance on institutional controls to prevent unacceptable exposures. However, the failure to apply this logic "up front" during the development of remedial actions results in an unbalanced remedy, which relies on excessive soil removal actions in residential and non-residential areas.

Institutional controls have been used as an effective method of preventing exposure to metals in soils at numerous similar large urban sites throughout the country, the principal control being to maintain or create areas where residential use is prohibited by zoning restrictions. An example of the effective use of institutional controls for remediation in urban areas is the cleanup currently being performed at an old lead smelter site in Murray, Utah. Like Everett, the former smelter area has been converted to commercial/residential uses since the smelter shut down. The remedy calls for excavation of approximately 60,000 cubic yards of soils containing flue dust and arsenic trioxide with an average arsenic concentration around 9,000 ppm. The material will be contained in a fully encapsulated repository system to form the base of a roadway through the site. The roadway will provide enhanced site access and has lead to a developer acquiring the land to construct commercial/service facilities, thus capping the remainder of the site. The repository is within 50 feet of current residences; however, with institutional controls administered by the city, the remedy is protective by preventing direct contact with the materials and by preventing migration of arsenic from the materials. With the use controlled by zoning, cleanup levels for the commercial area adjacent to the repository have been established at 5,600 ppm lead and 1,200 ppm arsenic.

The remediation of commercial areas at Everett should be based on realistic exposure scenarios and a recognition of the effective restriction of current and future land use due to zoning. Only by using institutional controls can substantial and disproportionate costs be avoided.

d. The selection of residential remediation levels for recreational areas is unrealistic and fails to consider actual arsenic exposure.

With respect to recreational areas, WAC 173-340-740(1)(d) provides clear flexibility for Ecology to set cleanup levels on a case-by-case basis, as noted in draft CAP Section 4.1.2. However, Ecology states that, "Since these (recreational) areas are all adjacent to or in the general vicinity of residential areas, and since cleanup to residential standards is practicable, cleanup levels will be established in accordance with residential use." Once again Ecology is using an assumed *practicability* of cleanup to residential cleanup levels as a basis to justify setting a cleanup level for non-residential areas. No analysis of practicability is presented in the draft CAP nor is a substantial and disproportionate analysis of cost presented. Potential exposure to arsenic in soils at a golf course or park is vastly different than for a residential area. While it is logical to assume that children play in playgrounds, it is not logical to assume that the same child, the hypothetical "reasonably maximally exposed" child, will play there every day for six years. Common sense dictates that a remediation level would be higher for recreational areas

where exposure is infrequent, and irregular, than for residential areas. The cost estimated to excavate and replace surface soils with arsenic just above 20 ppm from recreational areas is disproportionate to the negligible additional protection provided.

143 Section 4.1.3 Ground Water, pages 46-47

As noted in the following comment on Section 4.1.4 (Surface Water), investigation of groundwater conditions at the site, including the relationship between groundwater in the Upland Area and the Lowland Area, is continuing at this time. It is premature to define cleanup levels and points of compliance for groundwater until such time as the supporting studies are completed. These studies include evaluation of the source(s) of elevated arsenic in groundwater and the fate and transport of arsenic in groundwater.

It is noted that the Ecology-approved cleanup in late 1998 at the nearby Mill E/Koppers facility, where wood treating with arsenic compounds occurred, does not address large areas of groundwater with arsenic concentrations 100 to 1000 times the cleanup level noted in the draft CAP for that site (also 5 µg/L) adjacent to, and flowing into the Snohomish River.

144 Section 4.1.4 Surface Water, pages 47-48

The definition of cleanup levels and compliance points for surface water is inappropriate from a variety of perspectives. First, the definition of the point of compliance for surface water as *throughout the Upland Area of the Everett Smelter Site* is not consistent with State regulations. Most of the storm water runoff in the upland area is captured by the City of Everett's combined sewer system and conveyed to the treatment facility. Therefore, it does not constitute "surface waters of the state," as defined in WAC 173-201A-020, which clearly differentiates between surface waters of the state and storm water. Furthermore, WAC 173-340-730(1)(b) states that "Ecology does not expect that cleanup standards will be applied to storm water runoff that is in the process of being conveyed to a treatment system." In addition, Enforcement Order No. DE97TC-N119 stated that regulatory limits for discharge to the City's system are as follows:

- Arsenic - 0.50 mg/L
- Cadmium - 0.24 mg/L
- Lead - 1.89 mg/L

324 The EO further states that storm water flowing to the lowland is subject to WAC 173-340-730. Storm water entering the City's system should be evaluated by the City's pretreatment standards and not WAC 173-340-730.

145 Second, the cleanup level used was selected to protect aquatic organisms in surface water bodies. Ecology's application to surface water runoff entering storm drains in a

residential/commercial area clearly defies common sense for this type of protection. Water entering the storm drain in the upland should not be required to meet a standard applicable to a distant water body. It is entirely unrealistic to assume that the physical pathways will not dilute the concentrations. Water in storm drains typically has several hundred yards to travel before being collected by the City of Everett's main combined sewer system, this water undergoes mixing and treatment prior to discharge to the river. While a relatively small amount of site runoff discharges directly to the river after mixing with runoff from other areas, there is no evidence that these discharges have resulted in any exceedance of water quality standards in the river. The statement that "no dilution zone has been authorized" is simply an administrative statement that ignores the physical reality of dilution.

146 Finally, the cleanup level for arsenic is set below the background level for Puget Sound waters, which is 2 µg/L.

147 In addition, it is premature to establish surface water and groundwater cleanup levels prior to completion of the storm water and storm drain characterization program and the associated supplemental investigation of the lowland area. These ongoing investigations, the results of which will be integrated in a comprehensive report, are expected to characterize surface water and groundwater quality and quantity, and the interactions of these two media. The appropriate cleanup levels and points of compliance are dependent on the full characterization of these media and, thus, should not be defined until after the comprehensive report is completed and the subsequently required Feasibility Study is initiated.

334 Section 4.1.5 Storm Drain Sediment, pages 48-49

The cleanup standards for storm drain sediment are based on definition of the sediment as problem waste if it contains arsenic above 20 ppm (and other levels for other metals). However, this classification is based on Ecology's 20 ppm remediation level for residential soils, which as discussed earlier, fails to account for new science and is unrealistically low. The only exposure to drain sediments, if any occurs, would be to workers cleaning the drains. Ecology's 20 ppm cleanup level is based on a hypothetical child ingesting soil for 6 years. No such exposure could possibly occur for storm drain sediment.

In addition, Asarco is not responsible for all sediment with contaminant concentrations above the residential cleanup levels in the upland area. As Ecology is aware, the City of Everett conducted a right-of-way sampling investigation and data showed that arsenic concentrations above 20 ppm were detected throughout the City. It was determined that out sources of imported gravel were an important source of arsenic. There are also other urban sources of arsenic which could contribute to above-background levels, as discussed in comments on Section 2.4.1.

The cleanup level for mercury is given as 24 ppm in Section 4.1.5 but is listed as 1 ppm in Table 4-1.

5. Selection of Remedy.

148 Section 5.1 Introduction, page 55, second paragraph

Cleanup costs should be included in this discussion. Cleanup costs are required to be addressed in the remedy selection process. WAC 173-340-360(5)(d)(vi). In particular, cleanups are not practicable "if the incremental cost of the cleanup is substantial and disproportionate to the incremental degree of protection it would achieve over a lower preference cleanup action."

149 Section 5.3.1, Alternatives Evaluated, pages 58-59

The discussion in the draft CAP about alternatives fails to address critical issues regarding the relative impact of the alternatives and how adverse consequence could be avoided by alternate decisions.

First, it assumes adverse impacts on public health from leaving soil at any level above 20 ppm, but does not identify these effects or discuss them. For example, the draft CAP fails to identify how many children live in the Former Arsenic Trioxide Processing Area and in the Peripheral Area. Of these, how many fall within the group of highly exposed and sensitive children that the cleanup is designed to protect? In other words, the soil ingestion assumptions are addressed to the 95 % UCL child who is assumed to ingest 200 mg of soil/day. Even under Ecology's assumptions, only approximately 5% of the total population of children in the area could fall in this category. Only these children are even theoretically at risk. Ecology has not identified or even estimated the number of such children. Without performing this analysis, Ecology is unable to weigh the purported benefit of cleanups at different levels to the remediation and transportation risks that have been documented, and which increase proportionately relative to the volume of soil excavated and removed to alternate locations.

As Asarco has already demonstrated, the remediation risk factor alone requires use of Method C, rather than Method B under Ecology's regulations. See Section E. Because cleanup to 20 ppm will generate such a high volume of soil to be excavated and transported, the actual human health impacts from implementation of the remedy in terms of projected accidents will likely far exceed the theoretical risk from arsenic exposure. See Dr. Beck Statement in Section E.

Second, as noted, the draft CAP does not identify the cost of the proposed remedy compared to alternatives. This is a critical omission which makes it impossible for Ecology to perform the "substantial and disproportionate" analysis required by WAC 173-340-360(5)(d)(vi).

150 Section 5.3.2.1 Earth, Impact Mitigation, page 60

It appears that this section contradicts the draft EIS. It states that the grade change should not increase from the existing maximum elevation. Section 4.1.2.5, page A4-4 in the draft EIS states that a two foot increase in elevation is allowed near Hawthorne Street and higher elsewhere. It is Asarco's experience at other sites that a minimum of four feet of clean material

150 cont.

is necessary to accommodate utilities. Therefore in order to comply with the draft EIS in only having a two foot increase in elevation near Hawthorne Street and by providing four feet of clean material, it may not be practical to backfill 42,000 cubic yards of peripheral soil as suggested in the draft EIS (page A3-31).

By backfilling 25,000 cubic yards of peripheral soil (same volume as removed) and keeping a two foot grade increase near Hawthorne Street along with four feet of clean material, it is expected that a grade increase of about 5 feet would occur elsewhere.

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Section 5.4, Selection of Cleanup Action Alternative, pages 67-70

This section discusses the On-Site Containment versus Consolidation alternatives, but does not identify the costs or environmental consequences of either. The draft CAP simply chooses the latter based on a technical misreading of the State's Dangerous Waste Regulation (see above discussion at Sections 3.2 and 3.3, and below) and irrelevant references to the Hazardous Waste statute (RCW 70.105.035) and Ecology's AOC Policy. The draft CAP states that the waste proposed for disposal in an On-Site Containment Facility (OCF) is not covered by the exemption under RCW 70.105.035. This is irrelevant for purposes of determining whether an OCF may be located in the Former Arsenic Trioxide Processing Area. Even assuming the material at the Everett Smelter Site is dangerous waste and not exempt from the requirements of RCW 70.105, the implementing regulations for that law (WAC 173-303) specify that the siting criteria for dangerous waste landfills do not apply to the handling and consolidation of dangerous waste in the context of a MTCA cleanup.

As in Section 3.3.2, Section 5.4 of the draft CAP cites the Dangerous Waste Regulations siting criteria for dangerous waste landfills, 173-303-282 (specifically that dangerous waste management facilities must be located at least 500 feet from the nearest point of the facility property boundary and the facilities must be at least one-quarter mile from residences). These siting criteria, as discussed above, specifically do not apply to sites being cleaned up under MTCA pursuant to a consent decree, agreed order, enforcement order or by Ecology itself. Thus, the statement that the site "meets none of these requirements" incorrectly concludes that these siting criteria are "requirements" under the law. Since, by their express terms, these provisions of the Dangerous Waste Regulations do not apply to the Everett Smelter Site, these criteria are not requirements and cannot be imposed by Ecology. Ecology cannot ignore its own regulations that, for logical reasons, expressly are made not applicable to a cleanup such as at the Everett Smelter Site.

Although the draft CAP, at page 68, notes that both RCW 70.105.035 and Ecology's AOC Policy grant Ecology the ability to "determine that any substantive requirement of the Dangerous Waste Regulations are relevant and appropriate requirements," these provisions assume, and the prerequisite that must be met, is that the substantive provisions of the Dangerous Waste Regulations are, in fact, "requirements" under the law. The references relating to ARARs in 70.105.035 and in Ecology's AOC Policy cannot be read to allow Ecology to apply portions of the Regulations that, by their own explicit terms, do not apply and therefore are not relevant or appropriate. Ecology's conclusion on page 68 of draft CAP that landfilling dangerous waste (in

151 cont.

an OCF) within the Former Arsenic Trioxide Processing Area fails to comply with "applicable or relevant and appropriate provisions of the Dangerous Waste Regulation regarding siting requirements" is a patently incorrect legal conclusion. The italicized language that justifies this conclusion contained in subparagraphs (a) through (i) on pages 68-69 compounds this legal error by repeating the incorrect assertion that the Dangerous Waste Regulations siting criteria apply to and prohibit a dangerous waste OCF at the Former Arsenic Trioxide Processing Area.

As noted in comments on Section 3.2, the characterization of Dangerous Waste should be based on the TCLP test rather than setting the value at 3,000 ppm arsenic based on a statistical analysis of data. The Ecology approach will result in soils being unnecessarily handled and disposed of as Dangerous Waste.

Asarco's analysis is that an On-Site Containment Facility containing soils with arsenic above 3,000 ppm would be protective of human health and would also comply with ARARs and Ecology's AOC Policy. Construction of an appropriate cap to prevent direct contact with materials would be readily implemented and has been done in other similar sites (see discussion of Murray Smelter Site in comments on Section 4.1.2). A suitable cap with appropriate land use and institutional controls would provide protection of human health and the environment.

6. Implementation of Selected Remedy.

Section 6.2.1.1 Development of the Soil Removal and Containment Remedy, pages 72-84

152

a. Ecology's determination that a soil barrier of at least 12 inches of soil is necessary to meet threshold requirements is arbitrary and is not based on current science.

As discussed previously, Ecology's determination that a soil barrier is required to contain 20 ppm arsenic is not supported by current science. Remediation to this soil background level bears no reasonable or rational relation to protecting human health from any plausible cancer risk.

153

b. Ecology has failed to consider practicability in selection of their cleanup action and has presented no substantial and disproportionate analysis for the range of viable remedial alternatives.

The draft CAP provides no evaluation of cleanup action costs and has selected a remedy that is impracticable under MTCA. The draft CAP justifies its lack of analysis with the statement "..in selecting the Consolidation Facility alternative, the department has already given great consideration to cost by selecting cleanup options which are among the least permanent of the available cleanup technologies." However, an actual evaluation of costs demonstrates that the Consolidation Facility has a minimum effect on the overall cost of the remedy of less than $4 million in a total remedy cost of approximately $96 million and is not relevant to a substantial and disproportionate analysis at all. See Attachments H-1 and H-2.

330 One issue which should have been considered in the substantial and disproportionate analysis of cleanup options is the requirements for backfill soil for excavation areas. The draft CAP provides that all excavations shall be filled with clean soil which is defined as having "no concentrations of any hazardous substance exceeding MTCA Method B standards." (Page 87) The draft CAP does not clearly define the requirements for arsenic levels in backfill soil and two interpretations are possible. The first is a requirement of less than 0.67 ppm arsenic and the second is a requirement less than 20 ppm. For completeness, both scenarios are discussed.

For arsenic, Table 4-1 identifies the method B level as 1.67 ppm. However, Ecology in its Review of "New Science" states that it has chosen to employ a bioavailability factor of 100%, and use a Method B value of 0.67. MTCA, however, identifies soil background in the State at 20 ppm for arsenic. A subsequent Ecology study calculated Puget Sound background for arsenic at 7 ppm. There is no rational basis for requiring soils to be provided as backfill that have lower concentrations than which naturally exist at background. It defies common sense to identify unacceptable human health risks for a naturally-occurring substances as being encountered at any levels above 0.67 ppm, which is 30 times below natural background. That is tantamount to a finding that the natural environment is unreasonably dangerous to human health. Moreover, since residences which do not exceed the 20 ppm average will not be remediated at all, there is no rational basis to provide cleaner soils for those which are remediated. Soils with these below-background levels of arsenic either do not exist in this State or could be obtained only at substantial cost. Asarco estimates that 310,000 cubic yards of backfill will be required in the peripheral area. The use of backfill meeting 1.67 ppm arsenic, below background, bears no rational relation to protection of human health, and the cost is clearly substantial and disproportionate under WAC 173-340-360.

A second interpretation of statements in the draft CAP is that backfill soils will be required to contain arsenic at less than 20 ppm. However, this interpretation also leads to irrational results. It would require removal of soils with 21 ppm arsenic and backfilling with soil containing 19 ppm arsenic. The public health effectiveness of this type of action would be minimal (less than 10% reduction in arsenic concentrations) for large cost. It would, therefore, violate WAC 173-340-360(5)(d)(vi).

329 As discussed previously, Ecology has arbitrarily determined that a soil barrier is required to meet "threshold" requirements and by this determination has ruled out consideration of alternatives with lesser costs but which provide equivalent protection. These other alternatives for residential areas were provided by the Technical Working Group. In addition, as discussed in specific comments on Section 4, above, Ecology's failure to consider cost becomes even more extreme in the selected cleanup action for commercial and recreational levels where remediation levels have been selected based on assumed exposures that will never occur.

154 c. The estimate of arsenic levels which are protective against acute effects in children used in the draft CAP contains a series of conservative assumptions, which taken together results in an unrealistic analysis.

A detailed discussion of this issue is included in Section E.

155 d. The draft CAP provides no basis for the selected cleanup levels at the 12-24 inch and 24 inch to 15 foot soil horizons.

1) As explained in Section E, the 60 ppm average and 150 ppm single hit standard bear no reasonable relationship to any significant human health effect. Moreover, the end points identified are transient health effects such as nausea and diarrhea. These effects are too minor and short-lived to justify the expense involved.

2) The draft CAP states that these cleanup levels were selected based on a cost analysis. No supporting information is provided, and the attachment (Attachment H-2) demonstrates that the selected remedy is not consistent with WAC 173-340-360 (Substantial and Disproportionate Analysis). In particular, the regulation requires the cost to be compared to the net additional protection achieved, compared to less expensive remedies. Ecology simply compared alternatives in terms of level expenditure without regard to the degree of health protection. By doing so, it attempted to mask the fact that no additional protection will be achieved by the 20 ppm cleanup level.

3) The draft CAP provides that a marker such as a geomembrane or coarse gravel layer shall be placed at the bottom of the excavated 0-12 inch horizon. Although this, by itself, will provide an institutional control that will greatly limit exposure to deeper soil horizons by small children, that factor is ignored in setting cleanup levels in soils deeper than 12 inches.

4) The draft CAP selects a cleanup level of 150 ppm, with no single sample to exceed 500 ppm, for the soil horizon from 24 inches to 15 feet. As explained in the attached review of Ecology's analysis of acute health effects, there is no credible evidence of human health effects at this level of exposure. Indeed, it is lower than the level that Ecology agreed was protective for surface soils at Ruston.

5) Ecology's selection of the cleanup levels below 12 inches is not consistent with its own regulations disallowing selection of remedies that impose costs that are substantial and disproportionate to human health risk reduction.

6) Ecology provides no evidence that exposure to 15 feet needs to be regulated at all. This exceeds any reasonable foundation excavation in a residential area: typical foundation and utility depth is around 4 feet; a full basement could go to a depth of 8 feet.

Figure 6-6, page 85

156 It is unclear how Ecology derived the volume of soil to be removed in the Peripheral Area (145,000 cubic yards). Appendix A, Section 3 has estimated that approximately 166,000 cubic yards would be excavated. Asarco's comments on the volume estimate are contained in the draft EIS comments.

157 Section 6.2.1.2 Implementation of Remedy, pages 84-89

As discussed in the previous section, the draft CAP requires that "a permanent marker material (coarse gravel or a durable, permeable geofabric) shall be placed at the bottom of the excavation if sampling indicates the underlying soil has an average arsenic concentration above the cleanup level of 20 ppm or a maximum arsenic concentration exceeding 40 ppm." Placement of this marker along with other institutional controls, such as the public education program, provides a high level of protection from exposure to deeper soils. However, this level of protection is not considered by Ecology in setting remediation levels for deeper soils.

216 Asarco is concerned that the integrity of many of the nonpermanent structures will not allow them to be moved for remediation. Therefore, it is not appropriate for Asarco to move temperate structures, remediate beneath them, then replace them with new nonpermanent structures.

The draft CAP defines a permanent structure as "a structure which was built according to the Uniform Building Code under permit from the City of Everett, and was designed to be used indefinitely with proper maintenance." This definition is overly restrictive, will result in construction work being performed that is unrelated to any environmental issues and is not appropriate in the consideration of whether a structure is a suitable barrier. Other factors such as the actual barrier thickness (concrete roads for large trucks are often up to two feet thick and would be appropriate barriers regardless of their condition), location (for example, the exposure scenario of a child ingesting soil each day for 6 years is not plausible in service areas such as gas station lots, commercial areas, recreational areas, fenced storage areas and other non-residential uses).

326 Reliance on requirements to upgrade asphalt or concrete not meeting ASTM standards appropriate for the service bears no relation to potential environmental risk. Proving existing asphalt or concrete pavement meets ASTM standards is not appropriate. First, there are unlikely to be records of certification that the asphalt or concrete was initially constructed in compliance with ASTM standards. ASTM standards are not generally required or documented for residential areas (e.g., sidewalks, patios, and driveways). Second, it is not necessary for asphalt or concrete to be in full compliance with ASTM standards to be an effective barrier (e.g., ASTM density or subgrade material requirements). Third, it is industry standard to collect core samples to determine compliance with ASTM standards. Coring may jeopardize the barrier's integrity at that location. Lastly, it is not appropriate to make Asarco responsible for upgrading existing asphalt and concrete that should be maintained by routine City service requirements (i.e., streets).

Similarly removing decks that "impede" soil removal is not appropriate based on environmental considerations, nor is replacing the deck with one of <u>better</u> quality.

The third paragraph on page 87 contradicts the sixth paragraph on page 87 by requiring areas with existing asphalt or concrete not meeting ASTM standards to have the soil beneath them remediated before re-applying asphalt or concrete. The sixth paragraph allow areas without existing asphalt or concrete to be paved without soil removal.

The draft CAP would also require recaulking and repainting many window and door frames. It is likely that sealing with plastic will cause damage due to the use of tape.

158 Section 6.2.3 Maintenance Areas Not Normally Occupied, pages 90-91

As discussed in Section E, Ecology estimated the potential for acute health effects based on outdated scientific assumptions and then, by using a series of conservative assumptions, adding a safety factor of 10, resulting in an unrealistically low remediation level for acute exposures of 200 ppm (actually below the remediation level for residential use in Ruston).

328 There is no scientific justification for the requirement that "all maintenance areas not normally occupied must be sealed to prevent entry of animals...[using] a barrier sufficient to prevent entry by rats." This type of requirement would be unimplementable as it would be virtually impossible to prevent all animals such as rodents from entering maintenance areas and would provide no additional environmental protection.

Section 6.3 Soil Cleanup in the Former Arsenic Trioxide Processing Area, pages 92-94

See comments on Section 5.4 for a discussion of the appropriateness of an OCF for containment of soils with arsenic levels corresponding to Dangerous Waste.

As noted in comments on Section 3.2, the definition of Dangerous Waste should be based on TCLP testing and not a statistical analysis of data.

159 There is no environmental reason that all identifiable smelter debris, housing foundation material, road and driveway material, utility pipes, rubbish, vegetation and wood debris should be disposed offsite regardless of its arsenic concentration. The viability of keeping these materials within the fenced area should be addressed during remedial design.

331 The draft CAP calls for placement of the least contaminated soils in the consolidation facility. Placement of these soils under a cap in the fenced area provides no more protection than leaving them in place under grass cover. The difference in risk so marginal as to be outweighed by remediation risk so that the cost is substantial and disproportionate to the benefit. In addition, the proposed staging implies that Ecology is not that concerned about the soils with arsenic concentrations above their estimated acute risk level that will be remediated later in the overall remediation schedule.

332 If Ecology has the funds in its budget and wishes to spend them on such expensive add-ons such as "granite monuments" to commemorate its cleanup and an "aesthetically pleasing fence," Asarco has no objection. However, it would not be appropriate to require any PLP to implement or pay for such items. They are not part of a health-based cleanup.

333 Ecology, at page 93, "determines" that future uses of the Former Arsenic Trioxide Processing Area should be restricted to control by particular groups or compatible with certain

described uses. Although Ecology has the authority to impose deed restrictions on future uses of the site where there are elevated levels of hazardous substances remaining on-site, there is no authority in MTCA for limiting those groups who may purchase or exert control over properties in the Former Arsenic Trioxide Processing Area, so long as any institutional controls and other ongoing requirements that Ecology may have the authority to impose are carried out by successors-in-interest.

160 Section 6.7 Institutional Controls

Asarco agrees with Ecology that a well-defined program of institutional controls involving reasonable costs and aimed at the protection of human health and the environment may be part of an overall remedy for the Everett Site. However, the institutional controls proposed by Ecology in the draft CAP are excessive and costly, and bear no rational relationship to what Ecology is obligated to ensure, protection of human health and the environment. For example, the permit overlay program will involve the cooperation of several public entities, hundreds of hours and potentially hundreds of thousands of dollars to develop and implement, while adding little in the way of protection to the community.

To the extent that Ecology anticipates that the institutional controls program will be underwritten and/or implemented by any PLPs, Ecology is again reminded that Asarco is only one of several former owner/operators of the site. In addition, there are several public entities who, as current owners of properties within the site, fall squarely within the MTCA definition of "potentially liable party," with responsibilities for implementing the obligations of the draft CAP. RCW 70.105D.040.

161 Section 6.7.8 Exposure Testing Program, page 99

Asarco has no objection to post-remediation urinary arsenic testing because urinary arsenic is, indeed, an accurate measure of arsenic exposure as Ecology admits in its Review of New Science. What is noteworthy is that Ecology has failed to evaluate such testing before the draft CAP was promulgated. As noted, testing of urinary arsenic levels in children by ATSDR shows that the levels are not elevated above normal. As a result, Ecology failed to evaluate what levels of exposure to arsenic in soil are now occurring and whether arsenic in soil is in fact actually being ingested. Having failed to conduct this evaluation, Ecology is not in a position to select the appropriate health-protective response.

325 As explained in Asarco's response to Ecology's Review of "New Science," numerous scientific studies demonstrate that elevated urinary arsenic levels are not observed even in populations with much higher levels of exposure. They clearly demonstrate that much higher cleanup levels, such as the 230 ppm Ruston level that Ecology has previously agreed to, are protective of human health. See Section E, Statements of Drs. Beck, Tsuji and Schoof. Follow-up monitoring at Ruston demonstrates that remediation of soils to a level of 230 ppm is sufficient to prevent elevation of urinary arsenic levels above normal.

7. Compliance Monitoring.

Section 7.2.1.1 Peripheral Area, pages 102-104

The attached cover letter contains additional comments on and detailed discussion of the proposed sampling methodology and cleanup action levels for soils in the peripheral area.

162 a. In order to implement the selected cleanup levels the draft CAP proposed that the residential areas be divided into "decision units" of 4,000 square feet or less. Samples will be collected from eight depth intervals at ten locations within each decision unit. Each sample will be analyzed for arsenic, and a two-part decision rule will be applied to the results. If the average concentration from the 10 samples from a depth interval exceeds 20 ppm arsenic or if the maximum concentration exceeds 40 ppm, then soil will be removed from the entire decision unit to that depth interval.

The purpose of the performance sampling is to identify an area of soil, defined as the decision unit, where arsenic concentrations are sufficiently distinct from background to represent a risk to local residents, the potential receptors. The draft CAP approach requires a large number of sample analyses and, as a result, will be expensive to implement.

In order to identify areas where arsenic concentrations in soil exceed background, a large number of discrete sample concentrations is not required unless small, localized areas of higher arsenic concentrations are expected to be present. In peripheral areas, the available soil data show that arsenic concentrations generally decrease with distance from the smelter, and within individual properties, soil arsenic concentrations vary over a relatively narrow range of values. Given these site conditions, composite samples will be as effective as a large number of discrete samples in identifying the decision units where the arsenic concentration exceeds the action level.

163 b. Analysis of discrete samples adds additional expense but will only rarely result in a decision to remove soil. In areas where the actual arsenic concentrations are much higher than the cleanup action level, the average concentration will always trigger soil removal. In areas where the actual arsenic concentrations are similar to background (e.g., less than 40 ppm), the maximum concentration may result in additional decisions to remove soil, but the average concentration will still be more likely to trigger the cleanup action. Therefore, the effectiveness gained by analyzing a large number of discrete samples is minimal and only provides a reduction in decision errors at concentrations within the range of background concentrations measured in Puget Sound soils.

164 c. The cleanup level of 20 ppm is the background concentration of arsenic in Puget Sound soils, and as such represents a very conservative action level for the protection of human health. A cleanup action level of 20 ppm will result in decisions to remove soil from a decision unit when either the soil does not contain arsenic originating from the former Everett smelter (due to the presence of arsenic from other urban sources) or the arsenic

concentration in soil does not in fact exceed the background concentration (due to sampling errors).

165 d. In calculating the average concentration of 10 samples described in Ecology's proposed approach, the draft CAP does not specify what value will be used for samples with concentrations below laboratory method detection limits.

166 Section 7.2.1.2 Former Arsenic Trioxide Processing Area, pages 104-105

Under Ecology's proposed approach, the 3,000 ppm estimate is already based on a 95% UCL. Asarco believes that it is not appropriate to perform the UCL twice. Also, as noted previously, the definition of material to be removed under the Ecology alternative should be based on TCLP testing, not on a soil concentration of 3,000 ppm. The approach described in this section should be rewritten to address the appropriate testing procedure.

217 It is Asarco's understanding that sampling every 400 square feet is not required for the entire 6 acres, but rather, only at the bottom of excavated areas.

167 Section 7.2.2 Setting the Community Protection Measures Boundary, page 105

A critical problem with the Draft CAP is that because the cleanup level for arsenic is based on background concentrations, it will be very difficult to establish a final site boundary. Rather than determining the boundary of the site, the draft CAP sets an open-ended test program to find additional areas requiring remediation (page 105). This is apparently based on the assumption that any time an arsenic level exceeds 20 ppm, the source of arsenic must be the former Everett smelter. If other sources of arsenic exist within the Everett urban area, which they clearly do, it may not be possible to ever define the site boundary by applying a decision rule based on the background concentration of 20 ppm. The end result, in effect, may be that the site has infinite boundaries.

168 Section 7.2.3 Surface Water, page 105

Certain city rights-of-way with imported gravel or park areas and easements that may contain pesticides from past maintenance practices may show arsenic concentrations above levels listed in Section 4.1.4 but that are not attributable to the former smelter. Therefore, it is important for Ecology to identify the area subject to the performance monitoring plan.

169 Section 7.2.5 Storm Drain Sediment, page 106

Certain city rights-of-way may contain residual arsenic that would indicate arsenic concentrations in storm sediments above levels listed in Section 4.1.5 but that are not attributable to the former smelter.

170 Section 7.3 Confirmational Monitoring, page 106

Ecology's confirmation monitoring is not designed to distinguish arsenic from the smelter from other sources of arsenic. A new source could result in contaminant exceedances after completion of cleanup that are totally unrelated to the smelter. This requirement would seem appropriate only if Asarco had an ongoing operating facility in the area.

171 **8. Schedule.**

EPA is now in the process of a national re-evaluation of the toxicity and carcinogenicity of arsenic. It is also considering revisions to the arsenic drinking water standard. As part of this process, EPA is re-evaluating the question of determining a threshold for arsenic health effects and other issues. Significant new information is coming to light about arsenic every month as a result of EPA's investigations and those of many additional scientists. EPA has deferred official action on arsenic until this review process is completed and it has postponed its reconsideration of drinking water standards for arsenic.

Ecology is aware of these developments, but has chosen to ignore them. Rather than pushing forward aggressively at this pivotal threshold, Ecology should limit its cleanup activities to the most contaminated properties and defer any further action on the peripheral area until the arsenic evaluation process is completed. For example, there is a strong consensus among scientists that arsenic does not directly cause inheritable DNA damage and that arsenic carcinogenicity is not linear at low dose and likely displays a threshold below which it does not cause cancer. This means that cleanup to background is a complete waste of money that will have no beneficial effect in reducing cancer risk.

172 **9. Justification for Selection of Cleanup Action.**

Ecology's ultimate rationale for its Draft Cleanup Action Plan is institutional rather than health-based. Its key decision is that attainment of the cleanup level of 20 ppm is a "threshold" requirement that must be met regardless of lack of scientific merit and despite substantial and disproportionate cost compared to less expensive remedies that would fully protect human health. Remarkably, Ecology concludes that even the fact that implementation of its chosen remedy will result in a net increase in total human health risk is irrelevant.

327 None of these consequences are necessary. Under its regulations, Ecology can consider disproportionate cost, can avoid negative impacts on human health, and could utilize new scientific information about arsenic to avoid these unfortunate effects. Asarco urges it to do so.

C. General Comments on Draft Environmental Impact Statement

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- The draft EIS does not integrate MTCA and SEPA provisions as required by the regulations.

Page 41 of the draft CAP references the integration of MTCA and SEPA. It is not clear in the draft EIS how MTCA and SEPA provisions have been functionally integrated. It is incumbent on Ecology to include in the draft EIS a description of the integration process in accordance with WAC 197-11-262, particularly discussing the following:

- Determination of Significance;
- Timing of draft EIS in relationship to RI/FS and draft CAP; and,
- Format of draft EIS.

The overall purpose of the draft EIS is to provide an objective, unbiased assessment of potential impacts among various alternative actions. Within the content of the impact analysis, it often appears as if Ecology is trying to sell one alternative over another based on general and unsubstantiated analyses. In addition, throughout the environmental topic analysis there are often impacts discussed and no mitigation for that impact provided. If this is the case does that mean that the impact will "remain a significant and unavoidable impact?" Also in some instances, there were mitigation measures provided that did not refer back to a designated impact.

Some topics seem to be missing entirely from the draft EIS which could be relevant to the alternatives. There is no clear discussion of the scoping process and how this process lead to the topics analyzed in the draft EIS. The topics that come to mind include the following:

- Plants and Animals;
- Energy and Natural Resources; and,
- Historic and Cultural Resources.

It is not completely clear throughout the document what actions are actually being evaluated. It is Asarco's overall understanding that the draft EIS considers actions that are described in the Alternatives Description. These actions include the remediation actions specific to the cleanup of the site and the peripheral area (i.e., the entire upland area of the site). In many instances throughout the document, the document states that only the area within the Former Arsenic Trioxide Processing Area is being considered (see first sentence of the Earth Section-Section 4.1). Yet throughout other topics (and even within the Earth topic) it seems that the Peripheral Area is also being evaluated. Also, there would appear to be some primary or secondary impacts that could result "off-site," particularly related to Aesthetics, Land Use, Groundwater, Surface Water, or Transportation topics.

The draft EIS needs a coherent, complete Project Description that is entirely consistent with the draft CAP. The project description merely describes how the relevant provisions of MTCA and SEPA will be integrated at this site. The Project Descriptions should include a

238 cont. definition of the project site, actions to be taken, and connection to future actions. The draft EIS must clearly define the project study area. The project description could include a description of the Former Arsenic Trioxide Processing Area, the Peripheral Area and the Project Study Area to allow ease in determining specific impacts relative to specific areas.

In addition, the Project Description must also include a discussion regarding project scoping and future environmental review (particularly related to redevelopment of the site). It is unclear as to how this project is interrelated with the future land use of the site. The future land use is discussed within the content of the environmental topics impacts analysis and used to show "negative impacts" or "beneficial impacts" in the discussion of alternatives. There is no discussion within the Project Description that builds a foundation for this analysis.

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- The draft EIS is inconsistent with the draft CAP and inadequately cross-referenced for it to be a functional companion document to the draft CAP.

It is clear that the draft EIS is intended to be used as a companion document to the draft CAP, minimizing the need to restate items from one document in the other. This practice, while somewhat cumbersome, requires the draft EIS and draft CAP to be adequately cross-referenced and internally consistent. The document is often internally inconsistent. Inconsistencies occur between the draft CAP and the draft EIS and, in several instances, between specific sections in the draft EIS. In some instances, there are inconsistencies within the specific sections (e.g., Transportation Section). The draft EIS is not sufficiently clear or adequately cross-referenced, either in the descriptions of what is contemplated, the impacts, or potential mitigation actions that could be implemented to allow a coherent analysis of the draft CAP.

Specific questions, clarifications, or suggestions are provided in Asarco's detailed comments on the draft EIS; however, some examples provide a sense of the above mentioned problems. It is not uncommon to find graphics that are used to illustrate issues in the draft EIS that can only be located in the draft CAP. Acronyms and Abbreviations used in the draft EIS were not always defined; when referring back to the draft CAP, these Acronyms and Abbreviations are not listed. References cited in the draft EIS could not be found in either reference section. In several instances throughout the document, the topics are referenced that have not yet been discussed. This forces the reader to look ahead in the document to find and clarify the information being presented. As a result, it is very easy to become confused and misunderstand the impacts associated with particular actions or alternatives.

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- The draft EIS significantly underestimates the impacts arising from implementation of the draft CAP.

The most overarching deficiency of the draft EIS is the consistent underestimation of the level of disruption within the community that will arise from implementing the draft CAP and the significant impacts, including health impacts and risk of fatalities associated with the work described in the draft CAP.

240 cont.

There is no better example of this misrepresentation than the estimation of volumes to be excavated and backfilled (see Section 3.4). It is not clear how Ecology estimated 166,000 cubic yards from the peripheral area. Asarco does not understand why Ecology has not included recent data, particularly the boundary study performed by SAIC in 1997. Asarco believes that this data shows the area subject to soil removal and replacement would expand, resulting in a substantial increase in volume over that estimated in the draft EIS.

During mediation, the Technical Work Group agreed to several assumptions regarding volume estimates, including average size of a residential yard and number of decision units that require soil removal. The estimated volumes for alternatives most similar to the draft CAP ranged from 357,000 cubic yards or 643,000 tons (Alternative B), to 243,500 cubic yards or 438,000 tons (Alternative C). Asarco acknowledges that the cleanup and remediation levels are different in the draft CAP from those identified in the Technical Work Group alternatives. However, the changes in the cleanup and remediation levels in the draft CAP do not significantly change the volume estimated during mediation. For example, reviewing the Alternatives B and C, some reduction is provided in the draft CAP with removal of soil greater than 20 ppm to 12" instead of 18"; these are off set by more stringent remediation levels at depth. Therefore, the actual volume will still likely be somewhere in between the Alternative B and C estimates. Consequently, the draft EIS estimate is significantly low.

Higher volumes result in a proportionally higher cost for implementation along with greater disruption over a longer period in the neighborhoods and a greater risk of accidents. The draft EIS does not reflect these realistic, probable volume estimates. Rather, the draft EIS implies that the estimated 166,000 cubic yards will be excavated from residential neighborhoods (see Section 4.10.2.2). An average of 300 cubic yards of soil is estimated to be removed from each residence. Based on this information, it appears that Ecology has not accounted for any soil removal from commercial sites, public areas, and forested areas. Available data indicate that these areas contain arsenic concentrations greater than 20 ppm.

Asarco has estimated that a total of approximately 310,000 cubic yards will be excavated from the peripheral area yards if the draft CAP is implemented. Of that, approximately 220,000 cubic yards will be excavated from about 525 residential properties and another 90,000 cubic yards of soil will be excavated from non-residential properties, including three unpaved commercial properties, the mausoleum, American Legion Park, Wiggums Hollow Park, three forested areas east of East Marine View Drive, residential right-of-ways, and the cloverleafs at the intersection of SR529 and East Marine View Drive. These volume estimates are described in Asarco's cost estimate (see Attachment H-2).

241

In addition to the gross underestimation of volume, Asarco questions the practicability of a three year schedule. As noted, Asarco believes that Ecology has significantly underestimated the volume required to be removed which, in turn affects the schedule. The actual, foreseeable volume to be removed may be up to twice that estimated in the draft EIS. Even using the volume estimates from the draft EIS, Asarco believes that Ecology is overly optimistic in proposing the removal of approximately 55,000 cubic yards per year. Asarco believes that attempting to establishing 5 separate work areas will significantly disrupt the community throughout the

241 cont. duration of the work. In addition, safety risks greatly increase for workers as well as the public and unit costs substantially increase as a result of increased labor and equipment requirements.

It also appears that Ecology has not accounted for any potential complications associated with this type work. It is Asarco's experience that there will be a high likelihood of complications or decrease in productivity due to the following:

- Lack of accessibility to some properties;
- Delays associated with homeowner preparation or requested changes;
- More hand work or need for smaller equipment than anticipated (e.g., work around utilities or structures); and,
- Dealing with unknown conditions such private utilities or septic tanks.

242 It is Asarco's experience that these changes will materially increase the costs associated with the cleanup. Finally, it appears that other draft CAP requirements have not been addressed which will affect the schedule. These other requirements include:

- Moving non-permanent structures;
- Replacing decks;
- Securing maintenance areas;
- Thoroughly cleaning the houses post-remediation;
- Placing fabric barriers at the 12-inch depth; and,
- Replacing streets, sidewalks, driveways, steps, and patios that do not comply with ASTM standards.

243 The combined results of these misrepresentations is that the cost and day-to-day impacts for implementation of the draft CAP will be at least 1.5 to 2 times greater than presented in the draft CAP. This outcome is directly attributable to the provisions of the draft CAP and is based on Asarco's experience and information that has been available to Ecology for some time. The draft EIS is fundamentally deficient by not reflecting these foreseeable, probable consequences of the draft CAP. In particular, the document makes no quantitative or qualitative assessment of the risk of adverse public health impacts from the remediation itself, compared to health effects avoided from exposure to arsenic and lead in the concentrations and locations found.

D. Specific Comments on Draft Environmental Impact Statement.

173 Introduction

The project location should be described or included in a separate Project Description section. It should have a map that clearly defines the areas evaluated in the draft EIS.

174 Summary

The Summary Section does not comply with WAC 197-11-435 (4). The Summary Section should include a summary of the proposal, impacts, alternatives, mitigation measures, and significant adverse impacts that cannot be mitigated. The summary should also state when the draft EIS is part of a phased review and identify future environmental review.

Section 4.1 Earth Section

175 This section is only limited to topography. It should also include discussion of soils, geology and unique physical features (or natural geological hazards such as landslides, erosion, seismic). Later in the document (Environmental Health), there are references to potential earthquakes, yet geological natural disasters are not discussed in this section.

Later in the document, it appears the only mitigation offered is to minimize topographic impacts. No mitigation is provided to eliminate topographic impacts.

There is no mention that a redevelopment draft EIS will be done. As stated under general comments, this phased review process should be discussed in the Summary Section or Introduction Section of this document.

Section 3.3.5 has a discussion of excavation and backfill, but is not related to the Earth Section. No further discussion is made with the exception of the view-shed discussion of page A-4-1.

176 Section 4.1.1. The Affected Environment subsection is not clear how the Former Arsenic Processing Area fits with the adjacent neighborhood or the Peripheral Area.

177 Section 4.1.1. last paragraph. This is actually a discussion of an impact and should be discussed in the next subsection (Impacts).

178 Section 4.2.3. Dangerous Waste is mentioned above in section 4.2.2 but is not mentioned in this section.

179 Section 4.2.3. The impact section is difficult to follow for the lay person. The analysis states that the "grade could be raised somewhat more than 4 feet in the downhill area..." but then

the mitigation (4.1.2.4) says it should be "less than 2 feet." In addition, it is not consistent with information regarding grade and fill discussed in the draft CAP.

180 Section 4.2 Air Quality

Section 4.2.4. This section should be directly related to the transportation analysis (Section 4.10).

181 Sections 4.3 and Section 4.4 Surface Water and Ground Water

These sections should have an introduction stating where the information was developed for this section. Both sections appear to be a summary of reports completed by Hydrometrics. These reports are not referenced.

Much of the impact analysis refers to the impacts to the Lowland area which is addressed in this draft EIS. See comments under General Comments regarding definition of the "Study Area."

Table 4-1. The source of this information is not given.

Section 4.5 Environmental Health

This is a very relevant topic in this draft EIS particularly as it is one of the public's main concerns. This section should include a more in depth analysis.

182 Section 4.5.1. This section (Affected Environment) contains a discussion of impacts. In addition, this section includes a discussion of health hazards as a result of surface waters (paragraph 4). Impacts to the surface water do not appear to be identified in the surface water section.

183 Section 4.5.2.1. This section should be expanded to include more information. The assumptions are not given for the MTCA Risk Assessment assumptions and there are no references to this document.

184 Section 4.5.2.3. The statement that the on-site containment facility "could cause permanent and potentially lethal health affects" is not substantiated scientifically and the likelihood of exposure is not evaluated.

185 Section 4.5.2.3. Natural disasters such as earthquakes or floods are not discussed as potential issues in the earth or water sections.

219 Section 4.5.2.5. This section does not directly relate to the impacts discussed above (i.e., why the need signs in crawl spaces and basements). No information if provided that areas are likely to be dangerous.

220 Section 4.6 Land Use

No relationship to the shoreline or the Shoreline Designation is provided. The draft CAP states that this project is "subject to the Shoreline Act." Is this project subject to the requirements of the Shoreline Management Act?

In other parts of the document, the property is listed as R-2 which is inconsistent with this section.

221 Section 4.6.1.2. The statement that the designations are "essentially compatible" conflicts with the statement in the last paragraph, of Section 4.6.1.1. The statement that the "existing lot sizes exceed the minimum allowed" have no relevance.

222 Section 4.6.2.3. This is the first mention of RCRA in the draft EIS. It is not understandable to the general reader what conditions are imposed by the provisions of RCRA.

223 Section 4.6.2.5. Paragraph 1- The reference to the mitigation regarding interference with schools has no discussion under the impact analysis that would require this mitigation.

224 Section 4.6.2.5. Paragraph 2- The statement "Under each alternative" does not appear to include the No Action Alternative.

Section 4.7. Housing

225 Section 4.7.2.2. It is unlikely that the site will be developed for multi-family residence. In addition, the land use section says that it is designated "single family residential." If it were to be redeveloped as multifamily, it would require a change in the Comprehensive Plan and Zoning designation.

226 Section 4.7.2.3. In order to do a comparative analysis, this alternative would result in either no future development or development as a use other than residential. This should be included in the analysis.

227 Section 4.7.2.4. As stated above, it is stated in the land use section that this site is designated for single-family residential. See above comment (Section 4.7.2.2).

228 Section 4.7.2.5. Under the impact analysis (Section 4.,7.2.1), it is concluded that there was not really an impact or there was a "very small negative effect" if the site was not

redeveloped as residential. The mitigation measure stated assumes that there is an impact. In addition, it is unclear how the second sentence relates to this section.

Section 4.8 Aesthetics, Light and Glare

229 Section 4.8.1. View-shed descriptions in the Earth Section of this document are not necessarily consistent with those in this section.

230 Section 4.8.2.1. The statement in this section does not appear to be consistent with previous sections. It seems that the No Action alternative with the exiting contamination, fencing, and residual foundations would have a negative impact on the aesthetics of the area.

231 Section 4.8.2.5. There is mitigation relative to the attraction of undesirable uses. However, this is not discussed in the impact section.

232 Section 4.9.1 Parks and Recreation, Affected Environment

Data does exist in American Legion Memorial Park that indicate much of the area contains arsenic concentrations above 20 ppm (see letter to Dave Nazy, Ecology from Tom Aldrich, Asarco dated April 1, 1997).

233 Section 4.10 Transportation

The failure of the draft EIS to evaluate health risks arising from the remediation and soil transport is addressed at length in Dr. Beck's Statement and in Attachment H-5. That analysis will not be repeated here. The traffic analysis in the draft EIS is insufficient to address adequately the potential impacts of this project.

234 Section 4.12 Public Services and Facilities

The affected environment section is lacking in detail. It seems that a number of public services/facilities could be impacted by this project. These services should be detailed.

The impact analysis should be more specific. There needs to be a link between the proposed alternatives and the services/facilities to be impacted. For example, the document states that temporary revisions to traffic signals would be required. What public service would be impacted? Would it be the city? This comment is applicable throughout this section.

The statement that there are no mitigating measures is difficult to accept. Does that mean that all of the impacts are significant and unavoidable under all alternatives? It seems that some impacts could actually be mitigated.

235 Section 4.13 Maintenance

It is unclear how this section fits into the draft EIS. There appears to be design mitigations that are included or should be included in the different alternatives.

236 Section 4.14 Other Governmental Services or Utilities

This section should be incorporated into other relevant sections and should not be separate from Section 4.12. In addition, some of the information included in Section 4.14.2.2 is more relevant to Section 4.5 (Environmental Health).

237 References

This section does not reference all documents in this draft EIS. Several references appear to be missing. This would also include personal communications (documented in the draft EIS).

E. General Comments on Ecology's Review of "New Science" and Expert Statements

Introduction and Overview

449 Ecology's own regulations require Ecology to "consider new scientific information when establishing cleanup levels for individual sites", and provide that "[i]n making a determination how to use this information" Ecology should, as appropriate, consult with EPA, its Scientific Advisory Board, and the Department of Health. WAC 173-340-702(6). The regulation clearly contemplates that the new information should not be rejected out of hand, but rather should be considered on its merits and incorporated into the decision regarding cleanup levels, if that is appropriate based on those merits. Any other interpretation would violate the requirement that Ecology "ensure that cleanup standards under this chapter are established and implemented in a scientifically and technically sound manner." WAC 173-340-702(1). The regulation, consistent with MTCA itself, encourages Ecology to get "peer review" of the new scientific materials by disinterested bodies with technical expertise--by consulting with EPA, the Scientific Advisory Board (SAB), and the Department of Health.

450 Ecology has failed to fulfill these responsibilities. First, a number of key scientific developments are simply ignored in their entirety. For example, two of the most important developments since Ecology adopted its arsenic cleanup standard in 1991 are: (1) publication by Dr. Ken Brown, an author of the 1988 EPA arsenic risk assessment, of the disclosure that EPA used incorrect dose and response information in calculating the cancer slope factor that Ecology still uses in its Method B formula; and (2) evidence, published by Dr. Menzel, Dr. Beck, and many others, of a consensus that there is no plausible biological mechanism by which arsenic could have a linear, no-threshold impact on cancer incidence since arsenic clearly does not cause direct inheritable DNA damage in animals or on living human cells. This contradicts the central assumption upon which the cleanup level is premised. These matters must be addressed, not swept under the rug.

451 Second, other key points are dismissed out of hand, without regard to their merits, based on the assertion that Ecology has made a "policy choice" to "err on the side of protectiveness." Review at 3. It simply is not defensible "policy," either as a legal matter or as a legitimate matter of governance, to use bad science. For example, Ecology claims that choice of the extrapolation model is a "policy" decision not subject to scientific review. Review at 11. That is false. The model is used to predict risk at low dose, and if it is demonstrated that the model uses faulty assumptions, the resulting prediction of risk will likewise be faulty. This is but a variation of the familiar modeling maxim that "garbage in" is "garbage out." While use of plausible but conservative assumptions is sometimes justified, the use of assumptions that contradict the weight of evidence is not. Use of assumptions that contradict reality ensure that the resulting risk prediction upon which selection of a cleanup level is premised will have no rational relationship to reality. That clearly violates legal standards set forth in MTCA and the State Administrative Procedures Act.

452 Third, although Ecology consulted with EPA and the SAB regarding the lead cleanup levels, it did not do so with respect to arsenic. It refers cryptically to its consultation with EPA about arsenic risk as "less extensive," and makes no mention of the SAB in connection with arsenic. Review at 3. Thus, even though arsenic is undergoing a comprehensive national re-evaluation by EPA and various scientific boards and individual scientists, Ecology sought no independent or disinterested outside advice. Instead, it did only an internal review by a panel of persons who are all clearly identified with defending Ecology's regulations and existing cleanup standards. Mr. Blum and Dr. McCormack are Ecology employees. Dr. White, from the Department of Health, has been Ecology's technical advisor for this project and an active participant in the mediation on Ecology's behalf. Mr. Glass has been a technical advisor to a citizen's group, has been adverse to Asarco in the mediation, and has been an active advocate for rigid application of Ecology regulatory cleanup levels. Given the new scientific evidence at stake, such partisan review is not appropriate.[8]

453 Fourth, Ecology has determined that it should not change its cleanup levels based on new science unless it is presented with "clear and convincing" evidence that its own 1991 standards are wrong. Review at 4. Based on its Review, it is clear that Ecology interprets this to mean that it should ignore new information that is supported by the weight of scientific evidence in favor of its defaults even if the latter have no scientific or evidentiary support. This creates a preference for unscientific decision-making that violates the command of its own regulation to consider and, as appropriate, "use this new information", with the help of EPA and the SAB, in setting cleanup levels. It is also inconsistent with EPA's new proposed Risk Assessment Guidelines which require risk management decisions based on the "weight of the evidence." 61 Fed. Reg. 17961 (1996). At bottom, the "clear and convincing" standard, as interpreted by Ecology, effectively means that Ecology will never change its standard, no matter what the countervailing proof, because the risk it has targeted, any risk to the most susceptible individual in excess of one-in-a-million, is so small (indeed, theoretical) that it cannot be detected statistically in any epidemiological study. New science, and common sense, are dead letters under this approach even though the projected risks are so remote that this cleanup action plan, if implemented, will have no rational relationship to protecting human health. Indeed, as discussed below, Ecology's draft CAP will increase human health risk because of the remediation risks created by excavating, transporting, and replacing vast volumes of soil at the Site with arsenic barely above background levels.

454 Included with these comments are statements from Drs. Beck, Rodricks, Shoof and Tsuji responding to various errors and oversights in Ecology's Review. Ecology failed to respond to the Declaration of Dr. Menzel, which demonstrated that the identified biological mechanisms of arsenic behavior at the cellular level are inconsistent with Ecology's assumptions, or to the Declaration of Dr. Brown, which demonstrated the mathematical and conceptual errors committed by EPA in calculating the cancer slope factor. Consequently, further statements from

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[8] Ecology refers to Asarco's 1998 submission on new scientific developments as "Asarco's 'New Science'" Although Asarco retained the experts who submitted the declarations, their conclusions are based entirely on evidence about arsenic and arsenic risk published in the peer-reviewed scientific literature. Peer reviewed science is not "Asarco science."

454 cont.

them are not included here, but their original declarations and attached materials are incorporated by reference. Also attached to the statement of Dr. Schoof is a bibliography of additional key scientific articles that have been published since the July 1998 submission. Ecology does not identify or comment on any of them, even though the articles reflect some of the most current scientific thinking on the subjects at issue. Asarco will be happy to supply a copy of any article Ecology wishes to examine.

The balance of these comments summarize key errors in the Ecology Review of the new science. The statements in bold refer to the original assertion which Ecology addresses in its Review. Additional errors are discussed in the attached Statements.

455

1. Use of the linear no-threshold model for arsenic is inappropriate.

a. While there is clear evidence that arsenic causes skin cancer at high doses, there is no evidence that arsenic, particularly arsenic in soil, causes cancer at low doses. Rather, in its 1988 arsenic risk assessment, EPA assumed that arsenic might cause cancer at low doses based on the hypothesis that arsenic, like some other carcinogens, might cause inheritable DNA damage and thereby trigger the onset of cancer. Brown Dec. ¶ 14; 1988 EPA Risk Assessment at 7. This hypothesis was used as a default assumption for all carcinogens based on EPA's 1986 Cancer Risk Guidelines and based on the state of the science at the time. However, in 1988 EPA, in its arsenic risk assessment attached to Dr. Brown's declaration, disclosed that there was no evidence that that was true for arsenic, Risk Assessment at 7, 22, and that remains true today. Menzel Dec. ¶ 8. Standard tests show no gene mutations from arsenic. Moreover, arsenic by itself is generally not an animal carcinogen, whereas cancer initiators that cause inheritable DNA damage almost invariably are. Thus, there is no plausible biological evidence for arsenic to behave as the linear, no-threshold model assumes.

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b. On the other hand, there are biological mechanisms that explain how arsenic can cause cancer at higher doses. While it is not yet clear which one or more of these mechanisms are effective, all of them operate through biological pathways that are inherently non-linear or exhibit a threshold. Menzel Dec. ¶ 8; Rodricks Dec. ¶ 21-34. Thus, each of these mechanisms contradict the assumption of linearity at low dose.

457

c. In 1996, EPA published new Risk Assessment Guidelines that rejected automatic use of the default assumption of linearity for all carcinogens and other aspects of its then 10-year old cancer guidelines as inconsistent with current science. Its preferred method now is to examine evidence of biological mechanisms for a more realistic risk assessment and, for chemicals like arsenic that are not expected to operate in a linear, no-threshold fashion, to utilize a "margin of exposure" approach rather than hypothesizing a theoretical unacceptable risk that is not consistent with the biological evidence. EPA is now in the process of re-evaluating arsenic carcinogenicity and has postponed determination of new water quality standards until that is complete.

Ecology does not discuss this new approach, except to say that EPA provides little specific guidance on how to use the margin of exposure analysis, and that its guidelines are still in draft form. This ignores the more important point that EPA has specifically rejected the old

457 cont. risk assessment methods as an appropriate default for all carcinogens because it is inconsistent with current science. Ecology still uncritically applies the old guidelines. As the newest edition of Casarett and Doull's Toxicology, the standard teaching text, concludes:

> The linear multistage model is not appropriate for estimating low-dose carcinogenic potency for many chemicals. In most cases, the dose response at high doses of testing differs substantially from the considerably lower doses for exposure.

Casarett and Doull's Toxicology at 255 (Fifth ed. 1996). The linear multistage model is one of several models that use an assumption that there is no threshold below which the chemical is inactive, i.e., no threshold, and that the dose/response relationship is linear at low dose, i.e., that any dose above zero causes a proportional number of cancers which can be directly and proportionately extrapolated using observed cancer incidences at the high-dose level. (As described below, there is no evidence that that assumption is appropriate for arsenic.)

458 d. Ecology uncritically uses the EPA 1988 cancer slope factor as a literal measure of human health risk despite the fact that EPA cautioned against use of it without regard to the uncertainties. In the arsenic cancer risk assessment itself, EPA warned that the risk at low dose may be much lower than the cancer slope factor suggests, and may be as low as zero. Brown Dec. ¶ 15-16. The IRIS database contains the same cautions, all of which Ecology has ignored.

459 e. Ecology claims that the cancer slope factor has been corroborated by epidemiological studies. That is untrue. Some studies have provided corroboration of arsenic risk at high dose, although not at the levels assumed by EPA, but none provide corroboration at low dose. Moreover, Valberg et al in 1998 compared cancer rates among U.S. populations with relatively high arsenic levels in their drinking water to the predicted cancer rates using the cancer slope factor. They demonstrated that it is statistically twice as likely that arsenic does not cause cancer at these levels, which are much higher than Ecology has identified as harmful, as that it causes cancer at the rates projected by the 1988 EPA cancer slope factor. Beck Dec. ¶ 22; Valberg et al, Likelihood ratio analysis of skin cancer prevalence associated with arsenic in drinking water in the U.S., Environmental Geochemistry and Health (1998).

460 f. Ecology's analysis results in the conclusion that background levels of arsenic in soil raise a human health risk that is 30 times higher than what is acceptable under the MTCA Method B risk formula. Review at 14. This defies common sense. Given that humans have been exposed to such levels in the natural environment for millions of years, how can they now be regarded as unreasonably dangerous based on a formula that does not fit the known behavior of the substance at issue?

461 g. Studies also show that nutritionally-deprived populations are more susceptible to the carcinogenic effects of high doses of arsenic than are healthier populations, like the U.S. population. This may be due to a reduced ability in deprived populations to de-toxify and excrete arsenic. This provides further evidence that the Taiwan data cannot be extrapolated to the U.S. population.

462

2. The EPA arsenic cancer slope factor cannot be used for quantitative risk assessment.

a. Ecology's Review ignores Dr. Brown's declaration and published article concerning errors in EPA's calculation of the cancer slope factor for arsenic. It responds only obliquely by saying there is always "some degree of uncertainty" in epidemiological studies. This response is patently insufficient for all of the following reasons:

(1) The Taiwan study was an "ecological study," meaning that it was designed only to identify whether there was an elevated cancer rate in the population, and was not designed to detect specific dose/response relationships at given levels of exposure.

(2) As Dr. Brown explains, EPA had to estimate both dose and response levels to calculate a relationship. Both values came from EPA assumptions, not actual data.

(3) The assumptions used have now been shown to be totally implausible. For the low dose group, EPA assumed a uniform dose of 170 ug/L among all of the Taiwanese exposed to drinking water arsenic. In fact, based on later re-examination of the actual well data, one village in the "low dose" exposure group has arsenic levels of 770 ug/L and four had levels above 450 ug/L. By assuming that those persons who contracted cancer were exposed at 170 ug/L when they were in fact exposed at much higher levels, EPA substantially overestimated risk at low dose. It is entirely consistent with the data that those who developed cancer were actually exposed at 300 ug/L or even higher, yet EPA assumed that all of the reported cancers occurred at the 170 ug/L exposure level. Ecology incorporated the same false assumptions into its formula by its uncritical adoption into the formula of the 1988 cancer slope factor.

(4) EPA also had no data to tie cancer cases to exposure levels because cancer incidence was reported only by age group, not by location.

(5) Ecology thus uses the cancer slope factor to calculate an assumed dose/response relationship at low dose, when the fact is that neither dose nor response are known among the Taiwanese villagers.

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b. Ecology concedes that "there is no way to know today whether the classifications [used by EPA] were correct or incorrect, and what effect any possible misclassification actually had on the results." Review at 16. This concession undermines the validity of its entire draft CAP. How then can Ecology's formula be used to calculate cleanup levels? This is nothing less than a tacit acknowledgment of Dr. Brown's conclusion: "These data are not suitable for quantifying the dose/response relationship in the U.S. population."

464

c. It is also untrue that "the uncertainties [in the Taiwan data] may result in underestimation of risk." Review at 17. The only way that could be true is if there is a higher risk of cancer from arsenic at low dose than at high dose, an absurd hypothesis that contradicts

the most fundamental rule of toxicology--response increases rather than diminishes with higher dose.

465 **3. Ecology's assumption of daily soil ingestion of 200 mg is not realistic.**

a. The data that Ecology cites in favor of its soil ingestion assumption was gathered by Calabrese and Stanek at a day care center during the summer months. It is illogical, and defies common sense, to assume that children consume soil at Everett at the same rate 365 days a year. No data supports that assumption, and the Western Washington climate does not permit that inference.

466 b. Ecology also ignores Dr. Beck's demonstration that household dust comes from sources in addition to outside soil and the concentrations will be diluted. Ecology simply assumes, without support, that all ingested dust will have the same concentration as the average outdoor soil level.

467 **4. There is no scientific basis for a soil bioavailability factor of 100%.**

a. In its Anaconda ROD, based on extensive studies, EPA calculated that the bioavailability of arsenic in soil to humans was 18.3%. ROD at DS-22, Volume 8, Tab E of New Science. Based on this, and other data, Asarco argued that the 40% used by Ecology was too high. Ecology now announces that it will use 100% as the assumed bioavailability of arsenic in soil. It does so even though it suggests elsewhere in its Review that even arsenic in food has a lower bioavailability value, Review at 28, and that dissolved arsenic in water has a bioavailability of only 90%. Review at 29. How can arsenic in soil have a bioavailability higher than dissolved arsenic in water or higher than occurs with ingestion of pure arsenic compounds?

468 b. No data supports this value, and it is well known that arsenic binds to soils, making the value totally implausible. Ingestion of "purified arsenic compounds", (which Ecology admits themselves have a lower bioavailability than 100%), Review at 21, offers no support whatever for Ecology's assumption with respect to soil-bound arsenic. Particularly in light of the 18% value used by EPA at Anaconda, Asarco can only conclude that Ecology's selection of 100% is not based on science, but rather is either retaliatory or simply an attempt to "stack the deck" in favor of its cleanup level. Certainly, it could not survive peer review by EPA, its own SAB, or any neutral panel of scientists.

469 **5. Arsenic is likely an essential nutrient in humans at levels above the arsenic ingestion rate postulated by Ecology as harmful.**

a. Ecology attempts to rebut the materials Asarco presented on arsenic essentiality by pointing out that in 1988 EPA reported that arsenic essentiality was plausible, but not proven. EPA made that statement 10 years ago, and the evidence and scientific consensus has changed since. As noted in Asarco's comments on the draft CAP, in 1998 it has been reported in the literature not only that there is strong evidence of arsenic essentiality based on human data gathered from dialysis patients who have abnormally low blood arsenic levels, but

also that arsenic has anti-carcinogenic properties. This suggests that while arsenic at high dose is associated with cancer, inadequate amounts of arsenic also increases cancer risk.

470 b. Ecology concludes that "[e]ven if it were proven that arsenic is required for good health in humans, that finding wouldn't preclude it from having toxic actions at essential doses or just above such doses." Review at 38. This statement contradicts common sense. If arsenic is indeed essential, and arsenic deprivation causes immediate adverse health effects, it makes little sense as a regulatory policy to reduce arsenic to the lowest possible level in order to avoid extraordinarily low risks of cancer, i.e., theoretical one-in-a-million risks, when the result may be to increase the immediate risks from arsenic deficiency. Dr. Nielsen, a scientist with the U.S. Department of Agriculture, recently expressed concern, that based on extrapolation from animal studies, "some individuals may be consuming inadequate amounts of arsenic" in their diet. Nielsen, Ultratrace Elements in Nutrition, J. Trace Elem. Exp. Med. 11:254 (1998). As Dr. Nielson concluded, "[b]ecause arsenic most likely is an essential nutrient, the belief that any form or amount of arsenic is unnecessary, toxic, or carcinogenic is unrealistic, if not potentially harmful" (emphasis added).

471 c. Ecology also fails to comment on the recent publication in the New England Journal of Medicine and other journals of peer-reviewed studies showing that arsenic is an effective treatment for certain kinds of leukemia at doses that produce only mild side-effects. No objective evaluation of this chemical can ignore, as Ecology does, this striking new development.

472 **6. Scientific studies using urinary arsenic levels demonstrate that exposure to arsenic in soils at levels substantially higher than 20 ppm do not result in elevated urinary arsenic levels, a recognized measure of arsenic exposure.**

a. Ecology essentially rejects out of hand the demonstration that children exposed to elevated levels of arsenic in soil, many times higher than Ecology's soil cleanup level, do not show urinary arsenic levels that are higher than normal. Urinary arsenic is regarded as an accurate biomarker to exposure to arsenic. Ecology's response is first to complain that Asarco has not submitted Everett-specific urinary arsenic data. It uses this to reject consideration of the evidence developed at other sites on the very limited effect of arsenic in soil on urinary arsenic levels in exposed children. Next Ecology warns that its statement about Everett-specific data "should not be misinterpreted as Ecology approval for this approach to deriving soil cleanup standards," i.e., using urinary arsenic levels to determine the extent that soil cleanup is necessary, in the event Asarco did submit such data. Review at 35. Finally, Ecology states that it believes that if such data were submitted that it could "back-calculate" so as to corroborate its 20 ppm soil cleanup level, thus effectively pre-judging the issue. It does so notwithstanding that EPA at Anaconda concluded that such data corroborated that a 250 ppm soil level was protective of human health. This is clearly a partisan rather than objective review of the data.

473 b. In its draft CAP, on the other hand, Ecology proposes post-remediation arsenic testing to demonstrate that its cleanup has been effective. Draft CAP at 99. That is ironic because, of course, we already know that no elevated urinary arsenic will be detected because it

473 cont. is not found even at sites with much higher levels. The real question is how can it be that such data can be used to measure arsenic exposure after a cleanup, but that it is not useful when used to determine what level of exposure causes a problem before the cleanup is conducted? Indeed, urinary arsenic data has been collected from persons exposed to Everett soils in a urinary arsenic testing program being conducted by the Department of Health. Urinary arsenic levels in Everett children have been collected by ATSDR. As Ecology is, or should be aware, those tests do not show no elevated urinary arsenic levels even before remediation. See Dr. Tsuji Statement. This data, coupled with data from other sites, show that the default assumptions incorporated into Ecology's formula are not valid.

474 **7. The calculated exposure to arsenic in soil, which Ecology considers unacceptable for human health, is dwarfed by normal intake of arsenic, at background levels from diet and drink.**

a. Arsenic is a ubiquitous, naturally-occurring substance, found not only in soil but also food and water. Dr. Rodricks, in his Declaration, made a compelling demonstration that arsenic in soil, even at levels 5 times higher than Ecology's cleanup level, was a very small increment of the total lifetime arsenic intake from normal levels of arsenic in food and water, and that the difference between the two exposures had no material effect on arsenic exposure because it was dwarfed by the dietary and drinking water intake. Ecology tries to quibble with these facts, primarily by arguing that although it is not included in their Method B formula, one should also assume that adults living in Everett will also ingest large amounts of contaminated soil every day, at a rate of 100 mg a day for decades, either 30 years or 70 years, which add up over a lifetime. This, of course, assumes the validity of the underlying premise regarding extended daily exposure.

475 b. More importantly, this does not obscure the point that the amount of arsenic coming from soil, compared to normal intake of arsenic from diet and drinking water is very small. Ecology postulates that any arsenic intake from soil over 4 micrograms causes unreasonable health risk (200 mg at the 20 ppm arsenic soil level with 100% bioavailability). However, the mean arsenic value in drinking water in the United States is 2.4 ug/L leading to an assumed daily ingestion of 4.8 micrograms (also assuming 100% bioavailability). Average daily dietary intake estimates vary, but 11 to 18 ug/day is a good estimate. Beck Dec. at ¶ 26. Added to drinking water ingestion, the daily intake would be in the 15 to 22 ug/day range. Given these levels of normal intake, how can any level above 4 ug/day be regarded as unreasonably dangerous? Using realistic bioavailability numbers from Anaconda, the difference is even greater because the assumed absorbed fraction of arsenic from soil would be only .8 ug/day.

476 **8. The new human health risks introduced by excavating and moving in excess of 166,000 cubic yards of soil far exceed the theoretical cancer risk from exposure to the Everett soils.**

a. In the introduction to its Review, Ecology asks the following question concerning its method of assessing risk: "Does this mean that Ecology is overly protective?" Review at 3. Its answer is "possibly" but that it "will and should err on the side of

476 cont.

protectiveness." That Ecology has erred is clear. Its justification, that the error is on the side of protectiveness, however, is false.

b. As the Science Advisory Board warned Ecology about its regulations in 1990, as cleanup levels drop to extraordinarily low levels, such as to protect against an assumed one-in-a-million excess cancer risk, the volume of soil that must be removed and replaced with "clean" soil to achieve that level of "protection" increases exponentially. This raises not just cost, but also the human health risk from the remediation itself and from the transportation and replacement of the excavated soils.

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Ecology admits only part of this risk, a projected 6.5 truck accidents. Draft EIS at A-4-49. The question of how many of these accidents will be fatalities is not addressed. Moreover, the actual risk is substantially underestimated because, as demonstrated in the comments on the draft CAP, Ecology's estimates of the volumes of soil that will be remediated under its draft CAP are much higher than it estimated. Regardless of actual volume, Ecology does not compare the remediation and transportation risks to the purported reduction in cancer risk achieved by the cleanup. That risk is minuscule because there are clearly very few, if any, children who consume 200 mg of soil every day from a contaminated source in Everett.

To illustrate the point, assume that there are 10 children in Everett who consume that much soil 365 days/year for six years. Assume that arsenic in soil is 100% bioavailable, that Ecology's risk calculation is correct, and that soils are remediated so as to leave an average of 67 ppm in the soils, rather than 20 ppm. Since Ecology's 10^{-6} cleanup level is 0.67 ppm, each child would face a theoretical 10^{-4} risk over their lifetimes, or one-in-ten thousand and the entire population would face a risk of 1 in 1000. This exposed group of children would have to turn over and be replaced with new children 1000 times in succession before one would expect a single case of skin cancer in any of their lifetimes. Reduction of the cleanup level to 20 ppm would reduce the risk to slightly less than one in every 3000 generations of exposure. In contrast, at the 20 ppm cleanup level, Ecology projects 6.5 accidents involving trucks in three years. (And, of course, the actual cancer risk among this population is most likely zero for all the reasons discussed above.)

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Similarly, Ecology ignores the risk of fatal truck accidents. Data published in Ecology's Environmental Impact Statement on its MTCA regulations, when applied to the volumes and distances involved here, will create a risk of a traffic fatality of about 1×10^{-1}, many times higher than the cancer risk theoretically avoided. See Dr. Beck Statement.

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Moreover, the draft EIS ignores the risk of the on-site remediation itself, excavation and replacement of approximately 180,000 cubic yards of soil in a residential neighborhood where small children live. The risk to remediation workers alone is approximately 1.7×10^{-3}, which exceeds the theoretical cancer risk. See Dr. Beck Statement. They are not theoretical or based on a hypothetical computer model. They are based on statistics from actual accidents. There is no existing database to evaluate the remediation risk to children at Everett, but it cannot simply be ignored. There can be no doubt that the net effect of this plan, if implemented, will be to cause more harm than it prevents.

Conclusion

Perhaps the most striking feature concerning the new science regarding arsenic and risk assessment is that all of the evidence points to a lesser rather than greater risk from arsenic. Each of the new lines of evidence suggests that the Ecology formula overestimates risk, and none suggest the reverse. Arsenic does not cause direct DNA damage and is not an initiator of cancer. The biological evidence on modes of action point consistently to a sublinear dose/response relationship or threshold for arsenic. EPA's cancer slope factor overestimates cancer risk even among the Taiwanese, and strong lines of evidence suggest that the U.S. population is less susceptible. Data from high U.S. exposures demonstrate that the cancer slope factor is very unlikely to provide an accurate prediction of risk. Arsenic is a likely essential nutrient, and also has anti-carcinogenic effects. Arsenic in soil has limited bioavailability and does not lead to elevated urinary arsenic at levels more than 10 times higher than the Ecology standard, a fact corroborated by ATSDR data gathered from children in Everett itself. Finally, exposure to arsenic in food and drinking water is much higher than the level Ecology seeks to target here, meaning that the cleanup will not significantly reduce actual total inorganic arsenic ingestion.

Thus while Ecology is correct that all of the uncertainty about arsenic has not yet been overcome, the consistent weight of the evidence suggests that Ecology is chasing a phantom risk, and is willing to endanger human life in order to carry out its remediation initiative. Asarco strongly urges that Ecology withdraw and reconsider its Cleanup Action Plan.

Attached to these general comments are more detailed Statements regarding Ecology's Review of the New Science prepared by Dr. Beck, Dr. Rodricks, Dr. Schoof, and Dr. Tsuji. As noted, Dr. Schoof's Statement includes an updated Bibliography with new articles that were not included in the Bibliography submitted with the July 1998 New Science materials.

F. Comments on Ecology's Review of Hazards of Short-Term Exposure to Arsenic-contaminated Soil and on Ecology's January 26, 1999 Decision Memorandum

In these two documents, Ecology purports to analyze the hazards of acute arsenic exposure, which it then utilizes in its draft CAP (along with very limited consideration of costs) to arrive at the selected soil remediation levels for arsenic of 60 ppm (with no single sample above 150 ppm) for the 12 to 24 inch soil horizons, and 150 ppm (with no single sample above 500 ppm) in the soil horizons from 24 inches down to 15 feet.

480 As explained elsewhere in these comments, the cost component of this analysis is unintelligible, extremely abbreviated, and inconsistent with Ecology's own regulations. No meaningful cost data is presented, only a rough graph summarizing soil concentrations at various levels is included, and no "substantial and disproportionate" analysis was conducted in which the various cost increments are compared to changes in the degree of human health protection achieved by less expensive alternatives.

These comments focus on the acute toxicity aspects of Ecology's analysis. As Asarco understands Ecology's analysis, Ecology has concluded that, based on three postulated exposure scenarios, Ecology's best estimate is that

1) a soil arsenic level not to exceed 37 ppm is necessary to protect against relatively common exposures by children that could result in transient health effects;

2) a soil arsenic level not to exceed 162 ppm is necessary to protect children against an infrequent child exposure resulting in death; and,

3) a soil arsenic level not to exceed 175 ppm is necessary to protect adult residents and workers against a relatively common risk of transient health effects.

Each of these levels, in turn, was calculated by applying a series of default assumptions concerning soil ingestion and bioavailability, and then applying a safety factor of 10 to the level at which Ecology concluded those effects could possibly occur. Ecology then applied exposure scenario 1 to the 12 to 24 inch horizon, and scenarios 2 and 3 to the 24 inch and deeper zones.

481 Ecology's analysis is fundamentally flawed and inconsistent with contemporary scientific information for all of the following reasons:

1. Scenarios 1 and 3 are based on avoiding <u>transient health effects</u> that include such symptoms as nausea and diarrhea, but which do <u>not</u> result in permanent injury or harm to human health. These toxicological endpoints are too insignificant and the likelihood of their occurrence too small to justify the costs of achieving these levels of protection. Moreover, the soil ingestions assumed are so high it is likely that the same symptoms would occur from soil ingestion alone wholly apart from any arsenic content.

482 2. There is no justification for imposing a 10 fold safety factor to protect against such transient effects, particularly given the extraordinarily conservative assumptions used for soil ingestion and bioavailability. These factors, in effect, already have a safety factor built in, and Ecology's selected cleanup levels have redundant layers of protection built in to avoid insignificant and temporary effects.

483 3. Both Scenarios 1 and 3 are supposedly based on relatively common exposures. This characterization is inconsistent with the draft CAP's requirement of a geotextile or defined gravel layer at the bottom of the 0 to 12 inch horizon. That, coupled with institutional controls and a twelve inch layer of clean soils, means that the exposures will necessarily be "atypical" rather than "common."

484 4. Scenarios 1 and 3 assume a soil bioavailability of arsenic in soil of 100%. As explained in Asarco's comments on Ecology's Review of New Science, there is no scientific basis for that assumption, and it contradicts credible evidence of much lower bioavailability values published in the peer-reviewed literature. Further, there is no rational basis for using a different bioavailability factor for Scenarios 1 and 3 than for Scenario 2.

485 5. The soil ingestion rates are not realistic. The Scenario 3 ingestion value of 2000 mg/day for an adult is by no means "common." This exceeds by 10 times the 95 % UCL value used by Ecology for children, who clearly are more prone to soil ingestion than adults. It is unrealistic to assume that any adult would deliberately eat that much soil, unless the person was deranged, and it is silly to suggest that this consumption could occur on a "relatively common" basis from soils lying below 2 feet down to 15 feet.

486 6. Ecology's assumptions of a soil ingestion by a child of 20,000 mg/day in Scenario 2, resulting in lethality, is extraordinary. It is based on one reported incident of one child's behavior. The soil ingestion is so high, and the soil at issue is so inaccessible (more than 2 feet deep, covered with 12 inches of "clean soil" and under a geotextile or gravel layer) that the assumptions are without relation to reality. They should not be further exaggerated by using a 10-fold safety factor. In other words, under Ecology's own extraordinary assumptions, if a child did consume that much soil, lethality would not occur unless the soil had a concentration of 1625 ppm arsenic, not 162.5 ppm.

487 7. Ecology's Scenario 2 analysis for "lethality" results in calculation of an acceptable soil level of 162.5 ppm. In effect, this results in the unwarranted implication that soils left in place at the surface at Ruston below 230 ppm, and at Anaconda below 250 ppm, present an unreasonable risk of lethality. Yet Ecology advised EPA that it agreed that the Ruston cleanup level was adequate to protect human health. As noted in Asarco's Comments on Ecology's Review of New Science, a number of studies reveal that arsenic in soil at this level has no effect at all on urinary arsenic levels. To suggest that this concentration in soil presents an unreasonable risk of lethality is an absurd and unsubstantiated conclusion.

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8. Ecology has misinterpreted and misused the underlying studies on which its toxic effects conclusions were calculated. It had to assume body weights, with no supporting data, for example to calculate the concentration per kilogram of body weight at which toxic effects supposedly occurred; it had to assume that exposure levels were accurately measured, even though some of the data dates back more than 70 years; and it took examples of continuing exposures to arsenic over multiple days and assumed that the same toxic effects would occur from a single incident of exposure. Much of the data relied upon can only be described as anecdotal. Moreover, as explained in Dr. Schoof's Statement, it ignored more reliable modern data that contradicts its conclusions.

Additional comments on Ecology's cleanup levels at depth are presented in the Statements of Dr. Schoof, Dr. Tsuji and Dr. Rodricks attached to the Comments on Ecology's Review of New Science.

In conclusion, Ecology's remediation levels for arsenic in the 12 inch to 15 foot soil horizons, like the cleanup level selected for the top 12 inches of soil, lack any rational relationship to protecting human health. The cost of the additional excavation has not been considered relative to the incremental benefit to public health, as Ecology's regulations require. That omission is telling because the health effects avoided, in two of the exposure scenarios, are merely transient effects not culminating in permanent harm. Lethality, of course, is of significant concern. However, there is no realistic possibility that a child could consume enough soil contaminated at levels much higher than 162.5 ppm arsenic to result in death, and there is therefore no public health benefit to achieving that level compared to higher soil arsenic levels.

G. Significant Omissions in the Draft CAP and Draft EIS

The draft CAP and the draft EIS omit discussion of significant issues that Asarco has repeatedly called to Ecology's attention. This document briefly summarizes the most important of these omissions.

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1. Inconsistency with cleanup levels approved at Ruston.

Despite detailed submissions from Asarco on the Ruston smelter cleanup, the draft CAP contains no discussion or explanation of why a different cleanup level should be used at Everett than was used at the Ruston site. Indeed, the Ecology Review of "New Science" at 21 describes the Ruston site as having "conditions very similar to those at Everett." However, at the Ruston site, EPA, with Ecology's concurrence, selected a residential soil cleanup level of 230 ppm. Similarly, Ecology fails to explain why the 250 ppm cleanup level recently approved by EPA as protective of human health at the Anaconda Superfund site in Montana, is not protective at Everett. Asarco specifically requested Ecology to make this evaluation in its July 1998 submission.

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2. Cost

The draft CAP contains no substantive discussion of overall cost, and no evaluation whether the costs are substantial and disproportionate to benefits to human health. It purports to evaluate action levels below 12 inches in terms of cost, but does so only via a graph such that the basis for the decision is not comprehensible to the reader from the information provided. See Section B and Attachments H-1 and H-2.

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3. Human health risk from arsenic exposure.

The draft CAP does not identify the number of persons at risk from exposure to arsenic in soil, surface water or groundwater, nor does it include any quantitative or qualitative assessment of the cancer risk. Instead, it simply assumes that soil levels above 20 ppm create "unacceptable" risk. There is no quantitative or qualitative comparison of the risks at 20 ppm to risks at alternate cleanup levels. As a result, the draft CAP does not, and cannot, as written, provide a basis to evaluate whether the remediation will result in a net increase in human health risk. That evaluation is required under MTCA and Ecology's regulations to insure that no remedy is selected that results in such a net increase in health risk. As explained in Asarco's detailed comments on Ecology's Review of the "new science" (Section E and Statement of Dr. Beck), this draft CAP, if implemented, will increase total human health risk by a substantial margin.

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Moreover, for the 12 inch to 24 inch soil horizon, Ecology has selected a soil cleanup level that is tailored to avoid a risk of temporary nausea or diarrhea that could arise in the unlikely event that a child 10 times more susceptible than a normal child consumed large volumes of soil. The draft CAP contains no discussion as to how short-term nausea or diarrhea can be appropriate health effects on which to base selection of a cleanup level, or what the appropriate cleanup level would be if serious health effects were considered.

The cleanup level for 24 inches and deeper, set at 150 ppm arsenic, is purportedly based on an unreasonable risk of lethal effects from soil ingestion. Ecology fails to explain how it can reconcile that conclusion with its endorsement of 230 ppm at Ruston as protective for surface soils.

248 **4. Remediation Risk.**

The draft CAP fails to identify or evaluate remediation risk even though materials were supplied by Asarco on that subject in its July 1998 submission. Ecology was also warned by the Science Advisory Board when Ecology promulgated its regulations in 1990 that use of overly strict cleanup levels could lead to remediation risks that exceed the postulated risk of harm from exposure to the chemicals in soil the cleanup is designed to avoid.

249 Ecology's draft EIS does quantify transportation risk and concludes that 6.5 truck accidents are statistically expected from transporting estimated volumes of "contaminated" soil and replacing them with "clean" soils. However, Ecology's estimate is not accurate because use of its cleanup levels and compliance protocol will likely result in a substantially larger volume of soil being remediated. See Sections A and B. The draft EIS also fails to identify which of the expected accidents will likely result in fatalities, or serious injury, an expected potential consequence with large numbers of oversized trucks traveling long distances at highway speeds. As explained in Attachment H-3, Asarco, using Ecology's cleanup level, calculates that there is approximately a 1.2×10^{-1} risk, i.e., one in twelve, that transportation of the excavated and replacement soils will cause a fatal accident.

250 Most critically, the draft CAP and draft EIS fail to compare these risks to any quantified cancer risk from exposure to contaminated soils. When that comparison is performed, it reveals that this draft CAP, if implemented, will have a strongly negative net impact on human health. See Dr. Beck Statement in Section E. Only a very few children could possibly be at risk even using Ecology's assumptions, and the postulated risk is purely theoretical. In contrast, traffic accidents are predicted with considerable statistical reliability because of data collected by government agencies monitoring traffic safety. The risk of a truck-related fatality is many orders of magnitude greater than the risk of a single case of skin cancer.

251 **5. Method C Analysis.**

The draft CAP fails to evaluate whether using Method C cleanup levels would reduce the net negative impact on human health, and whether other alternate cleanup levels could further reduce the net adverse impact on human health of this cleanup. See Attachment H-3.

252 **6. Risk Assessment Guidelines.**

The draft CAP fails to evaluate whether EPA's new Risk Assessment Guidelines could be utilized to allow design of a cleanup that is both protective of human health, and consistent with current scientific knowledge about arsenic and its carcinogenicity. Instead, it simply assumes that all aspects of risk assessment are adequately addressed by its Method B formulas.

253

7. Vegetative Cover.

The draft CAP fails to consider new guidance from EPA on the effectiveness of sod covers in reducing exposure to heavy metals and what effect maintenance of a sod cover has on actual arsenic exposure. Urinary arsenic information now available from Everett indicates that the cover is a substantial barrier to ingestion of sufficient volumes of soil to affect urinary arsenic levels. ATSDR data shows that urinary arsenic levels are not elevated. Instead, the draft CAP simply postulates that because the sod cover might occasionally be breached, it should assume the same level of arsenic exposure will occur from grass-covered residential soils as from bare dirt. That assumption has no rational basis. Clearly, at a minimum, a sod cover reduces exposure, a factor that should be taken into account in setting appropriate cleanup levels in each of the soil horizons.

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Responsive Comments by Dr. Barbara D. Beck on Washington State Department of Ecology "Review of Asarco's 'New Science' Submittals Regarding Arsenic and Lead"

This document responds to the Washington State Department of Ecology's (Ecology) review of Asarco's "New Science" submission regarding arsenic and lead, particularly in the context of setting cleanup levels. I had commented earlier on the lack of scientific support for Ecology's MTCA cleanup level of 20 ppm for arsenic and 250 ppm for lead, and provided evidence that demonstrated that higher cleanup levels were scientifically supportable as well as health protective. I find nothing in the Ecology comments that changes my prior conclusions that Ecology's cleanup levels for arsenic and lead are not consistent with current scientific evidence.

Response to Comment 1: Use of a Linear No Threshold Model

Ecology refers to a linear threshold model; presumably they meant a linear no threshold model. Ecology states that the use of the linear no threshold model for arsenic is not appropriate (ignoring strong evidence of non-linearity in the arsenic dose-response relationship), using a variety of reasons that cannot survive critical examination.

First, Ecology is incorrect in stating that there is no epidemiological evidence that the cancer potency factor (CPF) for arsenic is inappropriate for use in protecting public health. As noted in my previous submission, two recently published articles (Guo and Valberg, 1998; Valberg *et al.*, 1997) provide evidence that the CPF overestimates cancer risk for arsenic as applied to drinking water studies outside the U.S. (Guo and Valberg, 1998) and in the U.S. (Valberg *et al.*, 1997).

Second, while Ecology is correct that the precise shape of the dose response curve may be difficult to describe, nonetheless the non-linearity is scientifically well supported, not only by the citations I provided earlier, but also by additional work, some of which was presented at the 1998 Society from Environmental Geochemistry and Health Conference on Arsenic in San Diego. At the San Diego conference, several additional mechanisms which are potentially involved in arsenic carcinogenicity were described. I will not discuss these mechanisms in detail, but they include the following:

- Changes in DNA methylation status (either hyper or hypo) leading to alterations in gene transcription and cell transformation;
- Enhanced transcription of growth promoting cytokines;
- Alterations in cellular redox potential, causing changes in glutathione levels, in turn modifying glutathione dependent enzymes, resulting in excess proliferation of cells
- Protein kinase mediated activation of nuclear regulatory factors, leading to altered gene expression, as associated with proliferation of cells.

The critical point is that none of the preceding mechanisms involve direct interaction of arsenic with DNA and they are all consistent with a non-linear mechanism, *e.g.*, modification of enzyme activity; this conclusion is consistent with that of EPA's expert panel on arsenic carcinogenicity in 1997 (ERG, 1997). This must be contrasted with the fact that there is no generally accepted mechanism for a linear dose response relationship for arsenic.

In addition, it should be noted that a recent study published in the New England Journal of Medicine demonstrated that arsenic injected intravenously on an outpatient basis in humans induced remission of acute promyelocytic leukemia with mild side effects (Soignet *et al*, 1998). The mechanism appeared to involve induction of cell differentiation of leukemic cells. In other words, at exposures orders of magnitude higher than those associated with exposures to soil containing arsenic at 20 ppm, arsenic can cause cancerous cells to become non-cancerous. This study provides additional evidence that the likely shape of the dose response relationship is nonlinear.

Third, EPA's new risk assessment guidelines cannot be dismissed on the ground that they have not yet been applied to arsenic. EPA has applied the guidelines to other chemicals. For example, a working group that included EPA recently applied the new cancer guidelines to a case study involving chloroform. The group concluded that the likely dose response relationship for chloroform was threshold in shape. Consideration of this dose response relationship for chloroform would cause a 60-fold increase in the MCL. (The proposed MCL has not yet been accepted pending further review by SAB). In addition, EPA's recent carcinogenicity analysis for PCBs also states that the new guidelines were used in the analysis. Thus, since the new guidelines have been used by EPA for other chemicals, Ecology should incorporate the new guidelines into its analysis.

Fourth, although responses to chemicals of course vary among human, comparisons of studies from other non U.S. populations (*e.g.* in India or in Taiwan) provide evidence that malnourishment appears to enhance responsiveness to arsenic. Individuals in the U.S., who are generally well nourished, would be likely to be less responsive to arsenic than individuals from other less developed nations. Moreover, variability in responsiveness is generally not a component of cancer risk assessment and is not incorporated into CPF's for other agents. However, variability among humans is addressed in developing toxicity criteria for threshold agents, *i.e.*, reference doses or RfD's.

Finally, it is misleading to claim the CPF for arsenic has been used at the sites listed by Ecology, without explaining that the actual cleanup levels for those sites are 230 ppm at Ruston and 250 ppm at Anaconda. The reasons for the higher cleanup levels include consideration of reduced bioavailability, acceptance of a higher target cancer risk level than the 10^{-6} value employed by Ecology, and recognition of the uncertainties in the CPF itself. It should be noted that EPA determined that a cleanup level for arsenic was not necessary at Sandy, Utah.

In conclusion, Ecology should have developed a more realistic cleanup level for arsenic by:

- Performing a margin-of-exposure analysis and comparing the calculated cleanup level with levels of arsenic associated with induction of cancer (this comparison would reveal that the 20 ppm level is orders of magnitude below levels associated with cancer)
- Selecting a less restrictive target cancer risk level
- Recognizing that arsenic in soil is the least important ingestion pathway

Response to Comment 2: Cancer Slope Factor

I have demonstrated that the arsenic slope factor is highly likely to overestimate cancer risk for the U.S. population. In response, Ecology claims that the U.S. population studies are too small for drawing conclusions and that the CPF doesn't consider other types of cancer, such as bladder cancer. However, I again refer to a recently published meta-analysis which combined data from multiple studies and provided evidence that the CPF for arsenic overestimates cancer risk for U.S. populations. A recent re-

analysis of the Taiwan data (still an ecological study but with a more refined exposure estimate) also provided evidence for a nonlinear dose response relationship for arsenic and skin cancer (Guo, 1998).

Based on mechanistic considerations a nonlinear dose response relationship for arsenic would apply not only to skin cancer, but also to bladder cancer. In fact, one of the studies discussed in Comment 1 on gene transcription involved studies in bladder cells.

Response to Comment 3: Uncertainties in the Taiwanese Study

Ecology provides no support for its claims that "adequate evidence that water intake rates were underestimated has not been presented." Ecology fails to justify its arbitrary rejection of studies published in peer reviewed journals. Again, I reiterate the evidence cited earlier, specifically the assumption of greater water intake assumed by U.S. EPA in the arsenic RfD development, as well as studies on water intake rates in hot climates under conditions of physical stress (Slayton *et al.*, 1996).

With respect to the demonstrated flaws in the use of the Taiwan data to calculate cancer risks in the U.S., Ecology reasons that "there is no way to know today whether the classifications [*i.e.*, the Taiwan exposure groupings] were correct or incorrect, and what effect any possible misclassifications actually had on the results" (Ecology, 1999). This comment does more to undermine confidence in exposure estimation from the original study than to support Ecology's arguments. If there is no way to know whether classifications are correct or incorrect, then on what basis does Ecology find reason to use the resulting numerical cancer slope factor?

Ecology states that the accuracy of reanalyses and new interpretations of the Tseng study is unknowable because original data are no longer available. This argument is used to refute, consecutively, claims regarding (i) the use of group exposure estimates, (ii) the choice of groupings, (iii) the accuracy of the exposure estimates, and (iv) the validity of retrospective analyses of arsenic concentrations and well usage. Yet Ecology insists the original study allows it to directly select cleanup goals.

It seems that Ecology is arguing that because data from the original study are no longer available, conclusions from the study cannot be updated. This reasoning is flawed. Scientific conclusions are generally distinguished from non-scientific ones by their falsifiability or verifiability. Thus, if

conclusions from the original study cannot be falsified or verified, they cannot properly be considered "scientific". Ecology's claim contradicts its own position.

Furthermore, as indicated by Guo *et al.* (1998) and Brown *et al.* (1997), the villages classified in the low exposure group contained some wells with higher arsenic concentrations. For example, arsenic well concentrations in villages assigned to the lowest exposure category (0 to 300 ppb average) had reported concentrations ranging as high as 770 ppb (Table 1, Brown). Thus it is likely that individuals in the "low exposure group" could in fact have had exposures well above the 170 ppb level used by EPA to represent that group for purposes of calculating the CPF. It is also reasonable to postulate that these individuals exposed to higher levels had a higher likelihood of contracting skin cancer.

Ecology acknowledges that all epidemiological studies involve some degree of uncertainty regarding dose. It follows this with a claim that "it cannot be determined whether the uncertainty has...resulted in the conclusions underestimating or overestimating the actual effect..." This conclusion runs counter to basic epidemiological principles. Much is known about epidemiological methods and the likely direction of the biases that may be introduced. For example, poor grouping (misclassification) for exposure and malnutrition (effect modification) tend to affect epidemiological results in a single direction and, when detected in a study, should be accounted for or acknowledged in the results.

As noted in my earlier statement, several of these phenomena (*e.g.*, confounding of the magnitude of response by nutritional factors or misclassification of some highly exposed individuals into the low exposure group) are likely to result in a CPF for arsenic that is too high, particularly as applied to the U.S. population.

Ecology claims that results of many studies support the results of the Taiwan study which U.S. EPA used to develop cancer and non-cancer potency estimates. It provides a table comparing doses determined in these studies to cause adverse health effects. In particular, Ecology cites the Mazumder study of a Bengali population exposed to arsenic in drinking water (Mazumder, 1998) in support of these similarities.

Mazumder *et al.* (1998) conducted a cross-sectional survey to investigate arsenic-associated skin lesions and arsenic water levels in West Bengal. 7683 participants were examined and interviewed and their

arsenic drinking water levels were measured. Ecology ignores the fact that the authors themselves concluded that the finding of skin lesions associated with low arsenic exposure was surprising and needed to be studied further, using more detailed exposure assessment. The authors call for further research concerning susceptibility factors which might be present in the study population. They also report evidence that risks were somewhat greater for those who might have been malnourished.

U.S. EPA also acknowledges poor nutritional status, as well as genetic susceptibility, and exposure from non-water sources as factors that limit the studies usefulness for dose-response estimation. U.S. EPA notes that "there is concern of the applicability of extrapolating data from the Taiwanese to the U.S. population because of different background rates of cancer, possibly genetically determined, and differences in diet other than arsenic (*e.g.*, low protein and fat and high carbohydrate)" (US EPA, 1999). Thus the Mazumder study provides additional support for the role of malnutrition as a factor that enhances the toxicity of arsenic.

A recent study by Zakharyan and Aposhian (1999) shows that arsenic can be methylated nonenzymatically by methylvitamin B_{12} and glutathione. This finding provides a possible mechanistic explanation of the role of malnourishment as an enhancer of susceptibility to arsenic - *i.e.*, detoxification may be reduced in individuals deficient in Vitamin B_{12}.

Ecology mentions the Hopenhayn-Rich (1996) study in Argentina in which an elevated bladder cancer risk was associated with arsenic in drinking water. This example doesn't negate the potential importance of diet as an enhancer of arsenic toxicity. Because this was an ecological study, it cannot be used to draw conclusions regarding arsenic dose-response relationships, or the lowest dose at which cancer may be induced.

Overall, Ecology's response to this issue consists of many unsubstantiated claims. Very few data, presentation of alternative studies, or supported reasoning accompany Ecology's attempt to justify confirmed reliance on discredited exposure assumptions from the Taiwan study. For example, Ecology concludes in the final paragraph to this Comment that there is only weak evidence that uncertainties result in overestimation of arsenic toxicity. It provides no further explanation. Similarly Ecology states that "(u)ncertainties cut both ways, and it is also possible that the uncertainties may result in

underestimation of risk." However, no evidence or examples have been provided to support the assertion that arsenic risk may be underestimated and I am aware of no such credible evidence.

Response to Comment 4: Application of Taiwan Study to the U.S. Population

Regarding arsenic in food, Ecology claims that modern food samples from Taiwan demonstrating high levels of arsenic cannot be shown to be representative of the diet of the 40,000 Taiwanese in the Tseng study. It offers no evidence why this might be so. It also claims that inorganic arsenic in food is not clearly active biologically or toxicologically. Again, Ecology provides no evidence to support this claim. In fact, it is likely that inorganic arsenic in food would be more bioavailable than inorganic arsenic in the soil matrix. Ecology fails to consider that the inorganic arsenic in food adds to the uncertainty in the risk assessment. As shown by Brown and Abernathy, underestimates in the food contribution can result in an overestimate of the CPF.

Response to Comment 5: Soil Ingestion Rate

Ecology summarizes the soil ingestion rate comments, noting three key points. Yet it only addresses one of these points. Ecology defends the use of this ingestion rate for the full year, claiming that Everett winters are characterized by rain and rarely snow or frozen ground. Ecology ignores that the Calabrese studies (and others) were conducted in late summer or early spring when the potential for soil ingestion is greatest. Therefore, these studies may overestimate average soil ingestion rate over the course of a year. Moreover Ecology does not address the remaining two arguments at all: (i) the failure to consider site and chemical-species differences in bioavailability and (ii) the lower fraction of metals concentration in dust *vs.* soil.

Ecology also ignores the effect of ground cover in reducing soil exposure. Ecology simply states that "there is nothing site-specific that would support another soil ingestion rate for the Everett Asarco site." Several studies explicitly address the impact of ground cover on soil exposure. Wohl *et al.* (1996) reported that the presence of ground cover was associated with approximately a 25% reduction in blood lead levels. Jenkins *et al.* (1988) concludes that contaminated soil which is covered by sufficient grass appears to be stabilized and less influential on blood. U.S. EPA (1998) provides further support by suggesting that grass cover is an effective intervention to reduce exposure to contaminated soil.

Response to Comment 6: Arsenic Bioavailability

Ecology criticizes the published evidence of reduced bioavailability of arsenic in soils by stating that site-specific data are not available and that no accurate human bioavailability measure exists. However the 100% bioavailability figure they select is lacking any scientific evidence; it is also implausible.

Ecology suggests that the 78% bioavailability factor developed for the Ruston smelter is relevant to Everett because conditions there are similar. This is not true in the case of bioavailability. The Ruston smelter operated until the 1980s. Bioavailability studies at Ruston therefore examined soil which had been contaminated more recently than at the Everett site, which closed in 1912. Such studies on fresh soil, which contains fine dust particulates from recent releases, are likely to yield higher bioavailability estimates due to small particle size than studies from aged soil. Additionally, arsenic becomes more tightly bound to soil over time, and is less easily released as time passes. Davis and others have shown that arsenic tends to be transformed into more stable forms in the environment, further inhibiting availability. Therefore arsenic bioavailability from soil at Everett is likely to be lower than at Ruston. Ecology's claim that arsenic in soil is more bioavailable than arsenic in food, water, or even pure arsenic compounds is contrary to any legitimate scientific inference.

Response to Comment 7: Arsenic in Food and Water

Ecology questions whether inorganic arsenic in food is biologically or toxicologically active. It cites Delnomdedieu *et al.* (1994) in arguing that arsenic is bound to glutathione and proteins and not released until pH is lowered to 1.5 or 1. Since stomach pH during meals is about 3 or 4, they claim that arsenic is never released and therefore is not harmful.

In fact, the Delnomdedieu *et al.* (1994) study was *in vitro*, and did not attempt to make these tests under conditions found in the gut. They report that the glutathione-arsenite complex is stable over the pH range of 1.5 to 7.0-7.5. The complex is dissociated at higher pH. Blood pH is given as 7.4 and the authors discuss the possibility of complex dissociation at supraphysiological pH (*i.e.*, pH > 7.5). The authors do not discuss the behavior of this complex in the stomach or small intestine, whether it is even found in the stomach or small intestine, nor do they discuss the fate of the complex at pH below 1.5. The authors do

not mention anything about pH of 1, as described by Ecology. There is little that can be concluded from this study about the behavior of arsenic in the gut or small intestine.

Response to Comment 8: Alternative for Calculating a Cleanup Level

Ecology criticizes using urinary arsenic as a measure of exposure to arsenic soil. However it relies on a study by Cohen *et al.* (1998) that contradicts their claim regarding the utility of urine arsenic measurement.

While the Cohen *et al.* (1998) study used an 85% bioavailability estimate for food arsenic (which Ecology cites), a much lower value (40%) was used for bioavailability from soil and dust (which Ecology does not cite). The most prominent conclusion of this study was that, even at approximately 200 ppm concentration in soil, food and water were more important contributors to urine arsenic than soil and dust. This study, showing only a modest impact of soil, is consistent with others which show virtually no impact of arsenic from soil on urine until soil concentrations exceed 200 to 800 ppm (see Response to Comment 10).

Response to Comment 9: Communities with Elevated Arsenic Concentrations

Ecology claims that "it is questionable to conclude that arsenic is not causing adverse health effects in a population if the full range of potential effects has not been evaluated." This assertion is at odds with the approach adopted by U.S. EPA in the development of toxicity values. By developing toxicity values for the most sensitive endpoint, U.S. EPA is by definition protecting against effects that occur at higher doses. This addresses the need to consider the full range of health effects. There is general agreement in the literature on environmental arsenic toxicity (Mazumder, Tseng, U.S. EPA, and others) that skin effects are the most sensitive endpoint for oral arsenic exposure. Therefore, by developing an RfD accordingly, the full range of potential effects has been considered.

Further, Ecology claims that "arsenic likely causes subtle subclinical effects prior to the appearance of overt symptoms, and until these effects are identified and quantified, it will be difficult to have confidence in the use [of] epidemiological studies...." Essentially, Ecology is arguing that because it can't be proven that adverse effects are not happening, we must assume that they are, in fact, occurring.

This argument rests on claims that arsenic "likely causes" effects which have not yet been identified and quantified. Ecology offers no positive evidence that these potential health effects are, in fact, present. An argument in this form could be used to justify response to a threat of nearly anything—a risk policy based on such reasoning has no scientific basis and contradicts what we do know about arsenic.

Response to Comment 10: Children and Urinary Arsenic

Ecology recognizes that urinary arsenic is the best biomarker for arsenic exposures. However it inconsistently endorses urine arsenic measures for use following remediation, but resists the use of these measures in risk assessment prior to remediation. In its conclusion, Ecology declares that "urinary arsenic measurements can provide useful information and are justifiably proposed as a component of the Community Protection Measures program" yet in the next sentence claim that "there are significant concerns regarding [these measurements] as a basis for deriving a soil cleanup standard...." Ecology provides no reasoning or sources to explain or support such a contradictory policy.

Ecology disputes the use of urinary arsenic data for individual person-day measurements because of the variability in day to day measurements of urinary arsenic. It declares that the possibility of imprecision and misalignment should be considered, yet it does not acknowledge that this variability is addressed through studies of large populations or through longitudinal studies.

As cited in my earlier declaration and my response to Comment 8, several studies are consistent with the conclusion that arsenic soil concentrations below 200 ppm result in very little, if any, effect on urine arsenic. These studies address the variability issue either through large sample size or longitudinal methods.

For example, Beck *et al.* studied the impact of soil and dust arsenic in a gold mining / milling town using a longitudinal study design. They found that exposure to soil containing high concentrations of arsenic did not contribute significantly to total variability in urinary arsenic levels, when factors including season, age, and day of week were considered. In addition, Bornschein (1994) conducted a longitudinal study at the Anaconda site which also showed limited impact of soil arsenic on urinary arsenic concentrations. Studies like these demonstrate that variability in arsenic can be addressed by increasing sample size or analyzing longitudinally and can yield reliable results.

Valberg *et al.* (1997) noted that reducing of arsenic concentrations in soil is likely to have only a small impact on health risks because soil arsenic makes only a minor contribution to the total body burden of arsenic. The authors note two studies in which elevated urinary arsenic levels are associated with quite high arsenic soil concentrations and three studies in which they report a weak relationship, if any, between soil arsenic levels and total urinary arsenic levels.

Response to Comment 11: Essential Nutrient

Ecology declares that "(e)ven if it were proven that arsenic is required for good health in humans, that finding wouldn't preclude it from having toxic action at essential doses or just above such doses."

This statement contradicts the definition of "essential." Nielsen (1998) discusses the current knowledge concerning arsenic as an ultratrace element in nutrition. Ultratrace elements are generally defined as those with an established, estimated, or suspected requirement generally on the order of micrograms per day for humans. Nielsen notes the large body of evidence for arsenic deprivation in a variety of animal species "quite convincingly" indicates that arsenic is an essential trace element for higher animals, including humans. A possible human arsenic requirement of 12 to 25 micrograms per day is cited. The report notes that arsenic may be important to human health because it has been found that injuries of the central nervous system, vascular diseases, and cancer are correlated to decreased arsenic concentrations in serum. Nielsen properly concludes that "because arsenic most likely is an essential nutrient, the belief that any form or amount of arsenic is unnecessary, toxic, or carcinogenic is unrealistic, if not potentially harmful." No evidence supports Ecology's speculation that arsenic may be beneficial and harmful at the same dose.

Response to Comment 12: Risk of Remediation

In its response, Ecology downplays remediation risks, yet in the draft Environmental Impact Statement it acknowledges that there will be risks during remediation and construction (Ecology, 1999, EIS). Ecology even calculates potential risks during construction. It is important to note that remediation and construction projects present actual risks based on actual historical data. In contrast, arsenic risk estimates are based on estimates of hypothetical scenarios. In terms of life years affected, Gilbert *et al.*

(1998) note that, with respect to occupational injuries, younger workers are often the victims of fatal injuries and as such contribute more years of potential life lost than for most other causes of death, specifically cancer. A similar conclusion was reached by Cohen *et al.* (1996). Thus remediation and construction risks can be considered to be equally significant or more so than hypothetical cancer risks from arsenic. Assuming 1425 worker-days involved in the Everett remediation (calculated by Asarco's consultants), a fatality risk to workers of 1.7×10^{-3} can be calculated - a risk level much higher than the hypothetical 10^{-6} cancer risk level targeted by Ecology due to soil arsenic.

Ecology also fails to address the full scope of risks than can be created by remediation activities. These include fatalities, not just the 6.5 trucking accidents described by Ecology, as a consequence of trucking accidents. Using information provided by Ecology in the draft Cleanup Action Plan on truck loads of dirt and truck miles driven and information of fatality risk per truck miles provided by Ecology in the Environmental Impact Statement for Ecology's MTCA regulations, I calculated a fatality risk of 10^{-1}, a value well above the hypothetical 10^{-6} cancer risk target. More recent data from the U.S. Department of Transportation (as reported in USA Today) indicate a fatality risk of 2.4 per 100,000,000 miles. This translates into a 50% increase in risk as compared to the number used by Ecology in the EIS for the MTCA regulations. This is equivalent to a 15% actuarial risk of a trucking fatality due to the remediation.

In addition, potential hazards can be created to young children residing in the area of remediation. This is a particular concern, since the remedy will take place on residential properties.

Ecology also claims that "(n)umerous examples of cleanup actions involving transportation of contaminated materials can be found for which there were no injuries or fatalities, *a priori* risk estimates notwithstanding." No studies are cited to support this statement. Moreover, this anecdotal evidence cannot be used to refute the well-established actuarial risks associated with traffic and construction activities. There is no justification to be less rigorous about remediation and transport risk due to the cleanup than about the health risks that the cleanup aims to reduce.

Response to Comment 16: Site-Specific Exposure Differences

Ecology responds to the comment that the MTCA Method B approach fails to consider site-specific conditions using several reasons: as a matter of policy, the use of generic assumptions speeds up the cleanup process; due to uncertainty, Ecology has made numerous decisions regarding risk on policy; and the current MTCA allows flexibility in allowing site and chemical-specific exposure differences to be considered.

Again, it is axiomatic that sound risk management decisions must be based on sound science. In the case of arsenic in soil, many studies are available to support the likely overestimate of the arsenic CPF as applied to the U.S. population, as well as to support the overestimates of calculation of exposures from arsenic in soil. While the use of generic assumptions in the absence of data may be supportable, the use of generic assumptions in the presence of data, merely to speed up the process, does not make for good scientific policy, particularly as here, where the assumptions contradict the weight of the evidence. In the case of the MTCA soil arsenic cleanup level, this line of reasoning has resulted in a cleanup level which will yield minimal, if any, incremental public health benefit as compared to a less restrictive level. Moreover, as noted earlier, the selection of this overly conservative level will, as a consequences of risks created during the remedial process, result in a net increase in human health risks.

Response to Comment 17: One in One Million Cancer Risk: The 10^{-6} Cancer Risk Level is Inappropriate

Ecology responds to this comment by stating that the selection of the risk level is a policy matter and refers to the Washington Department of Ecology statement that "Each person has a fundamental and inalienable right to a healthful environment...".

Again, I emphasize how small the calculated risks are and, how much smaller the risks would be, had Ecology used more plausible assumptions in its analysis. Consider for example, how an incremental cancer risk of 10^{-6} (even assuming for sake of argument that Ecology's assumptions are valid) would compare to total lifetime cancer risk; a lifetime risk of 0.25 would increase to a lifetime risk of only 0.250001. This incremental risk is extraordinarily small and not detectable especially with a population the size of Everett. As discussed earlier, the exposures and associated risks from inorganic arsenic at the

MTCA level of 20 ppm are dwarfed by the total exposure to inorganic arsenic in food. Ecology's use of an inflexible 10^{-6} risk target coupled with the outmoded cancer potency factor results in the irrational conclusion that typical naturally occurring levels of arsenic in the environment present an unacceptable risk. Finally the magnitude of the risks associated with such low levels of inorganic arsenic in soil (which are hypothetical) must be balanced by the magnitude of risks created by the remediation process (which are actuarial and based on empirical data regarding injuries and fatalities). These considerations demonstrate that the use of an inflexible target risk criterion yields decisions with adverse public health consequences.

Response to Comment 20: Grass as an Effective Cover

Regarding the effect of grass in reducing soil arsenic exposure, Ecology claims that (i) no evidence has been provided to support the claim that a grass cover minimizes exposure, (ii) the relevant question concerns the degree to which a grass cover would reduce exposure, and (iii) that grass cover alone does not reduce RME soil contact, (iv) that it does not provide long-term protectiveness, and (v) that its effectiveness is not proportional to the fraction of area covered.

As discussed in the Response to Comment 5, several sources indicate that grass cover mitigates exposure to contaminants in soil. In Wohl *et al.* (1996) reported that the presence of ground cover was associated with approximately a 25% reduction in blood lead levels. Jenkins *et al.* (1988) concludes that contaminated soil which is covered by sufficient grass appears to be stabilized and less influential on blood.

U.S. EPA, regarding possible interventions to reduce the accessibility of soil, "recommends that low cost measures, which may be sufficient to reduce exposure, be implemented. These measures include but are not limited to covering bare soil..." (US EPA, 1998).

Ecology addresses TSCA standards for bare soil by noting quoting U.S. EPA: "Although Title IV of TSCA restricts the standard for soil lead hazards to bare soil, EPA is concerned that the presence of soil cover, such as grass, may not reduce exposure to lead sufficiently. Consequently, it may be prudent to test covered soil to determine whether a soil-lead hazard exists." This statement does not claim that grass cover is not effective; it simply asserts that it may not be sufficient. Considered with the U.S. EPA

statement in the previous paragraph, it is clear that grass cover is acknowledged by the Agency to reduce exposure to contaminated soil. Ecology's conclusion, that grass cover is irrelevant to both exposure assumptions and remediation alternatives is without scientific basis.

Barbara D. Beck

Barbara D. Beck, Ph.D., DABT

Feb. 24, 1999

Date

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Statement of Joseph V. Rodricks, Ph.D.[1]

1. I am submitting this statement as a supplement to my earlier declaration, submitted in July, 1998. The purpose of this statement is to respond to the review by the Washington State Department of Ecology (Ecology) of information I and others submitted on behalf of Asarco regarding new science relevant to the establishment of appropriate soil cleanup goals for arsenic and lead at Asarco's Everett, Washington, site. In its comments, Ecology addresses several of the issues I raised in my original declaration, and I respond here to the most critical of these issues.

2. Ecology has remained wedded to outdated procedures for assessing potential cancer risks from arsenic, and is ignoring the information presented by myself and others that demonstrates that Ecology's proposed cleanup values for arsenic are inconsistent with current scientific knowledge and are otherwise inappropriate. Throughout its review Ecology invokes "policy" to compensate for scientific uncertainties, and then makes policy choices that support the outcome it desires. This approach is contrary to the principles of risk assessment, as they have been elaborated by two expert committees of the National Academy of Sciences (NAS) (I was a member of both committees) and by the U.S. Environmental Protection Agency (EPA). There are uncertainties in the conduct of risk assessment that need to be accommodated, but the type of "science policy" choices (the term used by the NAS) to be used to deal with uncertainty should not be chosen arbitrarily, and they should never be chosen in a way that is clearly inconsistent with available scientific knowledge. In its review of the information that I submitted on behalf of Asarco, Ecology has used "policy" arguments to counter many of the scientific issues I have raised, and has adopted policies that are inconsistent with current scientific understanding.

3. In my original declaration, I pointed out that since EPA originally prepared its cancer potency estimate of ingested arsenic in 1988, the value derived has been the subject of intense scrutiny. In particular, the data from an ecological epidemiology study in Taiwan that was used to generate the slope factor are subject to severe limitations and uncertainties, even more than is normally the case with epidemiological studies used by EPA to derive slope factors (potencies) for other chemicals. Indeed, as Dr. Kenneth Brown has pointed out in his declaration and published article, the deficiencies in the study rise to a level that, while the study may be adequate to confirm a causative link between high-level exposure to arsenic ingestion and skin cancer development, there is insufficient knowledge of the actual arsenic ingestion levels of the study participants and of potential confounding factors to permit valid determination of a cancer slope factor from the study that would be applicable to the current situation in Everett.

4. Considerable investigation by independent expert bodies is currently underway regarding the cancer potency of ingested arsenic. EPA is currently re-evaluating the situation, and a committee of the National Academy of Sciences is also performing a study of the carcinogenicity

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of ingested arsenic. In the meantime, as pointed out in my original declaration, there is abundant evidence that the slope factor derived by EPA for ingested arsenic, used by Ecology in its Method B formula, is not valid because it significantly overestimates risk. Not only are the epidemiologic data upon which it is based seriously flawed and inconsistent with the results of epidemiologic studies conducted in the U.S., but its derivation relies on a biological assumption (that arsenic has an entirely linear dose response relationship with no threshold) that is inconsistent with available data. As indicated in my original declaration, the members of EPA's own *Expert Panel on Arsenic Carcinogenicity* concluded that although they could not agree on a single mode of action of arsenic, all of the possible modes of action that seemed plausible would be expected to show either a threshold, or would be associated with a non-linear dose-response curve (USEPA 1997). The 1988 EPA slope factor used by Ecology is not consistent with either of these conclusions.

5. Ecology argues that the uncertainty in the slope factor could point in either direction, so that the slope factor might actually be higher than the EPA-derived value, but no epidemiological or biological evidence supports this conclusion. Such a suggestion is entirely inconsistent with the available US epidemiologic data, with the general absence of an epidemic of arsenic-associated skin cancer in the general US population[2], and with all of the available information on the likely mechanism of action of arsenic. The weight of all available evidence points in the same direction – that the 1988 EPA slope factor overestimates risk from low level arsenic exposure, not the reverse as suggested by Ecology.

6. Ecology suggests that the dose estimates used by EPA for the Taiwan data must be correct because minimally effective dose estimates from various other studies fall in a similar range. However, it is not clear if all of the dose estimates cited are accurate since they are subject to many of the same uncertainties regarding arsenic concentration in drinking water, water consumption, and intake of arsenic from other sources as are the data from Taiwan. Nor is it clear if the effects seen at these dose levels are skin cancer or just non-neoplastic skin lesions since some studies did not have confirmation of the diagnosis by a pathologist. More importantly, even if the dose estimates are all consistent, the high-dose data provide no information about the dose-response relationship at the low dose levels relevant in the present situation. The reported similarity of effect levels indicates that all studies show a similar threshold for toxic effects, and that no adverse effects occur at lower exposure levels in the range at issue here, i.e., they all identify a similar threshold dose.

7. Because of the major uncertainties in the quantitative dose-response data that form the

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[2] As pointed out in my original declaration, one would expect about 1,500 cases per year of arsenic-associated skin cancer just from the naturally occurring background level of arsenic in food and water in the US if EPA's estimates of intake of inorganic arsenic from food and water and slope factor were accurate. No such epidemic of arsenic-associated skin cancer in the US has been reported. Arsenic-associated skin cancer also shows a characteristic pattern of associated lesions, and there is no evidence that such characteristic signs of chronic arsenic toxicity are present in U.S. populations.

basis for the 1988 EPA potency estimate, the ongoing re-evaluation of the carcinogenicity of low doses of ingested arsenic, and the available mechanistic evidence that strongly suggest that the model EPA used to derive its slope factor is invalid, it is contrary to sound risk assessment practice to use this information as a basis for deriving a soil arsenic cleanup goal.

8. Because of this, I proposed in my original declaration an approach to considering the implications of alternative cleanup goals for total arsenic exposure and potential risk. In that procedure I estimated the total potential intakes of arsenic from soil containing 20 ppm or 100 ppm arsenic over a six-year period (the period identified under Ecology's own regulations), and compared then with the total inorganic arsenic received over a lifetime from the natural background level of arsenic in food and water.

9. In these calculations I used estimates of average dietary intake of arsenic from several sources, as summarized by Valberg et al. (1997), together with estimates of intake from water based on average arsenic concentration for Washington (2 ppb), assuming 90% absorption Valberg et al. 1997). High-end soil intake is based on a 40% arsenic absorption value, and a soil ingestion rate of 200 mg/day. Low-end soil intake is based on a 20% arsenic absorption, based on published data in animals, described above, and USEPA's current default soil ingestion rate for children of 100 mg/day.

10. If soils at Everett are cleaned up to 20 ppm, and exposure to affected soil is for 6 years, then individuals will incur total lifetime intakes of arsenic of:

food:	281,000 - 358,000	μg arsenic (μg = micrograms)
water:	92,000	μg arsenic
soil:	876 - 3,504	μg arsenic
total lifetime intake:	373,876 - 453,504	μg arsenic

11. If soils at Everett are cleaned up to 100 ppm, and exposure to affected soil is for 6 years, then individuals will incur total lifetime intakes of arsenic of:

food:	281,000 - 358,000	μg arsenic
water:	92,000	μg arsenic
soil:	4,380 - 17,520	μg arsenic
total lifetime intake:	377,380 - 467,520	μg arsenic

12. Judging by their comments, Ecology apparently misunderstood the purpose of this approach, which was to show that the increment of arsenic exposure, which Ecology claims would be unacceptable if the soil concentration exceeded 20 ppm, would in fact be very small compared to that from the natural background of food and water, as would the intake from soils at 100 ppm arsenic. The increment from soil at either 20 ppm or 100 ppm would, in fact, be lost in the "noise" of the normal variability in the intake of inorganic arsenic from food and water. If Ecology believes that arsenic from soil at above 20 ppm, under any reasonable condition of exposure, would present an unacceptable health risk, it must also logically believe that the entire food and water supply of the US presents a very large risk (compare arsenic intakes, above).

Clearly, arsenic intakes from food and water do not pose significant cancer risks.

13. Ecology argues that the bioavailability of inorganic arsenic from soil is 100%, despite the fact that it had previously assumed a 40% value for bioavailability of soil arsenic, and published data clearly point to a much lower bioavailability. As discussed in my original declaration, a value of about 20% is more appropriate. This is consistent with the finding that children living in the neighborhood of arsenic-contaminated sites with soil arsenic levels of 100 ppm or more do not show any elevation of urinary arsenic concentration. Since urinary arsenic is considered to be a reliable measure of arsenic exposure, as Ecology recognizes, this strongly suggests that contact with such soils does not add measurably to the normal background of arsenic exposure.

14. Ecology also reaches the contradictory conclusion that the bioavailability of inorganic arsenic from food is less than 100%, citing data showing that inorganic arsenic binds to sulfur-containing compounds, such as glutathione, rendering it "biologically inactive." The study cited by Ecology to support this conclusion relates to a highly artificial situation in which arsenic is added to a solution of glutathione in a test tube, and does not directly address the bioavailability of inorganic arsenic in food. Further, since arsenic from soil would also encounter such sulfur-containing compounds in the process of digestion, absorption, and transport in the blood, it is just as appropriate to suggest that arsenic in soil is also "biologically inactive." Indeed, at low concentrations, in the range of consideration here, soil arsenic is probably also biologically inactive, and only when there is massive exposure to soluble arsenic (as occurred in Taiwan) that overwhelms available tissue binding sites, does the ingested arsenic present a significant health risk. Certainly there is no evidence of any increase in arsenic-associated skin cancer in populations living in areas with elevated soil arsenic (Wong et al. 1992).

15. Based on all of the available evidence, it is my conclusion that there is no scientific basis for requiring a cleanup goal for arsenic in soil at the Everett site as low as 20 ppm as Ecology has proposed, and there is no discernible arsenic intake difference, relative to total arsenic intakes, in individuals exposed to soils at 20 ppm and 100 ppm.

16. I have reviewed two documents used by the State regarding arsenic clean-up levels in subsurface soils. These are the January 26, 1999, Decision Memorandum from Craig R. McCormack to Tim Nord, and the Washington State Department of Health (DOH) document entitled "Hazards of Short-Term Exposure to Arsenic-Contaminated Soil," dated January, 1999. These documents purport to show that short-term ingestion of large amounts of soil might cause immediate health effects, ranging from nausea, diarrhea, and abdominal cramps to lethality. The risk assessments used to support the soil levels considered to be acutely toxic are not supported by the available evidence.

17. The DOH examines various "scenarios" involving consumption of very high levels of soils by children (ranging from 1750 mg/day to 20,000 mg/day) and adults (up to 2,000 mg/day). Although it is remotely conceivable that a child might ingest 1750 mg soil on a single day, this level of consumption is not likely to be repeated on many occasions. A 20,000 mg ingestion rate is almost impossible to imagine and is 100 times greater than the 95th percentile rate used by the State and by EPA for daily incidental soil intakes. (A single intake of 20,000 mg of soil

containing natural levels of arsenic and many other substances would, by the State's calculation, also be toxic). The toxicity values used by the State for the risk assessments do not reflect the effects of a single day's intake, but rather intakes extended over many days or even a few weeks. Soil ingestion rates at the very high levels proposed by the DOH are not likely to continue under any reasonable scenario for many continuous days. Adult intake of 2,000 mg is likely to occur only if soil is deliberately consumed. Further, the DOH has assumed that 100% of the arsenic in soils is bioavailable, or has used the equally implausible assumption that arsenic in soil is as bioavailable as arsenic in water or soy sauce (the media in which the arsenic was present for purposes of documenting toxic doses.) The use of an additional 10-fold safety factor to protect against nausea and stomach aches seems excessively cautious. The risk assessments used by DOH exaggerate the potential for short-term effects for arsenic in soils, by unknown but probably large amounts.

18. With respect to acute toxicity, the DOH suggests soil cleanups at depths of 24 inches need to reach 150 ppm to protect against severe toxic effects of arsenic, including lethality. The EPA-promulgated arsenic clean-up for surface soils at Ruston, supported by Ecology, was 230 ppm. The EPA-promulgated clean-up for surface soils at the Anaconda site in Montana was 250 ppm. These are both higher than the 150 ppm proposed by DOH for subsurface soils as necessary to protect against acute and serious toxicity.

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JOSEPH V. RODRICKS February 23, 1999

Comments of Rosalind A. Schoof, Ph.D., DABT, on Documents Submitted to Asarco by Washington State Department of Ecology, January 1999

This document provides my responses and additional comments on the Washington State Department of Ecology's (Ecology) *Review of Asarco's "New Science" Submittals Regarding Arsenic and Lead* (Ecology 1999b) and *Everett, Arsenic Concentrations at Depth in Consideration of Acute Toxicities* (Ecology 1999a), and the Washington State Department of Health's (DOH) *Hazards of Short-Term Exposure to Arsenic-Contaminated Soil* (DOH 1999). In addition, I have attached a bibliography of 1998 and 1999 references reporting new scientific developments related to arsenic toxicity and exposures that we have obtained since the preparation of the bibliography that was attached to my July 1998 declaration on these issues. It does not appear that Ecology has addressed these new scientific developments in their documents.

Response to *Review of Asarco's "New Science" Submittals Regarding Arsenic and Lead*

In January 1999, Ecology provided to Asarco a review of a July 13, 1998, submittal by Asarco that was accompanied by sworn declarations from six outside experts, including myself. Asarco's submittal and Ecology's review address recent scientific developments regarding arsenic and lead. Ecology's review addresses 20 issues that were identified by Ecology in the Asarco submittal (Ecology 1999b). In this response, I provide responses to 8 of the 20 issues, including issues 1, 3, 4, 6, 7, 10, 11, and 17. It should be noted that the quote at the beginning of Ecology's issue 9 appears to be erroneously attributed to me. The quote does not correspond with my declaration, and consequently I have not responded to it.

Issue 1, Use of a Linear No Threshold Model

Ecology asserts that available data on the carcinogenic mechanism of action of arsenic are inadequate to support replacing the U.S. Environmental Protection Agency's (EPA's) linear quadratic dose-response model. Ecology, quoting from a 1988 EPA assessment of uncertainties regarding the mechanism, says ". . . a more complete understanding of these biological data in relation to carcinogenesis is needed before they can be factored with confidence into the risk assessment process." Ecology then cites EPA's May 1997 *Expert Panel Report on Arsenic Carcinogenicity* as concluding that the different theories of the mechanism by which arsenic causes cancer are all highly speculative and unproven. However, Ecology ignores the fact that EPA's expert panel reached a consensus that arsenic does act by a mechanism that will yield a nonlinear dose-response since all of the identified mechanisms are themselves nonlinear.

Since the time of the expert panel report, a virtual avalanche of papers has appeared in the peer-reviewed literature that support and further define the nonlinear mechanism by which arsenic acts. Clewell et al. (1999) review the literature through 1997, and propose that the evidence supports a co-carcinogenic mechanism of action for arsenic at a late stage in a pre-existing carcinogenic process. Specifically, they propose that arsenic inhibits DNA repair, leading to enhanced mutation and genomic instability in cells that already carry mutations. In mutated cells with an impaired G1-S phase checkpoint function in the cell cycle (i.e., the transition to DNA synthesis that precedes cell division), this action would accelerate the conversion of premalignant lesions to more aggressive tumors. Since this effect occurs on pre-existing mutated cells, the response is clearly nonlinear. During 1998 many papers have appeared that explore aspects of this issue (Doza et al. 1998; Chang et al. 1998; Hayashi et al. 1998; Ochi et al. 1998; Ludwig et al. 1998; Chen, W. et al. 1998). In addition, the recent reports of the antileukemogenic actions of arsenic have stimulated a great deal of research on inhibition of cancer by arsenic (Soignet et al. 1998, Zhang et al. 1998, Akao et al. 1998, Gallagher 1998, Ishitsuka et al. 1998, Wang et al. 1998, Gianni et al. 1998, Chen et al. 1998, Look 1998, Shao et al. 1998, Lo Coco et al. 1998, Ma et al. 1998). Interestingly, these studies suggest a mechanism of action consistent with the carcinogenic mode of action. Specifically, arsenic has been found to promote apoptosis, or programmed cell death, of highly aggressive cancer cells at the same G1-S phase transition in the cell cycle. In these cells, the existing mutations may be severe enough that inhibition of DNA repair results in cells that are not viable, with the associated stimulation of apoptosis.

Even more exciting is the consistency in effective doses for the antileukemogenic action of arsenic with doses clearly associated with cancer. Soignet et al. (1998) report complete remission of acute promyelocytic leukemia after intravenous administration of 0.06 to 0.2 mg arsenic trioxide/kg body weight for 12 to 39 days. This is equivalent to a dose range of 0.04 to 0.14 mg arsenic/kg body weight. Clewell et al. (1999) state that drinking water concentrations clearly associated with tumors in Taiwan are above 0.6 mg/L. Depending on amounts of water ingested per day, this concentration will be associated with doses in the range of 0.02 to 0.05 mg arsenic/kg body weight. Mechanistic studies of the antileukemogenic actions of arsenic indicate a biphasic reaction *in vitro*, with an inhibitory effect on cell survival or proliferation only at concentrations similar to the effective plasma concentrations in patients (Zhang et al. 1998). These studies indicate that we now have a more complete understanding of the biological mechanisms of arsenic's carcinogenic action, and that our understanding cannot be dismissed as speculative. Further, plasma dose-response data for antileukemogenic activity correlate with effective concentrations in *in vitro* studies. As evidence accumulates of a common mechanism of carcinogenic and antileukemogenic action, specific threshold doses for carcinogenic action are being identified.

Issue 3, Uncertainties in the Taiwanese Study

Ecology asserts that the Taiwanese data are currently the best data available for the purpose of evaluating the hazards of arsenic to humans. Ecology also asserts that

evidence presented by Asarco that EPA's dose-response assessment of the Taiwanese data overestimates arsenic toxicity is weak. Ecology states that uncertainties can "cut both ways." Ecology's conclusions are not consistent with the evidence. As described in my July 1998 declaration, the evidence that the EPA dose-response assessment markedly overestimates risks at lower arsenic doses is compelling. The Taiwanese data are appropriately used only for hazard assessment (i.e., identifying the carcinogenic action of arsenic), not for supporting a dose-response assessment. In addition, many of the studies cited by Ecology as supporting the Taiwanese data either do not include adequate data for dose-response assessment, or report noncancer effects that are expected to have a threshold dose. The actions proposed by Ecology at the Everett site will not serve their stated purpose of protecting human health, because no threat to human health exists at soil concentrations substantially higher than the Ecology cleanup level. Instead, the proposed cleanup activities themselves will introduce new public health risks to the community.

Issue 4, Application of the Taiwan Study Data to the U.S. Population

Recent studies have demonstrated that intake of inorganic arsenic from the diet is greater than that assumed by EPA in the dose-response assessments for arsenic (Schoof et al. 1998; Yost et al. 1998; Schoof et al. In press a, In press b; Mohri et al. 1990; MacIntosh et al. 1997). The highest intakes are reported in countries where rice composes a very large part of the diet. Rice has consistently been shown to have higher inorganic arsenic concentrations than most other foods. Thus, Ecology's assertion that it is not possible to improve upon EPA's estimates of dietary arsenic intake in the Taiwanese populations exposed to high arsenic concentrations during the period from 1910 to 1960 is incorrect.

EPA's cancer risk assessment (cancer slope factor) for ingested arsenic does not account for dietary exposures other than those arising from drinking water. The derivation of the EPA oral reference dose includes an assumption that dietary intake was 2 μg/day, based on an assumed total arsenic concentration of 0.03 mg/kg in rice, 35 percent of which was presumed to be inorganic, and the assumption that yams contained no inorganic arsenic (Abernathy et al. 1989, U.S. EPA 1988). At the time of EPA's assessment only one limited study (misinterpreted by EPA) had evaluated the forms of arsenic in rice, and EPA assumed that most of the arsenic in rice was in nontoxic organic forms. We now know that EPA's assumptions were flawed. The total arsenic concentration is about 5 times higher than assumed by EPA, and a larger proportion of the arsenic in rice is inorganic (Schoof et al. 1998). In addition, measurable inorganic arsenic was also present in many of the yam samples. Consequently, current estimates are that daily inorganic arsenic intake averaged about 50 μg/day in Taiwan (Schoof et al. 1998), while in the United States average intake is closer to 10 μg/day or less (Yost et al. 1998; Schoof et al. In press a,b; MacIntosh et al. 1997).

Ecology also asserts that the inorganic arsenic in food may not be biologically or toxicologically active. This assertion is also erroneous. Evidence of the availability of dietary inorganic arsenic is provided in my response to Ecology comment 7 below.

Issue 6, Arsenic Bioavailability

Ecology provides a review of studies of arsenic bioavailability from soil, and concludes that an assumption of 40 percent bioavailability for arsenic from soil (the Ecology default assumption) is too low. In my declaration, I described several new studies of human populations that provide evidence that absorbed doses of arsenic from soil are lower than commonly assumed in risk assessments. My declaration did not include a review of the laboratory studies that provide evidence that arsenic has only limited absorption from soil. These data are summarized below, but first some definitions are provided.

When we discuss oral bioavailability in the context of human health risk assessments, we are generally discussing the application of a bioavailability adjustment factor in the exposure assessment to correct for reduced bioavailability of a chemical in the exposure medium being assessed (e.g., soil) compared to the exposure medium from the toxicity studies (i.e., water in the case of arsenic). Consequently, the value we are trying to identify in our bioavailability studies is the "relative bioavailability" of arsenic in one medium compared to another. This means that the validity of our studies is not dependent on an accurate assessment of the "absolute bioavailability," or total fraction, of an administered dose that is absorbed. Instead, we seek to measure the difference in absorption from different media. Ecology argues that animal studies may provide unreliable bioavailability estimates for humans because the absolute bioavailability of arsenic in animal models is lower than that observed in humans. This argument is irrelevant for estimation of relative bioavailability.

Oral bioavailability of metals decreases with decreasing water solubility of the metal compound in question. Most toxicity studies of metals have been conducted with the most soluble forms of the metal, often dissolved in water. This is the case for arsenic, with the oral cancer slope factor and the oral reference dose both based on studies of Taiwanese populations exposed to arsenic dissolved in their drinking water. However, inorganic arsenic compounds vary widely in their water solubility.

Arsenic compounds present in soils commonly include less soluble forms such as metal arsenic oxides, metal arsenic silicates, and arsenic phosphate. These compounds are generally formed over time in soil as weathering reactions occur that favor most stable and less soluble compounds. Reduced bioavailability of arsenic in soil is thought to be primarily a function of the presence of these less soluble compounds, and the size of the soil particles in which the compounds reside. At a site such as Everett, where many decades have passed since the atmospheric release of soluble arsenic forms, weathering reactions will have changed virtually all of the arsenic present to less soluble compounds. The relative bioavailability of arsenic in Everett soils would be expected to be much lower than the relative bioavailability of arsenic in soils near the Tacoma smelter that operated until the mid 1980s, or the Anaconda smelter that shut down in the early 1980s.

Numerous studies have demonstrated the reduced relative bioavailability of arsenic in soils at a variety of sites. These include studies in monkeys (Freeman et al. 1995), swine (Casteel et al. 1997, Rodriguez et al. 1999, Lorenzana et al. 1996), rabbits (Freeman et al.

1993), rats (Rodriguez et al. 1998) and dogs (Groen et al. 1994), as well as studies using *in vitro* models of gastrointestinal absorption (Ruby et al. 1996; Rodriguez et al. 1999). Most of these studies have found that relative bioavailability is 50 percent or less.

When the results of all of these studies are examined, rather than the subset selected by Ecology and presented in their Figure 1, there is no evidence to support Ecology's assertion that the relative bioavailability estimates are dependent on the amount of soil ingested by the animals tested. The extensive swine studies conducted at the University of Missouri by Dr. Stan Casteel and colleagues (Casteel et al. 1997, Rodriguez et al. 1999), combined with the mineralogical studies of Dr. John Drexler at the University of Colorado, clearly show that differences in bioavailability among arsenic-containing soils is a function of differences among the soils, rather than being an artifact of differences in animal models and study conditions, as asserted by Ecology. When 13 arsenic-containing soils were administered to the swine at doses of 6.25 mg soil/kg body weight, relative bioavailability estimates ranged from 2.7 to 42.8 percent (Rodriguez et al. 1999). These marked variations in relative bioavailability occurred even though the same soil dose was administered to all the animals. In addition, even though these soil doses were lower than those in any of the studies cited in Ecology's Figure 1, the relative bioavailability estimates spanned the lower end of the range of estimates in all the previous studies. Similarly, Casteel et al. (1997) administered soils and waste materials at doses of approximately 15 to 200 mg soil or waste material/kg body weight. Relative bioavailability estimates ranged from zero to 52 percent, with the exception of samples from the Aspen/Smuggler site.

If results of these studies are plotted on Ecology's Figure 1, the apparent downward trend of relative bioavailability with soil dose is lost. Furthermore, the appropriateness of some of the data points included by Ecology is questionable. Data presented by Lorenzana et al. (1996) can be interpreted as supporting other estimates of relative bioavailability for the Tacoma soil (for several doses, my calculations indicate a relative bioavailability estimate of 60 percent may be more appropriate). Lorenzana et al. (1996) also present data for Triumph, Idaho, soil that support a relative bioavailability estimate of less than 20 percent at the same soil doses used for the Tacoma soil estimates. Finally, soil from Butte, Montana, was tested in swine with very low soil doses, and yielded a relative bioavailability estimate almost identical to the estimate from rabbits fed a large soil dose. Taken together, the available evidence does not support Ecology's hypothesis that relative bioavailability estimates are dependent on soil dose.

In the review of *in vitro* leaching/solubility tests, Ecology cites four potential problems with "using this system as a model for human bioavailability." These potential problems include the soil:solution ratio selected, ionic strength below physiological conditions, removal of arsenic mass during sampling of the reaction cell, and the lack of some unspecified but potentially important factor from the *in vitro* system (i.e., the *in vitro* system is not a perfect replication of human gastrointestinal function and chemistry). Before addressing these issues, it is worth noting that the *in vitro* method published by Ruby et al. (1996) did not purport to present an *in vitro* model that was completely validated for estimating arsenic bioavailability, since there were only three *in vivo*:*in*

vitro comparison data points available at the time of this publication. However, based on the data presented in Ruby et al. (1996), the results from the *in vitro* extraction generally appear to be representative of relative arsenic bioavailability in rabbits and monkeys.

Since the Ruby et al. (1996) data were published, it has become clear that the fraction of arsenic extracted in a low pH solution (pH value of 1.5 to 1.8) is predictive of relative arsenic bioavailability in animal models. Rodriguez et al. (1999) evaluated 13 mine site soils and waste materials and demonstrated a linear correlation between arsenic extracted in a stomach phase test (pH of 1.8) and relative arsenic bioavailability for the same soils in a young swine ($r = 0.83$, $P < 0.01$). The Rodriguez et al. (1999) results, when reviewed together with the Ruby et al. (1996) data, indicate that solution pH controls the extent of arsenic dissolution. Having identified the rate-determining parameter for arsenic dissolution, it becomes obvious that sodium chloride concentration, or other unspecified gastrointestinal parameters, are unimportant for assessing the extent of gastrointestinal arsenic dissolution.

The soil to solution ratio of 1:100 (by weight) used in Ruby et al. (1996) was selected based on the minimum amount of soil that would provide a representative sample (approximately 0.4 g), and a best estimate of pediatric gastric fluid volume at a single point in time (note that the daily volume of fluid excreted and resorbed has no obvious relationship to the average volume present in the stomach). If a child has approximately 100 mL of fluid in their stomach and ingests 400 mg of soil at one sitting (unlikely except for a child with pica for soil), then the ratio of 1:100 is an appropriate estimate. Given that children generally ingest less than 400 mg of soil at a time, the 1:100 ratio is likely on the low side. *In vitro* soil to solution ratios similar to 1:100 have been used by various groups performing *in vitro* research (1:30 [CBR 1993] and 1:150 (Rodriguez et al. 1999). In addition, a study of the effect of soil to solution ratio on *in vitro* extraction of metals from soils (including arsenic) determined that "bioaccessibility of metals in the soils extracted by the *in vitro* synthetic gastric juice will only be affected slightly by changes in gastric fluid to solid ratios for the range 100:1 to 5000:1 (Hamel et al. 1998).

Given the advances in applying *in vitro* techniques to estimation of relative arsenic bioavailability from soil since the Ruby et al. (1996) paper was published, it appears that this approach provides reasonable estimates of relative arsenic bioavailability in a variety of mammalian species.

The scientific weight of evidence clearly supports the use of a default bioavailability adjustment of less than 100 percent for arsenic in soil. The new draft *Toxicological Profile for Arsenic* from the Agency for Toxic Substance and Disease Registry (ATSDR 1998) supports this conclusion, stating "[t]ypically, it has been assumed that 100 percent of arsenic that is ingested is bioavailable. . . . However, this approach is flawed for evaluating the bioavailability of metals from soils, because solid phases in soil are typically much less soluble than metal salts." In summary, there is no scientific basis for assuming 100 percent absorption for arsenic in soil.

Issue 7, Arsenic in Food and Water

In response to my statement that the likely significance of exposures to arsenic in soil is diminished in comparison to background exposures from diet and drinking water, Ecology asserts that even so, the harm caused by additional exposure is not acceptable under the Model Toxics Control Act. Ecology further asserts that arsenic in food may not be biologically or toxicologically active. My point with regard to small relative doses of arsenic from soil compared to other background sources is that considering the wide variations in background exposures, the soil dose is not likely to be large enough to cause harm at all.

Regarding the biological activity of inorganic arsenic in food, Ecology asserts that the digestion method used in the analysis of arsenic in food is much more extreme than conditions in the gastrointestinal tract, and would release as free arsenic ions arsenic that would still be bound to macromolecules during transit through the gastrointestinal tract. However, the concentrated acid digestion procedure described by Ecology is the digestion for total arsenic. The digestion for inorganic arsenic is much milder. In a study by Schoof et al. (1998), split samples of rice and yams were analyzed using two different digestion procedures by the laboratories of Dr. Eric Crecelius (Battelle Marine Science, Sequim, Washington) and Dr. Kurt Irgolic (Institut für Analytische Chemie at Karl-Franzens Universitat, Graz, Austria). These are the two premier laboratories in the world for analysis of arsenic species in biological samples. Dr. Crecelius has just completed a major survey of arsenic species present in seafood for EPA. The digestion used by Dr. Crecelius uses a 2M HCl digestion overnight at 80°C, a method that has been demonstrated not to break down organic arsenic compounds. The digestion used by Dr. Irgolic involved grinding the sample and shaking it overnight in water. Despite the differences in these digestion methods, there was excellent agreement in the inorganic arsenic concentrations according to these two methods (Schoof et al. 1998). In fact, the average inorganic arsenic concentration in five rice samples tested was a little higher in the samples from Dr. Irgolic's laboratory that were only digested in water.

Evidence that dietary arsenic is absorbed can be deduced from studies of urinary arsenic excretion in unexposed populations. Even when drinking water concentrations are very low, studies show that substantial inorganic arsenic and its metabolites are excreted in urine. This urinary arsenic must have originated as dietary arsenic. Further, the presence of metabolites of inorganic arsenic in the urine indicates that the inorganic arsenic was indeed biologically active.

Issue 10, Children and Urinary Arsenic

Ecology raises several concerns regarding my discussion of human studies of arsenic exposure that relied on the use of urinary arsenic as an indicator of exposure. Most of these concerns are related to variability in urinary arsenic excretion, and the reliability of these measures as indicators of exposure. The strength of the studies conducted in Anaconda and Bingham Creek Channel lies in their extraordinary size. The large populations studied provide the power needed to characterize relationships even in the

presence of substantial variability in individual background urine arsenic concentrations. Even if the "outliers" in this population are considered, there is no evidence of arsenic exposures on the order of those predicted by Ecology's risk model.

Ecology notes that no site-specific urinary arsenic background values for the Everett site have been submitted by Asarco, but this does not justify ignoring data that are available. As demonstrated in the Anaconda study and described in my declaration, arsenic exposures could barely be detected in a population of 400 children living in a community with much higher average soil arsenic concentrations than those at the Everett site. Even in the Bingham Creek Channel study, which included almost 700 children, no changes in average urinary arsenic concentrations were observed as soil arsenic concentrations were increased from a range of 0–25 to 26–50 to 51–75 to 76–100 ppm, as described in my declaration. There is no reason to believe that soil arsenic concentrations in these ranges are causing any identifiable exposures in Everett children, much less any harm.

Dr. Robert Bornschein of the University of Cincinnati, who conducted these studies, has years of prior experience conducting studies of lead exposure in children. The results of his studies have formed the basis for lead risk models which Ecology itself now accepts to derive the soil lead standard. The same should be true of his arsenic studies (i.e., if our risk models are inconsistent with his studies, it is likely that our risk models are in error, not the exposure data). Indeed, Walker and Griffin (1998) modified the risk model used by EPA at Anaconda to account for the results of the exposure study. They concluded that a 250 ppm soil arsenic cleanup level would be protective of human health.

Issue 11, Arsenic Is an Essential Element

Ecology's response quotes extensively from a 1988 EPA document that concluded that the nutritional essentiality of inorganic arsenic was plausible, but not proven (U.S. EPA 1988). Ecology then concludes that little additional proof of essentiality has been provided since that time, and that even if it were proven that arsenic was essential, it could still be toxic at or close to essential doses. Both of these conclusions are erroneous. In a recent review, U.S. Department of Agriculture scientist Forrest H. Nielsen concludes that although a specific biochemical function has not been identified for arsenic and five other proposed ultratrace elements, circumstantial evidence for essentiality is substantial (Nielsen 1998). The essentiality of arsenic in higher animals is supported by the large number of responses to arsenic deprivation reported in various animal species. After suggesting that some individuals may be consuming inadequate amounts of arsenic, Nielsen concludes that "[b]ecause arsenic most likely is an essential nutrient, the belief that any form or amount of arsenic is unnecessary, toxic, or carcinogenic is unrealistic, if not potentially harmful."

Since 1988 a number of studies have explored the hypothesis that arsenic has a function related to the formation and utilization of methyl groups arising from methionine (Uthus and Kang 1998, Uthus 1994, Uthus and Poellot 1991–1992, Uthus and Poellot 1992, Uthus 1993). Ecology criticizes animal studies of arsenic essentiality on the grounds that arsenic in supplemented diets may be having a pharmacologic effect of stimulating

appetites, or that animals on highly purified "arsenic-deficient" diets may be getting inadequate nutrition. Ecology notes that food consumption data are not reported for these studies; however, body weight data appear to refute Ecology concern. For example, in one recent study, rats were maintained either on a purified basal diet with 2.7 ng As/g or on an arsenic supplemented diet with 0.5 μg As/g (Uthus and Kang 1998). After 70 days, average body weights of rats from the two groups were identical, 263 g, suggesting no differing impacts on food consumption in the two groups.

Ecology's assertion that arsenic could be toxic at doses close to essential doses, and the implication that they may need to regulate such low exposures to arsenic is inconsistent with their stated mission of protecting public health. If arsenic is indeed essential, regulation of low exposures in the range of essentiality will most certainly not have a beneficial effect on public health.

Issue 17, One in One Million Cancer Risk

Ecology asserts that the State has made a policy decision that the acceptable incremental risk for a chemical at a site is one in a million, then implies that this policy is based on protection of public health by quoting the following: "Declaration of policy. (1) Each person has a fundamental and inalienable right to a healthful environment. . . ." RCW 70.105D.010." However, in the case of arsenic, there is overwhelming evidence that Ecology's risk model is not accurately predicting risks from arsenic in soil. The quote attributed to me at the beginning of Ecology's comment, "[c]onsequently, EPA site mangers may use higher target risks and cleanup levels when they believe arsenic exposures at a site are low enough that no public health hazard exists," was made in the context of a description of the flaws in the dose-response assessment for arsenic. My point is not that Ecology should have a different definition of acceptable risk, but that the risk model for arsenic is in error and that sufficient evidence is available to use other methods to identify soil arsenic cleanup levels that will be protective of public health.

The ubiquity of background exposures to inorganic arsenic at doses more than 100 times greater than the dose predicted by Ecology to threaten public health must be carefully considered. As stated in my declaration, the average concentration of arsenic in drinking water in the United States has been reported to be 2.4 μg/L. This means a typical person drinking 2 L of water per day ingests about 5 μg of arsenic per day. Typical daily intakes of inorganic arsenic in food have been reported to range from 5–15 μg (MacIntosh et al. 1997, Yost et al. 1998, Schoof et al. In press a). Thus, a typical adult will ingest at least 10 μg of arsenic per day. A typical child will ingest at least 5 μg per day. As described above, urinary arsenic data support these estimates, and provide evidence that inorganic arsenic from these sources is biologically active. In contrast, Ecology's risk model predicts an unacceptable risk to public health for a child ingesting 0.054 μg of arsenic per day (based on Ecology's assertion that 100 percent of arsenic in soil is absorbed). Clearly, the risk model is not providing accurate predictions of public health risks for a natural chemical such as arsenic.

Comments on Washington State Documents Related to Acute Risks of Exposure to Arsenic in Soil

On January 26, 1999, an Ecology Decision Memorandum was issued entitled *Everett, Arsenic Concentrations at Depth in Consideration of Acute Toxicities* (Ecology 1999a). This document derives ranges of soil arsenic concentrations described as being protective of human health for three different exposure scenarios, and is based on a January 1999 assessment by DOH entitled *Hazards of Short-Term Exposure to Arsenic-Contaminated Soil* (DOH 1999). These documents suffer from a number of scientific flaws that are described below.

Critical assumptions in the derivation of these soil arsenic concentrations deemed protective of human health for acute exposures include:

- Identification of doses of soluble, highly bioavailable arsenic forms that induce acute effects
- Estimation of amounts of soil that might be ingested
- Evaluation of the relative bioavailability of arsenic in soil compared to soluble arsenic forms
- A determination of the need for and magnitude of a safety factor to account for variations in human sensitivity.

These four assumptions are discussed below.

Acutely Toxic Doses of Arsenic

For two of the three exposure scenarios (Scenarios 1 and 3), Ecology identifies doses of arsenic that are expected to be associated with transient acute effects. The third scenario (Scenario 2) is based on potentially lethal doses. These doses were based on a review of literature reports of accidental poisonings, and on a 1928 book describing therapeutic doses of medicinal arsenic compounds. These references suffer from some serious limitations. In most cases, the reports of accidental poisonings include only retrospective estimates of doses causing the reported effects. In many cases, exposure to arsenic occurred for a week or more, and therefore does not truly represent acute exposures. Uncertainty is also associated with the old textbook reports of responses associated with specific doses, which are often anecdotal. A much more reliable source identifying potentially toxic doses has recently become available, which is not addressed in the DOH document. The recent discovery that arsenic trioxide is highly effective in the treatment of acute promyelocytic leukemia has elicited a number of literature reports describing treatment regimens and doses.

Soignet et al. (1998) report complete remission of acute promyelocytic leukemia after intravenous administration of 0.06 to 0.2 mg arsenic trioxide/kg body weight for 12 to

39 days. This is equivalent to a dose range of 0.04 to 0.14 mg arsenic/kg body weight. Adverse effects in the 12 patients studied were characterized as relatively mild, and included rash, lightheadedness, fatigue, and musculoskeletal pain. The authors note that these effects may have other causes than arsenic trioxide. Eleven of the 12 patients, including several children, went into complete remission after this treatment. Their tolerance of these doses is all the more remarkable because these were extremely sick, debilitated people. Since the drug was administered intravenously, the absorbed doses were even higher than an expected absorbed dose after ingestion of the same doses. Further, these doses were administered repeatedly for a number of days. Thus, this study provides evidence that the doses that DOH identified as being associated with transient acute effects (i.e., 0.035–0.071 mg/kg body weight) will actually be protective for even the most sensitive individuals in the population.

Amounts of Soil Ingested

Soil ingestion studies conducted so far do not provide definitive estimates of the largest amounts of soil a child may ingest. However, some obvious physical limitations may be applied to these estimates. The highest amount of acutely ingested soil identified in any of the scenarios by DOH is 50,000 mg. This is equivalent to approximately a quarter cup of soil, a quantity that could only be ingested by a child with considerable effort. Such a quantity of soil is likely to induce gastrointestinal distress for reasons completely unrelated to the intake of arsenic. A bolus of soil of this size is large enough to stimulate stomach emptying, and rapid passage through the gastrointestinal tract. Even the 20,000 mg identified as the best estimate for soil ingestion in Scenario 2 is a large enough soil dose to cause significant discomfort. These are truly upper-bound estimates of feasible doses. Similarly, Scenario 3 identifies 2,000 mg per day as a "commonly occurring" short-term soil ingestion rate for adults working in the soil. This quantity of soil is far too large to be "commonly occurring" in adults. Even a fraction of this intake would cause enough discomfort to induce any normal adult to spit the soil out.

Relative Bioavailability

Ecology and DOH conclude that the current Ecology default assumption that arsenic in soil is only 40 percent bioavailable as arsenic dissolved in water is too low. For Scenarios 1 and 3 they apply a bioavailability factor of 100 percent. Only for Scenario 2, which includes extremely large assumed doses of soil, are lower bioavailability estimates included. The DOH analysis of this issue is almost identical to the analysis presented in a January 1999 Ecology document (Ecology 1999b) reviewing Asarco's July 1998 submittals regarding new scientific developments related to arsenic. The DOH/Ecology analysis is flawed, and is not supported by the full body of available data. My detailed analysis of this issue is presented in my response to issue 6 of the Ecology document (Ecology 1999b).

Safety Factor

As described above, the arsenic doses described by DOH as being potentially acutely toxic are adequately protective for even the most sensitive members of the population. Additional conservatism (i.e., protectiveness) is introduced in the assumptions selected by DOH for soil ingestion and relative bioavailability. The use of a 100 percent assumption for bioavailability alone introduces a safety factor of 2 to 5. Consequently, no additional safety factor is needed to derive extremely protective soil concentrations. Without the additional 10-fold safety factor applied by DOH, the range of protective soil concentrations for transient effects in children would be 230–920 ppm, with a best estimate of 370 ppm. The cleanup level for soils at depth should be no lower than 370 ppm, assuming that it is appropriate to develop a cleanup level that protects against transient effects such as nausea and diarrhea.

Rosalind A. Schoof February 25, 1999

Rosalind A. Schoof, Ph.D., DABT Date

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Attachment

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DEPT OF ECOLOGY

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RE: Correction to Dr. Schoof Reference in TAB E of Asarco Comments on Ecology Draft Cleanup Action Plan

Dear Mr. South:

Dr. Schoof has advised us of an error in one of the cited references in her Statement located in Tab E of the materials we submitted to you on February 25, 1999. I am writing on Dr. Schoof's behalf to make the necessary correction. The Casteel et al (1997) citation throughout Dr. Schoof's Statement is described incorrectly in the References on page 13 of her Statement. The correct citation to the referenced document is:

> Casteel, S.W., L.D. Brown, M.E. Dunsmore, C.P. Weis, G.M. Henningsen, E. Hoffman, W.J. Brattin, and T.L. Hammon. 1997. Relative bioavailability of arsenic in mining wastes. Doc. Control No. 4500-88-AORH. U.S. Environmental Protection Agency, Region VIII, Denver, CO.

HELLER EHRMAN WHITE & McAULIFFE
ATTORNEYS

I enclose three copies of the corrected page 13 to be inserted in Dr. Schoof's bibliography. We apologize for the error.

Very truly yours,

Steve Anderson

Steven S. Anderson

SSAskp
Encls.
cc: Thomas L. Aldrich (w/encls.)
Dr. Rosalind A. Schoof
Mary Sue Wilson (w/encls.)
Ronald L. Lavigne (w/encls.)

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Ecology. 1999a. Memorandum from C.R. McCormack to T. Nord, Toxics Cleanup Program, dated January 26, 1999, regarding Everett arsenic concentrations at depth in consideration of acute toxicities. Washington State Department of Ecology, Toxics Cleanup Program, Olympia, WA.

Comments of Joyce Tsuji, Ph.D., DABT, on Documents Submitted to Asarco by Washington State Department of Ecology, January 1999

I have reviewed the *Review of Asarco's "New Science" Submittals Regarding Arsenic and Lead*, prepared by the Washington State Department of Ecology (Ecology). This document is Ecology's response to Asarco's July 13, 1998, submittal which was accompanied by declarations by myself and five other outside experts. I am providing comments primarily on the portions of Ecology's document that responded to issues discussed in my declaration. Although I have not commented on all of Ecology's responses, my lack of comment does not indicate my acceptance of those responses.

Issue 1, Use of a Linear No Threshold Model

Page 11, second paragraph of response. In justification of its reliance on the cancer slope factor derived from the Taiwan data, the response states that differences in skin cancer prevalence rates were negligible between a Mexican population (Cebrian et al., as cited in U.S. EPA 1988) and the Taiwan population. This comparison of prevalence rates is limited by the uncertainty in the dose and prevalence rates in the Taiwanese population and the small sample size (296 exposed, 318 control; only four cases of skin cancer among those exposed) and single dose group examined in the Mexican population (U.S. EPA 1988). Just because two highly uncertain estimates happen to match doesn't mean that either is accurate. Also, this comparison is at high doses (average arsenic water concentration in the Mexican population was 0.41 mg/L, a dose of 0.022 mg/kg/day according to page 17 of the response; an equivalent soil dose assuming 200 mg/day of soil ingested, 16 kg body weight and 40 percent absorption as in the MTCA Method B equation is at a soil concentration of 4,400 mg/kg). This comparison to the Mexican data thus gives no indication that the Taiwan data would predict cancer at low doses.

Page 11–12. Arsenic is notable among environmental carcinogens in that several lines of evidence (e.g., mechanistic, pharmacokinetic, and epidemiological) indicate that arsenic does not fit the linear, no threshold model assumed by the cancer slope factor. The Ecology response cites the U.S. Environmental Protection Agency's (EPA's) Expert Panel Report on Arsenic Carcinogenicity, but apparently didn't consider the consensus of this panel that the likely mechanisms by which arsenic causes cancer are consistent only with a sublinear or practical threshold dose-response model. Although the exact mechanism by which arsenic causes cancer is not known, all possible theories based on what is scientifically known are inconsistent with a linear model.

Other evidence in support of non-linear dose response comes from studies of arsenic methylation and excretion. Arsenic methylation and excretion is mediated by enzymes and, as such, is a saturable process, so that increasing doses of arsenic result in less rapid

excretion and elimination (Vahter 1994). Thus, this evidence also indicates that extrapolation of exposure at higher doses to much lower doses is not be expected to be linear.

In the last paragraph on page 12, Ecology states that it is not known whether any non-linear portions of the dose-response relationship are below the doses of interest at Everett. However, new epidemiological analyses do indicate non-linearity at lower doses relevant to the Everett site. Epidemiological studies that have more finely divided the exposure groups into smaller concentration ranges are more appropriate for assessing the shape of the dose-response curve. Compared to the earlier Taiwan study used to develop the arsenic cancer slope factor, Guo et al. (1997) uses much more accurate information on exposure, provides a much better characterization of exposure levels of the subjects, and covers a much larger population in Taiwan. Guo et al. (1997) divided exposure into multiple, relatively narrow concentration categories. Exposure was thus characterized by the proportions of wells in each of the categories of arsenic concentrations. The division of exposure into more categories with narrower concentration ranges provides more insight into the dose-response relationship than the original Taiwan data based on medians of village medians. Guo et al. (1997) shows that statistically increased rates of urinary cancers with dose do not exist below a concentration of arsenic in water of 640 μg/L. A poster presented by Guo et al. (1998) at the Third International Conference on Arsenic reports similar results for a particular cell type of lung cancer: squamous cell carcinoma was associated with arsenic exposure at high arsenic concentrations (>640 μg/L) but not at lower concentrations. Thus, these analyses indicate that risks of cancer at low doses are overestimated by the cancer slope factor for arsenic which extrapolates risk at high doses to lower doses.

Other epidemiological evidence that should be considered comes from studies of U.S. populations with elevated arsenic concentrations in drinking water (and exposure as indicated by elevated urinary arsenic levels), but scant signs of arsenicism or skin or other cancers (Petito-Boyce and Beck 1990; Valentine 1994; Valberg et al. 1998). Except when drinking water concentrations were high enough to cause obvious acute or subchronic symptoms (gastrointestinal disturbances, nail and skin changes, and neurological involvement), for the most part, significant associations with effects on skin or internal organs, cancer, and various clinical signs and symptoms have not been noted, even when drinking water was approximately two to eight times the MCL of 50 μg/L (Valentine 1994).

Page 13, paragraph 3. The response states that other cancers than skin increase the cancer risk for arsenic beyond that predicted by the skin cancer risk factor. However, cancers of the liver have been less frequently reported (summarized by Clewell et al. 1999) and may be confounded by the high prevalence of hepatitis (a risk factor for liver cancer) in the Taiwanese population exposed to elevated arsenic well water concentrations (Hsueh et al. 1995). In addition, the same factors that would result in a non-linear dose response for skin are also applicable to the other internal cancers. Studies by Guo et al. (1997, 1998) indicate that increased risk of urinary and lung cancers may not be associated with exposure to arsenic at lower doses.

A number of U.S. communities located near smelters have been studied for elevated lung cancer rates in residents. One would expect that if lung cancer were strongly associated with arsenic dose as indicated by the Taiwan data, such studies should show some evidence of increased lung cancer because of its association with arsenic exposure both by ingestion and inhalation. Residents of these communities had elevated arsenic exposure via air and soil while the smelters were operating. Collectively, these studies have not shown increases in lung cancer risk (or any other cancers studied) associated with arsenic exposure near smelters (Frost et al. 1987; Lyon et al. 1977; Greaves et al. 1981; Rom et al. 1982; Harter et al. 1994; CDPHE 1995; Marsh et al. 1995; ATSDR 1995).

Page 13, last paragraph. The response cites Casarett and Doull's (1996) chapter on developmental toxicity regarding thresholds (Klaassen 1996). The more appropriate chapter to cite would be the chapter titled *Chemical Carcinogenesis* by Pitot and Dragan, which is not mentioned in the response. The authors conclude (Klaassen 1996, at page 255):

> Models of cancer risk assessment assume that all carcinogens are the same and that there is no threshold for carcinogenic action. However, it is known that for most carcinogens, repair processes are available within the cell. In addition, most early changes are adaptive in nature, and functionally redundant pathways exist to compensate for those changes...The linear multistage model is not appropriate for estimating low-dose carcinogenic potency for many chemicals. In most cases, the dose response at high doses of testing differs substantially from the considerably lower doses for exposure.

The chapter titled *Chemical Carcinogenesis* by Williams and Weisburger (noted authorities on carcinogenesis) from the 1991 edition of this textbook notes that arsenic is classified as an epigenetic carcinogen (i.e., a carcinogen that acts by indirect means and is not reactive with DNA). They state that "[t]he main features of their [i.e., epigenetic carcinogens] carcinogenicity are that high doses and sustained exposure are usually required" (Amdur et al. 1991, at page 185).

Issue 2, Cancer Slope Factor

Page 15, first paragraph of response. The relevant question here is whether, because of the small populations examined in the U.S., studies of exposures in this country can or cannot be used to confirm or deny the possibility that differences between the Taiwanese and U.S. populations affect the utility of the cancer potency factor to predict public health risk in the U.S. Although each study in the U.S. individually is smaller than the 40,000 population size in Taiwan, the number of negative (no increased cancer occurrence) results among these U.S. studies collectively make up a powerful weight of evidence. Meta-analysis is a statistical technique which examines the combined probability of the outcome from a number of studies. A recent such examination of several skin cancer

studies of populations exposed to arsenic in drinking water reported that the hypothesis of no additional skin cancer risk from arsenic was approximately 2.2 times more likely than the hypothesis that arsenic would cause the rate of cancers predicted by the cancer slope factor (Valberg et al. 1998).

Issue 3, Uncertainties in Taiwan Study

Page 16, second paragraph of response. The response states that adequate evidence that intake rates of water were underestimated has not been presented. The response does not address the underestimation of water intake from use of arsenic-containing water to rehydrate and cook a relatively monotonous diet of dehydrated yams and rice, further adding to the dose. Added water exposure for food processing and some arsenic dietary exposure was incorporated by EPA in calculating the reference dose for arsenic but was not considered in the slope factor calculation (see the EPA Integrated Risk Information System record for arsenic). As demonstrated by Brown and Abernathy (1997), changes in the arsenic exposure from food and water can have a large effect on the risk estimation for U.S. populations at lower doses. This factor again indicates that the cancer slope factor overestimates risk at low doses.

Page 16, third paragraph of response. The response states that there is currently no way to know whether the classifications were correct or incorrect, and what effect any possible misclassifications actually had on the results. This statement ignores the scientific facts. We know for sure that the exposure in the Tseng study was grouped into broad categories, or ranges (low, 0 to 300 μg/L; medium, 300 to 600 μg/L; and high, $\geq$600 μg/L) from which the median was used by U.S. EPA (1988) to represent the dose. What is not generally known is that these are actually ranges in averages among villages, not the range of concentrations to which individuals were exposed. The actual well water concentrations to which people were exposed thus cover an even broader range (Brown and Abernathy 1997). For example, 5 of 14 villages that would be in the low dose group had more than one well tested (the actual number of wells in each village is unknown). Of these five villages, all but one had an upper range of concentrations that exceeded 300 μg/L. The maximum concentrations ranged from 458 to 770 μg/L. None of the well water concentrations reported were actually zero. The lowest concentration measured was 10 μg/L, and only 3 of the 14 villages had concentrations that low. Villages in the medium dose groups had well water concentrations that exceeded both the upper and lower end of the range of averages that represents this group. The high dose group ($\geq$ 600 μg/L) had a number of villages with well water concentrations less than 600 μg/L.

The effect of this grouping is that the cancer incidence in the low dose group (i.e., 0 to 300 μg/L) is likely due to those exposed to concentrations as high as 770 μg/L. Yet EPA's calculation of the cancer slope factor assumes that these people were exposed to a concentration of only 170 μg/L. In the high dose group, the inclusion of people with lower water concentrations than the dose range may have decreased the cancer incidence. The effect of such errors biases the dose-response relationship to show higher cancer incidence at lower doses.

Thus, although any study has uncertainties, the scientific weight of evidence should be considered regarding what we do know about those uncertainties and their effect on the outcome. Uncertainty always exists in any scientific data set, but that does not mean that scientists and physicians should ignore the weight of evidence in making health-protective decisions. The medical field regularly relies on epidemiological studies and biomonitoring data in making decisions and recommendations about the safety of different lifestyles, risk factors, and the use of drugs.

Page 17, first paragraph. The response notes various arsenic water concentration and dose levels associated with health effects based on studies in foreign countries. This comparison is stated to indicate that the lowest dose of the Taiwanese study did not significantly underestimate exposure. However, information would also have to be provided on the incidence of cancer at these doses to conclude that the Taiwan data do not underestimate low dose exposure. The reported concentrations for many of these other studies are also group averages, which tend to dampen out differences. It should be noted that the dose for Taiwan is close to the lowest among these studies. This comparison does not validate the dose-response or slope factor based on the Taiwan data, particularly at low doses.

Page 17, second paragraph. A study in West Bengal, India, is mentioned which estimated exposure on an individual basis. No comparison, however, is made in this paragraph between the incidence of skin effects in Taiwan and West Bengal at similar doses. Reported doses in West Bengal could also be low because of inaccuracies in reported water intakes, differences between actual arsenic water concentrations associated with chronic exposure and the recent measurements of wells, or nutritional deficiencies (see comments below). Study authors (Mazumder et al. 1998) note that it is possible that individuals with low arsenic water concentrations (e.g., <100 μg/L) and skin lesions were exposed to high levels of arsenic from drinking water sources other than the one measured in the survey. Mazumder et al. (1998) also report considerably higher arsenic water concentrations for skin lesions in previous studies in West Bengal: the mean drinking water concentration of those with skin lesions was 640 μg/L, with a range of 200 to 2,000 μg/L, as compared to those without skin lesions for which the mean was 210 μg/L, with a range of 0 to 740 μg/L.

Issue 4, Application of the Taiwan Study to U.S. Population

Page 18, second paragraph, regarding nutritional deficiency. Poor diet and low social economic conditions are well known to be associated with higher disease incidence, including cancer (Leonard and Berkman 1976), and specifically has been identified as a risk factor for arsenic carcinogenicity (e.g., Hsueh et al. 1995). The text discounts the effects of malnutrition on the cancer risk and notes that increased bladder cancer has been associated with arsenic intake in at least one well-nourished population. The question, however, is not whether arsenical cancer occurs only in association with malnutrition, but what effect malnutrition has on the incidence of cancer. The text also states that the increased risk due to severe malnourishment in the West Bengal population (Mazumder

et al. 1998) was not very large. Although the overall increase in risk (for those that were 80 percent of the standard body weight) was less than 2 times, the increased risk was higher for females (2.1 times) than males (1.5 times), possibly indicating the additional nutritional stress of child-bearing. Mazumder et al. (1998) report that 30 percent of females and 38 percent of males in the population were 80 percent or less of the standard body weight, indicating that much of this population may have body weights below the standard average and overall may be poorly nourished. If the West Bengal population overall was malnourished, this condition would also decrease any apparent differences within the population. In addition, body weight is not necessarily a good indicator of an adequate diet nutritionally, only of sufficient caloric intake.

Vitamin A has been raised as possibly important in protecting against the carcinogenic potential of arsenic (Valentine 1994). Populations affected by arsenic in Mexico have been found to have only one-third the U.S. RDA requirement for vitamin A in their diet.

Biswas et al. (1998) at the Third International Arsenic Conference presented a talk on widespread arsenicism (primarily skin lesions) in Bangladesh. They noted lower incidence of arsenicism in areas with better nutrition even though the arsenic in water may be similar or higher than areas with high incidence of arsenicism. The speaker concluded that 80 percent of the people would not be affected if nutrition were improved.

Zakharyan and Aposhian (1999) report that arsenic methylation (and therefore detoxification and excretion) may occur non-enzymatically in humans by a mechanism involving vitamin B_{12} and possibly selenium. The authors also note that the source of vitamin B_{12} in the diet is animal byproducts, and therefore diets in many economically poor populations that contain little animal-derived food may result in a vitamin B_{12} deficiency. If vitamin B_{12} is essential for arsenic methylation in humans, such a deficiency would increase sensitivity to arsenic toxicity.

Page 18, last paragraph. EPA's estimate of arsenic intake from food (mentioned here) was included in their calculation of the reference dose for non-carcinogenic effects but was not included in the earlier calculation of the slope factor. As noted in above comments, EPA also included in the reference dose calculation, but not in the slope factor calculation, the additional arsenic-containing water that was consumed in rehydrating and cooking food.

Issue 6, Arsenic Bioavailability in MTCA Method B is Too high

Page 21, first paragraph. The arsenic soil conditions at Ruston are not very similar to those at Everett. The arsenic in soil in Ruston was more recently deposited in the soil (smelter closed in 1986) relative to when the bioavailability measurements were performed (April through September 1992) by U.S. EPA (1996). By contrast, the arsenic incorporated in soils in Everett was deposited about 100 years ago. Arsenic in soil binds to iron and sulfur and forms various mineral complexes. These complexes would decrease the bioavailability of the arsenic in soil (Davis et al. 1996).

Issue 8, Alternative for Calculating a Cleanup Level

As a general comment on the risk assessment methods used by Ecology, conservative values are selected for many of the input assumptions in the face of any uncertainty, without consideration for the scientific weight of evidence. Use of conservative assumptions may seem reasonable for each assumption independently, but the combination of these conservative assumptions multiplies the bias such that the resulting calculation would be implausible. For example, Ecology assumes several conservative assumptions in calculating the protective soil level for acute exposure: a child would have access to undiluted soil concentrations at depth; a high amount of soil ingestion. 100 percent bioavailability, conservative assumptions in calculating acute doses from the literature (e.g., higher than average weight of 70 kg for the woman who drank water) which biases the toxic dose lower, and a child who is 10 times more sensitive than the general population. Each of these assumptions may seem possible independently, but taken together, result in a soil concentration that is well within background levels in the U.S. The implication is that any concentrations exceeding this soil concentration would result in an unacceptable risk of acute health effects. If this were true, more effects should be seen in communities (e.g., Everett, Ruston, Anaconda) with arsenic soil levels that far exceed this level.

The same comment can be made about the calculations of chronic risk. These estimates result in a target soil level that is below background, particularly when 100 percent bioavailability is used.

Issue 9, Communities with Elevated Arsenic Concentrations

The accuracy and utility of risk assessments depend on incorporation of the weight of scientific evidence. For many chemicals, little evidence is available in humans for making safety judgements. Arsenic has a considerable amount of mechanistic, pharmacokinetic, epidemiological, and biomonitoring data that could be considered. Unfortunately, the standard risk assessment equations in MTCA incorporate little of this scientific information.

Although arsenic at sufficiently high doses may cause a multitude of adverse effects, many of these (such as the nausea, vomiting, diarrhea, bronchitis, and cirrhosis cited by the response) occur at high doses. Several of these effects such as nausea, vomiting, and diarrhea occur after short-term exposure to very high doses. We know from many studies that skin effects and skin and lung cancer are common in populations chronically exposed to high doses of arsenic in drinking water for up to a lifetime. Skin effects are one of the notable signs of arsenic exposure (summarized by Mazumder et al. 1998), and populations with elevated cancer rates from arsenic also have increased skin effects. In fact, arsenic-induced skin disease is a good indicator of higher risk of skin and other cancers (Cuzick et al. 1992; Tsuda et al. 1995). Consequently, EPA's reference dose is based on skin changes and possible vascular complications as the health effect noted at the lowest chronic dose (U.S. EPA 1999).

More studies have been conducted of potential adverse effects associated with arsenic in water than arsenic in soil. Based on studies of exposure (urinary arsenic), exposure to arsenic in soil from mining and smelter sites appears to be lower and less direct than exposure to arsenic in water (Valberg et al. 1997). Increases in urinary arsenic are common with elevated levels of arsenic in water. Such a relationship is not as apparent for soil arsenic concentrations, especially if an active air emissions source is not present. Accordingly, the incidence of adverse health effects should be expected to be lower in communities with soil exposure as compared to those with water exposure.

Probably the most thoroughly studied population living near a smelter with elevated soil arsenic is in Ruston, Washington, which was exposed to arsenic in soil and air emissions from a smelter that operated from the early 1900s until 1986. A number of health effects were studied in that population by the State Department of Health and students and researchers at the University of Washington. Unfortunately, many of these studies are not published. Milham (1977) did not detect any differences in hearing, blood status, and school attendance in exposed and unexposed children despite elevations in urinary and hair arsenic concentrations of children near the Tacoma smelter. Milham (1988) also reports that growth and development, blood counts and blood chemistry, academic and physical performance, blood pressure, and sister chromatid exchange rates were found to be normal in Ruston school children. Glass and SAIC (1992) provide a good summary of many of the studies in this community, including some cancer studies (in addition to the published lung cancer studies by Frost et al. [1987] and Harter et al. [1994]), and adverse birth outcomes such as low birthweights, congenital malformations, oral clefts, stillbirths, perinatal deaths, and prematurity in delivery. No statistically significant adverse effects were found in any of these studies.

Morse et al. (1979) examined a number of symptoms in children from a smelter town versus a non-smelter town in Arizona. Children in the smelter town were also exposed to higher arsenic levels in drinking water. Although urinary arsenic levels were elevated in proportion to arsenic in drinking water and distance from the smelter, no differences were found in reported symptoms of arsenicism or dermatological, neurological, or hematological signs by clinical examination.

Wong et al. (1992) conducted an ecological study of skin cancer and environmental arsenic exposure near the former Anaconda copper smelter and near an open pit copper mine. No effects of arsenic exposure were seen. Age-adjusted annual skin cancer rates were higher for the two control counties than either county with the former smelter or the county with the mine.[1]

A number of studies have examined the incidence of lung cancer in U.S. populations living near smelters. Although lung cancer was the focus because of its association with inhaled arsenic, ingested arsenic has been associated with lung cancer as well and populations near smelters also could have received oral exposure because of elevated

[1] The clinical features of the skin cancer observed were not similar to those described for arsenic.

arsenic concentrations in soil and dust. The oral lung cancer risk estimates from Taiwan are similar to those for skin cancer (Chen et al. 1992). None of these studies have found an association between arsenic exposure and lung cancer (Frost et al. 1987; Lyon et al. 1977; Greaves et al. 1981; Rom et al. 1982; Harter et al. 1994; CDPHE 1995; Marsh et al. 1995; ATSDR 1995). Because of the much higher exposure to arsenic in air, soil, and dust from an operating smelter, one would expect that these communities would be even more likely to show elevated lung cancer incidence than the Everett community.

Thus, although the available studies each may have relatively small population sizes compared to the Taiwan population, when taken together, these studies comprise strong evidence that the arsenic risk is likely to be overestimated at lower doses by the linear risk model.

Issue 10, Children and Urinary Arsenic

As discussed in my original declaration, site-specific data are available in the form of a study conducted by the Agency for Toxic Substances and Disease Registry which measured urinary arsenic levels of approximately 95 residents living on some of the highest soil arsenic levels in the Everett community. These results did not show increased arsenic exposure in children, the population most exposed to soil (Sanderson and Kess 1995; Sanderson et al. 1995). These data are not discussed or evaluated in the response.

Page 34, first paragraph. Although urinary arsenic measurements are indicative of short-term exposure, because many of these studies have been conducted in warmer seasons, they are more likely to show higher levels of soil exposure than other times of the year. In addition, sampling of a large number of individuals within a population helps control short-term and individual variation. Urinary arsenic studies in Bingham Creek, Utah (UCDEH 1997), and in Anaconda, Montana (Hwang et al. 1997), are of larger sample sizes and are consistent with the Everett data in showing a relatively low impact of soil arsenic on urinary arsenic levels.

If the urinary arsenic results are not considered a reliable indicator of exposure before site remediation at Everett, it is unclear why such measurements would be necessary or useful after remediation when soil arsenic levels are near background.

On page 35, second paragraph. The response mentions Walker and Griffin (1998), but does not note that this study assumed about 20 percent bioavailability for soil and dust in order to match the urinary arsenic data for children at the Anaconda smelter site. Thus, 100 percent bioavailability for Everett seems extreme.

In the third paragraph on page 35, the response uses an assumed tolerable increment in urinary arsenic of 5 μg/L and calculates a soil cleanup level of below 20 mg/kg. However, the urinary data from Anaconda demonstrate the unrealistic nature of Ecology's assumptions in this calculation. According to Hwang et al. (1997), a 5 μg/L change in average urinary arsenic would require an increase in soil arsenic concentration

from about 10 mg/kg to 700 mg/kg. Although Ecology is basing its calculations on an RME exposure, the discrepancy between their predictions and the empirical data is unreasonable.

Issue 13, Lead Cleanup Level is Too Low

Ecology's new lead cleanup level of 353 mg/kg, although higher than the previous value of 250 mg/kg, is still below the lower end of nationwide levels generally considered protective of children. For example, national guidance on Superfund sites states that decisions at residential sites that fall outside of the 500 to 1,200 mg/kg range must undergo a review by the national Lead Sites Workgroup (Luftig 1997). Ecology must have used very conservative assumptions in the EPA lead model to derive a cleanup level that is below EPA's screening level of 400 mg/kg (which is based on the same model with default assumptions). This model also has been found to greatly overpredict blood lead levels of children at western smelting and mining sites (e.g., Sandy, Utah, a residential site built over an area which had historic lead smelters; U.S. EPA [1995]).

Issue 15, Contaminated Soil Removal Depths

The activities that could result in exposure to subsurface soil mentioned here would be primarily within the upper 12 inches of soil, with the exception of installing or repairing utility lines or poles, possibly digging for fence posts, removing or installing heating oil tanks, and possibly construction of new homes or other structures. Most of these activities are major projects that would go deeper than 18 to 24 inches, are relatively infrequent, and can be managed through an institutional control program. Digging also results in mixing soil from the surface layers with soil at depth so that the concentration resulting at the surface would not be the same. Also, if a geomembrane liner is left at 12 inches as in the Cleanup Action Plan, this would be an obvious sign to the home owner that precautions should be taken for soil below this level.

Issue 20, Grass as an Effective Cover

Grass or ground cover has been recommended as a part of a continuum of recommended remedial actions with increasing levels of a contaminant (e.g., Section 403 rule for lead in soil: U.S. EPA 1994). A number of studies have also shown that ground cover significantly decreases exposure to metals in soil (e.g., Cook et al. 1993, Hilts 1996; Hwang et al. 1997).

Joyce S. Tsuji, Ph.D., DABT — 2/25/99 Date

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H-1. COST ESTIMATE

In order to better understand impacts of implementing the draft Cleanup Action Plan (CAP), Asarco conducted a preliminary analysis of project costs. In preparing the cost estimate, Asarco attempted to identify requirements contained in the CAP as well as interpret tasks that did not contain much detail. In addition, Asarco used reduced costs for tasks identified in the CAP that allowed some flexibility in implementation such as relief from sampling all properties to a depth of four feet. By this approach, the cost presents a balanced estimate.

The cost estimate contains tasks associated with the following:

- mobilization and set-up
- remediation of residential properties
- remediation of commercial properties
- remediation of public areas
- remediation of right-of-ways including residential and cloverleafs
- sufficient containment
- performance monitoring
- confirmational monitoring
- remediation of fenced area
- institutional controls
- transportation and disposal of peripheral soil
- additional properties outside the current boundary

This attachment includes the following:

- general assumptions used to estimate each task cost
- spreadsheet for right-of-way overlying smelter residuals (cloverleafs)
- spreadsheet for the fenced area
- spreadsheet for institutional controls

The total estimated cost is $96.5 million dollars. The single most significant factor affecting the estimate is the number of properties and/or decision units that require remediation.

Asarco used data generated by the GIS linear maximum methodology presented to the Technical Work Group during mediation to estimate the number of residential properties which would require remediation to each depth increment. In addition, data from Ecology's boundary study was used to estimate the impact of the 2-times maximum decision rule (40 ppm for the top 12 inches). The scope of remediation for commercial and public areas was estimated based on evaluations performed during mediation.

This estimate also assumes the most cost effective option for disposal of the excavated soil. This includes managing as much soil at the Tacoma Smelter as possible (approximately 115,200 tons) and using the rail option for hauling soil destined for a Subtitle D landfill.

Asarco made several assumptions that provide substantial cost savings. Two significant assumptions include using backfill material with arsenic concentrations less than 20 ppm but above 0.67 ppm and sloping excavations near building structures when excavating to a depth of 42 inches. The total estimated cost would increase significantly if these assumptions change. In addition, Asarco estimated only 46 properties outside the current study area boundary will require remediation. Analysis indicates that many more properties could require remediation based on the proposed sampling strategy.

ACTIVITY	Description	Number	Units	Unit Cost	Total Cost
Mobilization & set-up[1]	All tasks	1	LS	$1,000,000	$1,000,000
Residential pre-removal sampling[2]	To 48 inches	38	Prop.	$6,400	$243,200
Residential pre-removal sampling[3]	To 36 inches	101	Prop.	$5,300	$535,300
Residential pre-removal sampling[4]	To 24 inches	456	Prop.	$4,200	$1,915,200
Residential pre-removal sampling - additional 400 square foot areas[5]	To 24 inches	1,280	Boring	$75	$96,000
Residential pre-removal sampling - additional analyzes for lead, antimony, and thallium[6]	Only 10 properties remediated in 1999	1,600	Sample	$35	$56,000
Residential maintenance area soil and dust sampling[7]	Crawl spaces and utility access	595	Prop.	$500	$297,500
Boundary Sampling[8]	Transects	8	Each	$7,500	$60,000
Residential properties for verification sampling[9]	Property	526	Prop.	$630	$331,380
Residential properties to remediate[10]	Total properties to remediate as designated below:				
	>20 ppm (0-6 in)	99	Prop.	$28,200	$2,791,800
	>20 ppm (0-12 in)	138	Prop.	$37,000	$5,106,000
	>60 ppm (0-18 in)	88	Prop.	$40,500	$3,564,000
	>60 ppm (0-24 in)	86	Prop.	$52,700	$4,532,200
	>150 ppm (0-30 in)	66	Prop.	$69,000	$4,554,000
	>150 ppm (0-36 in)	-	Prop.	$84,000	$0
	>150 ppm (0-42 in)	14	Prop.	$98,000	$1,372,000
	>150 ppm (0-42 in)	32	Prop.	$80,700	$2,582,400
	>150 ppm (0-48 in)	3	Prop.	$121,000	$363,000
Residential soil requiring transportation and disposal[11]	Tons excavated	398,000	Tons	see peripheral soil T & D	-
Residential window sealing[12]	Plastic and tape and painting trim	526	Prop.	$1,000	$526,000
Residential air conditioning[13]	Portable unit per house	1	LS	$75,000	$75,000
Residential deck replacement[14]	Remove existing to access soil and replace	175	Each	$1,000	$175,000
Residential non-permanent structures[15]	Move to access soil and rebuild to meet standards	120 and 30	LS	$720,000	$720,000
Residential maintenance areas[16]	Secure screen, clean, apply sign and lock, and supply PPE	526	Prop.	$650	$341,900
Residential house cleaning[17]	Dusting, mopping, and carpet shampooing	526	Prop.	$500	$263,000
Placement of fabric markers[18]	Sites with arsenic concentrations >20 ppm below 12 inches	289	Prop.	$775	$223,975
Residential post-removal dust sampling[19]	Carpet and window sills	526	Prop.	$250	$131,500
Commercial pre-removal sampling[20]	4,000 sq.ft. decision unit to 24 inches	54	DU	$1,700	$91,800
Commercial verification sampling[21]	4,000 sq.ft. decision unit	46	DU	$330	$15,180
Commercial decision units requiring remediation[22]	Commercial decision units requiring remediation				
	>20 ppm (0-6 in)	-	DU	$14,300	$0
	>20 ppm (0-12 in)	-	DU	$26,000	$0
	>60 ppm (0-18 in)	46	DU	$28,000	$1,288,000
Placement of fabric markers[23]	Sites with arsenic concentrations >20 ppm below 12 inches	46	DU	$560	$25,760
Commercial soil requiring transportation and disposal[24]	Tons excavated	18,400	Tons	see peripheral soil T & D	-

Public areas pre-removal sampling[25]	4,000 sq.ft. decision unit to 24 inches	462	DU	$1,700	$785,400
Public areas verification sampling[26]	4,000 sq.ft. decision unit	325	DU	$330	$107,250
Public areas decision units requiring remediation[27]	Total public area decision units to remediate as designated below:				
	>20 ppm (0-6 in)	148	DU	$13,000	$1,924,000
	>20 ppm (0-12 in)	133	DU	$17,000	$2,261,000
	>60 ppm (0-18 in)	13	DU	$19,000	$247,000
	>60 ppm (0-24 in)	-	DU	$23,000	$0
	>150 ppm (0-30 in)	-	DU	$30,000	$0
	>150 ppm (0-36 in)	-	DU	$38,000	$0
	>150 ppm (0-42 in)	31	DU	$46,000	$1,426,000
Placement of fabric markers[28]	Sites with arsenic concentrations >20 ppm below 12 inches	44	DU	$560	$24,640
Public areas soil requiring transportation and disposal[29]	Tons excavated	89,100	Tons	see peripheral soil T & D	-
Residential ROW pre-removal sampling[30]	Unpaved alleys	11	Block	$1,700	$18,700
Residential ROW decision units > 20 ppm arsenic[31]	Paving	11	Block	$20,000	$220,000
Amount of Residential ROW soil requiring transportation and disposal[32]	Tons excavated	1,700	Tons	see peripheral soil T & D	-
ROW Overlying Smelter Residuals Remediation (Cloverleafs)[33]	All tasks	1	LS	$2,700,000	$2,700,000
Amount of ROW Overlying Smelter Residuals soil requiring transportation and Disposal[34]	Tons excavated	52,200	Tons	see peripheral soil T & D	-
Sufficient Containment Determination[35]	Visual inspection and sampling	1	LS	$213,000	$213,000
Sidewalk Upgrade[36]	Replacement	473	Each	$1,500	$709,500
Driveway Upgrade[37]	Replacement	263	Each	$3,000	$789,000
Patio Upgrade[38]	Replacement	60	Each	$1,500	$90,000
Step Upgrade[39]	Replacement	473	Each	$700	$331,100
Street and Curb Upgrade[40]	Replacement	50	Each	$70,000	$3,500,000
Additional Performance Monitoring, excluding soil (surface water, groundwater, and storm drain sediment)[41]	All tasks	1	LS	$215,000	$215,000
Confirmational Monitoring - soil, surface water, groundwater, and storm drain sediment[42]	All tasks	1	LS	$823,000	$823,000
Fenced Area[43]	All tasks	1	LS	$13,000,000	$13,000,000
Institutional Controls[44]	All tasks	1	LS	$9,500,000	$9,500,000
Peripheral Soil T & D:[45]	Total tons excavated	559,400	Tons	see below:	see below:
1. Short haul to Fenced Area[46]		45,000	Tons	$5.00	$225,000
2. Stockpile/transfer soil destined for Tacoma Smelter[47]		86,400	Tons	$8.00	$691,200
3. Transport and dispose of at Tacoma Smelter[48]		115,200	Tons	$20.00	$2,304,000
4. Short haul soil destined for Subtitle D facility to railroad spur[49]		399,200	Tons	$5.00	$1,996,000
5. Transport and dispose of at Subtitle D Facility[50]		399,200	Tons	$40.00	$15,968,000
Additional Properties Outside Current Boundary[51]	All tasks	46	Prop.	$70,000	$3,220,000
ESTIMATED TOTAL COST (rounded to thousands)					**$96,566,000**

GENERAL ASSUMPTIONS

(1) Mobilization and office set-up based on project duration of 9 years. This estimate includes only 10 properties remediated the first year (1999).

(2) An estimated 38 of 595 properties will require sampling to a depth of 48 inches. Sampling includes 20 borings with a sample collected every 6 inch interval resulting in 160 samples analyzed for arsenic per property. Residential properties comprising the 595 sites consist of the following:1 senior center, 1 child care facility, 2 trailer parks, and 591 single or multi-family residences.

(3) An estimated 101 properties will require sampling to a depth of 36 inches. Sampling includes 20 borings with a sample collected every 6 inch interval resulting in 120 samples analyzed for arsenic per property.

(4) An estimated 456 properties will require sampling to a depth of 24 inches. Sampling includes 20 borings with a sample collected every 6 inch interval resulting in 80 samples analyzed for arsenic per property.

(5) Properties exceeding 8,000 square feet will have a total of 1,280 - 400 square foot areas requiring a sample location. For example: a property of 20,000 square feet requires 30 additional sample borings (20,000 - 8,000 = 12,000 / 400 = 30). It is assumed that the larger properties effected by this are located in areas where sampling is to a depth of 24 inches. Note this was used in Alternative B.

(6) The 10 properties remediated in 1999 require additional analyses. Note that thallium cannot be analyzed with the XRF; therefore, these analyses will be conducted by wet chemistry.

(7) Every property has some type of maintenance area. Ten dust and soil samples will be collected and analyzed for arsenic.

(8) This estimate was taken from Alternative C.

(9) 526 properties will fail the two decision rules (average and maximum). GIS linear max data indicated a total of 458 properties fail the average decision rule. Based on SAIC's boundary study in 1996, data suggest that approximately 50 percent of the properties passing the average decision rule will fail the maximum decision rule. Therefore, about one-half of 137 properties passing the average rule (595 total properties less 458 properties) will fail the maximum rule resulting in 68 additional properties totaling 526 properties requiring remediation. Of the 68 additional properties, 34 were placed in the 0-6 inch interval and 34 were placed in the 6-12 inch interval.

(10) Because almost all properties in the current study area are addressed in remedial activities, the average property size of available area excluding the house and driveway was used (7,400 square feet) for cost estimates. In an attempt to be more precise, the 49 properties requiring remediation at depth (greater than 36 inches) were evaluated for area size. It is estimated that 35 properties have an average of 6,000 square feet. Therefore, 14 properties remediated to a depth of 42 inches utilize the 7,400 square foot average. The costs include site preparation, soil removal, soil replacement, and landscaping. Properties remediated to a depth of 48 inches require shoring. Backfill material will be below 20 ppm but above 0.67 ppm.

(11) Cubic yards based on the average area was converted to tons for cost estimating. Conversion was multiplying the volume in cubic yards by 1.8 (30% for swell and 50% for density).

(12) All home owners will request their windows sealed. Trim will require repainting and caulking when plastic is removed.

(13) Cost includes purchasing air conditioners and supplying to residences during remediation throughout the project duration.

(14) Estimated one-third of the properties will require the deck to be removed and replaced.

(15) Estimated 10% of the properties will have a non-permanent structure that must have permit status researched and must be moved for $1000. An estimated 30 properties will require a non-permanent structure (e.g., detached garage) to be removed and replaced for $20,000 each.

(16) It is estimated that all properties will have a maintenance area. It is assumed that all the areas have an existing vapor barrier (plastic). Areas will be cleaned by removing vapor barrier and washing off and wiping down joists, etc. with water and rag. Sealing consists of attaching screen to above-grade access areas.

(17) Costs include cleaning the structure by shampooing carpet, mopping floors and dusting.

(18) Fabric marker required at properties remediated below a depth of 12 inches because it is likely that arsenic concentrations above 20 ppm exist. In addition, all properties remediated to a depth of 6 inches do not contain arsenic concentration above 20 ppm below that depth.

(19) Costs include collecting and analyzing 10 total samples from house and carpet.

(20) 4 commercial sites south of Broadway, including the DOT yard, have unpaved areas that total 215,000 square feet. Also, Ecology will issue a "No Further Action" letter for the Denney Youth Center.

(21) The 3 sites adjacent to Broadway, along with the DOT yard, require remediation. The site at the southeast corner of the study area near 14th and Mill Street will not require remediation.

(22) Costs include site preparation, soil removal, soil replacement, and landscaping. Backfill material will be below 20 ppm but above 0.67 ppm.

(23) Fabric marker required at decision units remediated below a depth of 12 inches because it likely that arsenic concentrations above 20 ppm exist.

(24) Cubic yards based on the area was converted to tons for cost estimating. Conversion was multiplying the volume in cubic yards by 1.8 (30% for swell and 50% for density).

(25) Public areas include the American Legion Park, Wiggums Hollow Park, Hawthorne Elementary School, the mausoleum, and 3 wooded areas that total 1,850,000 square feet. Also, Ecology will issue a "No Further Action" letter for the Legion Memorial Golf Course.

(26) The mausoleum will require remediation (124,000 square feet) to 42 inches; two wooded areas (50,000 square feet) to 18 inches; one wooded area (270,000 square feet), one-half of Wiggums Hollow Park (153,000 square feet), and one-eighth of American Legion Park (110,000 square feet) to 12 inches; and one-half of Wiggums Hollow Park (153,000 square feet) and one-half of American Legion Park (440,000 square feet) to 6 inches. Areas not remediated include Hawthorne Elementary School (220,000 square feet) and three-eighths of American Legion Park (330,000 square feet).

(27) Costs include site preparation, soil removal, soil replacement, and landscaping. Backfill material will be less than 20 ppm but above 0.67 ppm.

(28) Fabric marker required at decision units remediated below a depth of 12 inches because it is likely that arsenic concentrations above 20 ppm exist.

(29) Cubic yards based on the area was converted to tons for cost estimating. Conversion was multiplying the volume in cubic yards by 1.8 (30% for swell and 50% for density).

(30) Residential ROWs include 10 unpaved alleys and Balsam Lane which is unpaved. Each is about 7,000 square feet.

(31) All residential ROWs require remediation. Therefore, paving option selected because its more cost effective.

(32) Total tons generated based on excavation of top 4 inches so current grade is kept. Cubic yards was converted to tons by multiplying the volume in cubic yards by 1.8 (30% for swell and 50% for density).

(33) See Attached.

(34) Cubic yards based on the area was converted to tons for cost estimating. Conversion was multiplying the volume in cubic yards by 1.8 (30% for swell and 50% for density).

(35) A qualified individual will inspect all paved surfaces (streets, sidewalks, driveways, patios, and steps) for approximately $50,000. 53 of 526 sidewalks, 53 of 526 steps, 60 of 120 patios, 263 of 526 driveways, and 115 of 165 streets will have a core sample obtained and analyzed for a cost of approximately $300 each. Units listed to be replaced will not be sampled due to visible cracks.

(36) 90% of all sidewalks will require replacement. Concrete may be disposed of at a demolition landfill and no soil removal is required.

(37) 50% of all driveways will require replacement. Concrete may be disposed of at a demolition landfill and no soil removal

is required.

(38) About 60 properties have a patio that will require replacement. Concrete may be disposed of at a demolition landfill and no soil removal required.

(39) 90% of all steps will require replacement. Concrete may be disposed of at a demolition landfill an no soil removal is required.

(40) About 30% of all streets and curbs will require replacement. Concrete may be disposed of at a demolition landfill and no soil removal required.

(41) Additional performance monitoring includes sampling the following during remediation for 9 years: 20 sites for surface water twice per year ($6500 per year); installing 10 additional shallow groundwater wells ($20,000) and sample a total of 16 wells twice per year ($10,000 per year); and sample 60 catch basins for sediment twice per year ($5,600 per year). Note soil sampling is addressed in assumptions 2, 3, 4, 5, 8, 9, 20, 21, 25, 26, 30, 33, and 43. Also, soil sampling is not repeated throughout the 9 years.

(42) Confirmation monitoring includes sampling the following every 5 years for 30 years (6 episodes): 5% of residential properties for soil which consists of 30 properties to 24 inches ($126,000 per episode); 10 sites for storm water ($3,300 per episode); 16 groundwater monitoring wells ($5,000 per episode); and 30 catch basins for sediment ($2,800 per episode). Note that 30 years used for cost estimating, beyond 30 years is not included.

(43) See Attached.

(44) See Attached.

(45) Total tons generated in Peripheral Area. Note that soil removed from Fenced Area is addressed in the detailed attachment. The amount generated from the Fenced Area was not added to the Peripheral Area because it is dangerous waste while the soil from the Peripheral Area is problem waste and therefore, they are managed differently.

(46) Approximately 25,000 cubic yards (45,000 tons) of problem waste (<3,000 ppm arsenic) can be placed in the excavated area within the Fenced Area. Soil will be hauled with a dump truck. Placement cost is included in the detailed Fenced Area cost estimate.

(47) Approximately 75% of soil that can be managed at Tacoma Smelter must be hauled to a location, stockpiled, and reloaded due limited access for truck and pups. Therefore, only 25% of all soil that will be managed at the Tacoma Smelter will allow the direct use of a truck and pup.

(48) A total of 64,000 cubic yards (115,200 tons) of problem waste can be disposed of at the Tacoma Smelter. Cost includes hauling soil by truck and pup and stockpiling.

(49) All excess soil (soil beyond the amount allowed in the Fenced Area and at the Tacoma Smelter) will be disposed of at a Subtitle D landfill. This amount of soil will be hauled to a railroad spur with dump trucks.

(50) Soil being managed at a Subtitle D landfill will be hauled by rail.

(51) An estimated 93 additional properties were identified in Alternative B. This estimate was not based on chemical data. For purposes of this cost estimate, one-half of the Alternative B estimate was used because the 3-part rule is replaced with a 2-part rule. However, the actual number of additional properties could resemble or exceed the Alternative B estimate of 93 properties given the proposed sampling strategy.

Cleanup Action Plan Cost Estimate
for Right-of-Way Overlying Smelter Residuals

ASSUMPTIONS:

Total area addressed is 9 acres which consists of both cloverleafs, right-of-way adjacent to Broadway, and 529 overpass

Due to location of 529 overpass, excavation cannot occur

Cloverleafs and right-of-way will require excavation to 2 feet and site resembles public area remediation (total of 29,000 cubic yards)

Transportation and disposal of soil is addressed in main spreadsheet

Fabric marker is not required

Backfill material will be below 20 ppm but above 0.67 ppm

TASK DESCRIPTION	UNITS		COST		SUBTOTAL COST
Cap 529 overpass	LS	$	150,000	$	150,000
Sampling (98 - 4,000 sq.ft. decision units to 4 feet)	98	$	2,800	$	274,400
Soil removal and replacement (98 - 4,000 sq.ft. decision units)	98	$	23,000	$	2,254,000
Engineering and Health and Safety	LS	$	50,000	$	50,000
TOTAL COST				$	2,728,400

Cleanup Action Plan Cost Estimate for Fenced Area

ASSUMPTIONS:

Remove material with arsenic concentrations >3,000 ppm
A multiplier of 1.6 is used to convert cubic yards to tons
A Subtitle C facility can effectively treat all levels of arsenic
Area grade will be increased by about 2 feet near Hawthorne Street and 5 feet elsewhere
Entire area will be a consolidation area and capped (4 foot cap)

TASK DESCRIPTION	NO UNITS	UNIT	MATERIAL UNIT COST	MATERIAL COST	LABOR AND EQUIPMENT UNIT COST	LABOR AND EQUIPMENT COST	SUBTOTAL COST
EXCAVATION OF FENCED AREA							
Mobilization	1	LS			$ 95,000	$ 95,000	$ 95,000
Sampling (to 3' every 400 ft2 of excavation, total area is 2.8 acres, 305 borings, and 1830 samples)	1	LS			$ 60,000	$ 60,000	$ 60,000
Clearing & Grubbing	6	ACRE			$ 4,560	$ 27,360	$ 27,360
Subsurface Demolition & cap utils	1	LS			$ 154,000	$ 154,000	$ 154,000
Remove existing streets incl asphalt	1	LS			$ 28,000	$ 28,000	$ 28,000
Detention Ponds & haul roads	1	LS			$ 131,000	$ 131,000	$ 131,000
Temp & Perm. fencing	1	LS	$ 40,000	$ 40,000	$ 22,000	$ 22,000	$ 62,000
Excavate soils >3,000 ppm	25,000	CY			$ 18.00	$ 450,000	$ 450,000
Backfill with residential soils <3,000 ppm	25,000	CY			$ 3.50	$ 87,500	$ 87,500
Temporary cover during construction	250,000	SF	$ 0.25	$ 62,500	$ 0.25	$ 62,500	$ 125,000
Install sand bags restraints for temp cover	250,000	SF	$ 0.10	$ 25,000	$ 0.15	$ 37,500	$ 62,500
Transport >3,000 ppm to Subtitle C	40,000	TON			$ 30	$ 1,200,000	$ 1,200,000
Dispose soil >3,000 ppm at Subtitle C	40,000	TON			$ 140	$ 5,600,000	$ 5,600,000
Subtotal				$ 127,500		$ 7,799,860	$ 8,082,360
CAP FENCED AREA							
Mobilization	1	LS			$ 10,000	$ 10,000	$ 10,000
Monuments	1	LS			$ 2,000	$ 2,000	$ 2,000
Site Grading (6 acres)	250,000	SF			$ 1.00	$ 250,000	$ 250,000
Geosynthetic Clay Liner	250,000	SF	$ 0.50	$ 125,000	$ 0.20	$ 50,000	$ 175,000
Flexible Membrane Liner	250,000	SF	$ 0.50	$ 125,000	$ 0.20	$ 50,000	$ 175,000
Drainage Layer (6" thick)	4,630	CY	$ 12.00	$ 55,560	$ 6.75	$ 31,253	$ 86,813
Cover Soil (36" thick)	28,000	CY	$ 10.00	$ 280,000	$ 6.75	$ 189,000	$ 469,000
Topsoil (6" thick)	4,630	CY	$ 15.00	$ 69,444	$ 6.75	$ 31,250	$ 100,694
Hydroseeding	250,000	SF	$ 0.25	$ 62,500	$ 0.20	$ 50,000	$ 112,500
Passive venting system	1	LS	$ 5,000	$ 5,000	$ 10,000	$ 10,000	$ 15,000
Stormwater Management System	1	LS	$ 40,000	$ 40,000	$ 35,000	$ 35,000	$ 75,000
Groundwater Interception Trench	350	LF	$ 100	$ 35,000	$ 125.00	$ 43,750	$ 78,750
Subtotal				$ 797,504		$ 752,253	$ 1,549,757
ESTIMATED COST							$ 9,632,117
Contingency (20%)							$ 1,926,423
H&S (2%)							$ 192,642
TOTAL ESTIMATED COST							$ 11,751,183
ENGINEERING							
Engineering Design	1	LS					$ 600,000
Construction Management	1	LS					$ 600,000
Total Engineering							$ 1,200,000
TOTAL CAPITAL OUTLAY (rounded to thousands)							$ 12,951,000

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Cleanup Action Plan Cost Estimate
for Institutional Controls

Description	Initial	Subsequent[1]	Present Value of Outyears[2]	Total Cost
Deed Covenants	(year 1)	(years 2-30)		
Continuing Operations, Maintenance & Monitoring of the Consolidation Facility[3]	$20,000	$20,000	$271,814	$291,814
Deed Covenants & Restrictions[4]	$3,000			$3,000
Permit Overlay	(years 1-5)	(years 6-30)		
Construction Permits & Sampling as Needed[5]	$40,000	$20,000	$394,271	$434,271
Database and Web Page	(year 1)	(years 2-30)		
Development[6]	$150,000			$150,000
Maintenance[7]		$20,000	$271,814	$271,814
Worker Protection Program	(year 1)	(years 2-30)		
Document[8]	$75,000			$75,000
Guidance Distribution		$5,000	$67,954	$72,954
Small Quantity Soil Disposal Program	(year 1)	(years 2-30)		
Labor, Materials & Disposal[9]	$25,000	$25,000	$339,768	$364,768
Large Project Soil Disposal and Management Program	(year 1)	(years 2-30)		
Labor, Materials & Disposal[10]	$464,000	$464,000	$6,306,095	$6,770,095
Public Education Program	(year 1)	(years 2-30)		
Development	$30,000			$30,000
Mailings	$5,000	$5,000	$67,954	$72,954
Exposure Testing Program	(years 1-5)	(years 6-30)		
Health Monitoring[11]	$20,000	$10,000	$197,136	$217,136
Environmental Investigations	(year 1)	(years 2-30)		
Program Development	$20,000			$20,000
Investigations		$10,000	$135,907	$135,907
Effectiveness Evaluation	(year 1)	(years 2-30)		
Evaluation of effectiveness of Institutional Controls	$5,000	$5,000	$67,954	$72,954
Resampling Costs[12]				
Citizen's Advisory Committee Progra	(year 1)	(years 2-30)		
Committee Supplies, Support	$5,000	$5,000	$67,954	$72,954
Dispute Resolution Program	(year 1)	(years 2-30)		
Development of Program & Dispute Resolution	$30,000	$15,000	$203,861	$233,861

Cleanup Action Plan Cost Estimate
for Institutional Controls

Contingency Plans	(year 1)			
Plan Development	$30,000			$30,000
Financial Assurances	(year 1)	(years 2-30)		
Development of Financial Assurance Plan and Contingency Plan	$20,000			$20,000
Testing & Reporting	$10,000	$10,000	$135,907	$145,907
TOTAL				$9,485,388

ASSUMPTIONS

[1] Based on 30 years for cost estimating. Beyond 30 years is not included but no significant cost change expected using present value.

[2] Used 6% rate.

[3] Site maintenance at the fenced area. Monitoring costs included in Additional Performance Monitoring in main cost estimate.

[4] Place covenants and restrictions in the deeds for Asarco owned property within the Former Arsenic Trioxide Processing Area and all properties within the peripheral area owned by an Ecology-named Potentially Liable Person.

[5] Develop guidance and permit applications first year. Subsequent years working with applicants and sampling.

[6] Reimbursement costs to Health District for initial setup of database and assistance in completion.

[7] Data entry and computer updates.

[8] Develop a program based on a study.

[9] Based on Alternative B.

[10] Based on Alternative B.

[11] More residents will participate in years 1-5 (based on Alternative B).

[12] See Confirmational Monitoring in main cost estimate.

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Everett Smelter Site Feasibility Study
Substantial and Disproportionate Analysis

The Feasibility Study for the Everett Smelter Site (Hydrometrics, 1995) includes a Substantial and Disproportionate Analysis of cleanup costs associated with varying arsenic action levels for the remediation of site soils. The focus of the analysis is the volume of soil generated through removal and replacement actions relative to varying arsenic action levels and the corresponding costs. In order to provide a point of comparison with regard to the effectiveness of the varying arsenic action levels, a corresponding analysis of the mass percentage of arsenic reduction within the site is also provided. The finding of the Substantial and Disproportionate Analysis is that the most cost-effective cleanup program would be based on soil removal and replacement at an action level between 76 and 100 ppm arsenic.

Subsequent to this analysis, Washington Department of Ecology contracted for an independent review of the remediation cost estimate provided in the FS (Final Report - Determination of Total and Accessible Soil Volumes and Associated Cleanup Costs at the Everett Smelter Site [Ecology Report] [prepared for Washington State Department of Ecology by Science Applications International Corporation, 1997]). The cost estimates provided in the Ecology report correspond to a selected group of the varying action levels for arsenic provided in the FS analyses. For the purpose of illustration, the following table provides a comparison of the estimated costs for action levels of 20 and 100 ppm arsenic provided in the two reports.

Action Level Considered	Everett Smelter Site Feasibility Study	Ecology Report
20 ppm	$64,478,000.00	$54,327,000.00
100 ppm	$30,909,000.00	$27,558,000.00
Ratio	2.1	2.0

As shown on the above table, although there is a difference in estimated cost between the two analyses the proportional relationship between estimated remediation costs for 20 and 100 ppm arsenic action levels is essentially the same.

Both of the above analyses rely on the RI data set for soil arsenic concentrations. Numerous data points for site soil arsenic concentrations have been generated since the RI.

Albuquerque, NM • Austin, TX • Boston, MA • Boulder CO • Missoula, MT • Port Lavaca, TX • San Francisco, CA • Seattle, WA • Wallace, ID

Those data points are from a variety of sources including site investigations conducted independently by Ecology, detailed investigations of residential properties conducted by ASARCO in response to Ecology's 1997 Administrative Order, and independent sampling efforts by other parties within the site. The data from these studies have been merged with the RI data set to provide a comprehensive data set for the Everett Smelter Site Soils (see attached). This data set has been provided both in hard copy and electronic format to Ecology and other interested parties and has served as the basis for further evaluation of remedial alternatives.

In order to allow the expanded data set to be readily used for analyses similar to those described previously for the FS and Ecology efforts, the data set has been imported into a geographic information system (GIS). The GIS analysis employed three methods of estimating sitewide arsenic concentrations to provide the approximate number of properties and corresponding soil volumes potentially requiring removal. After the standardization of the data set to allow for input to the GIS, the following steps were preformed to estimate concentrations at the approximately 595 existing residences peripheral to the fenced portion of the former smelter facility footprint and within the current Community Protection Measures boundary:

- All sample points had coordinates corresponding to their locations. The entire data set (excluding qualified data) was used to estimate sitewide concentrations in 6" depth increments using one of three methodologies. The first methodology utilized a linear interpolation of the average concentrations for the depth interval, the second utilized a linear interpolation of the maximum concentration for the individual depth increments, and the third utilized a linear interpolation of the maximum concentration within a 500-foot cell approach.

- For each methodology employed, the interpolation process estimated sitewide concentrations for the soil column in 6-inch increments. Each residence was then queried to estimate the maximum removal depth based on the criteria for each alternative. For example, if an alternative required removal of soil if the concentration exceeded 20 ppm up to two feet in depth and 200 ppm in any depth interval thereafter, the query of a residence examined 6" increments and used interpolated concentration values to "test" the depth and concentration criteria for failure. The maximum depth of "failure" was counted for each residence to obtain house counts requiring removal in 6" increments. For the above example, if the 0"-6" concentration was 60 ppm (fail), the 6"-12" concentration was 45 ppm (fail), the 12"-18" concentration was 18 ppm (pass), the 18"-24" concentration was 50 ppm (fail), the 24"-30" concentration was 180 (pass), the 30"-36" concentration was 150 ppm (pass), and the 36"-42" concentration was 100 ppm (pass), the <u>greatest</u> depth of failure is in the 18"-24" increment and the residence is counted in the 0"-24" removal category. The total number of houses failing in each depth increment were tallied within the Community Protection Measures to obtain total counts.

As previously noted, the GIS analyses described above provide estimates of the number of residential properties and associated soil volumes requiring remediation at a given action

level. These analyses can be used as a means of evaluating whether a substantial and disproportionate analysis relying on the expanded site data set would be similar to those provided in the FS and confirmed by Ecology in their report. Both the FS and the Ecology report utilize area of the site (or number of residences) exceeding an action level along with assumptions on soil removal depths to develop soil volume estimates that are then multiplied by unit costs to develop total project cots. Since there is a linear relationship between the number of residences requiring soil removal and replacement corresponding soil volumes, and total costs. the estimates of number of residences and soils volumes requiring remediation at a given action level can serve the same purpose in terms of evaluating the disproportionality between differing action levels. For the purpose of a simple comparison, the number of residential properties (with associated soil volumes) requiring remediation are provided below utilizing the three GIS analysis techniques described previously, for action levels of 20 and 100 ppm:

*Action Level Considered	GIS Linear Max 500' cell	GIS Linear Max	GIS Linear Average
20 ppm	517 residences (221,00 cy)	480 residences (235,430 cy)	464 residences (211,000 cy)
100 ppm	215 residences (81,500 cy)	230 residences (92,000 cy)	125 residences (48,000 cy)
Ratio	2.4 (2.7)	2.1 (2.6)	3.7 (4.4)

* Each residence is queried to estimate the maximum removal depth based on specific test criteria. For this comparison, the test criteria for a 20 ppm action level included removal of soil above 20 ppm up to 24" in depth, and removal of soil above 760 ppm up to 42". Similarly, the 100 ppm action level removed soil above 100 ppm up to 24" and above 760 ppm up to 42". Volumes were generated based on an average lot size of 7,400 sq. ft. House counts were generated, based on the specific test criteria, in 6-inch depth increments. The number of houses in an individual increment, multiplied by the removal depth, multiplied by the average lot size yields anticipated volumes of soils to be removed.

As shown above, the ratios of numbers of properties requiring remediation at 20 ppm vs. 100 ppm are the same or higher than the ratios of costs provided in the FS or Ecology report. Analyses including an assumed maximum depth of remediation provide similar ratios based on volumes of soil requiring removal and replacement. It should also be noted that the number of properties estimated at 20 ppm using maximum values is limited by the coverage of the data. It is highly likely that if additional samples were collected beyond the area currently represented by sampling, additional homes would be identified as potentially requiring remediation at an action level of 20 ppm arsenic.

Review of the original FS Substantial and Disproportionate Analysis and Ecology's subsequent evaluation of arsenic costs, relative to the larger data set for Everett soils indicates that those analyses are still representative. Analysis of the larger data set also indicates that, depending on the sampling methodology chosen, the number of residential properties with soils exceeding 20 ppm arsenic may not be bounded by the current data set; therefore, the costs associated with 20 ppm may be even more disproportionate relative to action levels between 76 and 100 ppm arsenic.

MCCULLEY, FRICK & GILMAN, INC.

Steven A. Werner
President

H-3. Method C and Additional Regulatory Flexibility

Ecology's rigid interpretation of its regulations led it to conclude that compliance with a 20 ppm cleanup level is a "threshold requirement" that must be met in the 0 to 6 inch and 6 to 12 inch soil horizons. It apparently has concluded that this is required even if implementation of that soil cleanup level leads to a net increase in human health risk.

This interpretation, with its attendant negative impacts on human health, is totally unwarranted. WAC 173-340-360(9)(i) sets forth the general goal that "cleanup actions conducted under this chapter will not result in a significantly greater overall threat to human health and the environment than other alternatives." Ecology's regulations give it latitude to avoid such remediation risks in a number of ways.

First, WAC 173-340-706 allows use of Method C cleanup levels in lieu of Methods A or B when attainment of Method A or Method B levels will create a significantly greater overall threat to human health than attainment of Method C levels. Remediation risk increases proportionately with the volume of soil excavated, transported, disposed, and replaced with clean soil, and Ecology's own data demonstrates that attainment of the 20 ppm cleanup level will cause a net increase in human health risk.

In its Final EIS for its MTCA regulations, Ecology, using actual traffic data collected by the State Department of Transportation, calculated a risk fatal traffic accidents of 1.1×10^{-5} per truckload of excavated soil transported to the hazardous waste facility at Arlington, Oregon (assuming a 600 mile round-trip). When that statistic is applied to the soil volume and mileage data in the draft EIS, and the mileage adjusted for the distances from Everett, the transportation of the massive volume of soils to be excavated from Everett will create a risk of a fatal truck accident of approximately 1×10^{-1}, i.e. one in ten. See Dr. Beck Statement, Response to Comment 12. This occurs because implementation of the plan contemplates in excess of 16,000 truckloads of excavated and replacement soils. Although Ecology does not mention this risk of a fatality, it does project a total of 6.5 accidents from transportation of these same soil volumes. Presumably, some of these will involve serious but non-fatal personal injuries.

Ecology has also failed to consider remediation risk from the on-site excavation and other activities. Based on the number of man-days anticipated that will be spent on the remediation, more than 1400, there is a risk of fatal accidents from the remediation itself of approximately 1.7×10^{-3}. See Dr. Beck Statement, Response to Comment 12.

These actuarial risks, individually or in the aggregate, exceed by orders of magnitude the theoretical risk of cancer that the cleanup is designed to avoid. Ecology's Method B formula is designed to avoid any risk larger than one-in-a-million to the most susceptible individual in the exposed population. To illustrate, even assuming that all of Ecology's default assumptions are actually true, the cancer risk to this most exposed child that would result from leaving soil in place with an average concentration of 67 mg/kg would be only 10^{-4} or one-in-ten-thousand. This figure is derived from Ecology's calculation that 0.67 mg/kg corresponds to a 10^{-6} risk. The

risk level from leaving arsenic in soil at 67 ppm is therefore one thousand times smaller than the risk of a traffic fatality. And, as demonstrated throughout these comments, the actual cancer risk is much lower, and is effectively non-existent.[1]

A second avenue to avoid the adverse human health impacts of the proposed cleanup lies in the specific authorization that Ecology may consider new scientific information when setting cleanup levels for individual sites. Since use of 20 ppm is not scientifically defensible, the agency has authority to set new cleanup levels for this site to avoid implementation of a cleanup that would not be "scientifically and technically sound" under WAC 173-340-702(6). Similarly, WAC 173-340-708 authorizes Ecology to adopt new cancer potency factors for specific chemicals and site-specific bioavailability factors based on the clear and convincing evidence that has already been provided. That information has been provided to Ecology, but it has been categorically rejected on that ground that it is Ecology's "policy decision" to apply its formula so that it can be assured of adequately protecting human health. See Comments on Ecology Review of New Science. Given that its cleanup will increase human health risk, this rationale is indefensible.

Third, consistent with its interpretation of its regulations in connection with the Ruston site, Ecology can set a cleanup level of 20 ppm, above which institutional controls are required, but set higher action levels.[2] This is allowed because a sod cover provides "containment" under WAC 173-340-740. (Containment is defined broadly to include "natural" barriers that "minimize" release into the environment.) The cleanup regulations themselves allow hazardous substance to be left in place exceeding cleanup levels, WAC 173-340-700(7)(i), and those cleanup regulations cross-reference the provisions of WAC 173-340-360(8) that allow hazardous substances to be left on site in excess of cleanup levels with "containment" and institutional controls.

Finally, as described in more detail in Sections A and B, Ecology's regulations prohibit adoption of cleanup actions for which the costs are "substantial and disproportionate" compared to the incremental gains in human health protection. Under Ecology's draft CAP, the end result

---

[1] In pointing out these regulatory provisions, Asarco does not suggest that Method C should be used at this site. Method C would also result in a cleanup with a net negative impact on human health because the soil volumes would remain quite substantial. Moreover, Method C is also inconsistent with current science since it employs the same formula as Method B with slightly different assumptions regarding exposure. Method C, however, would at least reduce the negative consequences of this cleanup.

[2] Ecology's regulations require it to insist that its regulations be applied by EPA as ARARs at federal Superfund sites. WAC 173-340-702(2). Thus, when Ecology advised EPA that it approved the Ruston cleanup and regarded it as protective of human health, Ecology effectively interpreted its own regulations as allowing an action level to be set at 230 mg/kg, provided that institutional controls were applied for soils left in place above the "cleanup level" of 20 mg/kg. There is no basis to adopt an inconsistent interpretation here.

will be that human health risks are increased at a cost exceeding $96 million. This draft CAP thus violates Ecology's own regulations and policies.

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H-4. Summary Information on Non-Smelter Urban Sources of Arsenic

As discussed in the general and detailed comments, there are the other non-smelter sources of arsenic to the urban environment which may affect arsenic concentrations in soils. This attachment provides summary supporting information for each source type.

1. Gravel/Crushed Rock

Crushed rock used by the City of Everett was tested for arsenic in 1998. Attached is the press release from Ecology, a memorandum from Hydrometrics describing the findings of the testing, and the data summary from the City of Everett.

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FOR IMMEDIATE RELEASE

May 6, 1998

98-068

Contact: Norm Peck, Toxics Cleanup Program, (425) 649-7047
Ron Langley, Ecology Public Information, (425) 649-7009

Government and Industry Test Snohomish County Crushed Rock for Arsenic

EVERETT - During routine testing, the city of Everett found naturally occurring arsenic in some of the crushed rock it uses for road projects, prompting the city to expand its testing program and avoid using the arsenic-bearing rock in residential areas. Everett's discovery of arsenic also has prompted additional research by the city, sand-and-gravel industry and the Washington State Department of Ecology.

The crushed rock came from quarries in eastern Snohomish County where arsenic occurs in mountain rock formations, and where soil and ground water arsenic concentrations are naturally higher than the average background level found in Washington. Quarry owners in that area have cooperated by providing information about their products, which they say are widely used for construction projects in Snohomish County.

"Health experts tell us that crushed rock which has already been used is not likely to cause health problems," said Ecology investigator Norm Peck. He said Ecology has advised Everett and other local governments that crushed rock from eastern Snohomish County is okay for projects where the rock does not exceed state soil cleanup standards.

State soil cleanup standards for arsenic vary from 20 parts per million (ppm) in a residential area to 67 ppm on commercial property and 200 ppm in an industrial area.

Peck said the state Department of Health is evaluating potential long-term health risks posed by arsenic in crushed rock. Ecology, the city and the industry also will continue their investigation into the matter.

He noted that arsenic runs in veins through rock formations in eastern Snohomish County in the form of arsenopyrite, which is a mixture of iron, arsenic and sulfur. Because arsenopyrite occurs intermittently, not all rock products from the area will contain it, nor has it been found in natural gravel or other rock products.

Everett public works staff discovered arsenic in some of its crushed rock during routine testing last November and promptly reported it to Ecology. In late March, Ecology and the city received test results from street shoulders and alleys where the rock was used.

Crushed rock samples taken from nine locations in Everett had arsenic levels ranging from approximately 8 parts per million (ppm) to 161 ppm. The results show that seven of the nine crushed rock samples have arsenic levels between the state residential soils cleanup standard of 20 ppm and the commercial property cleanup standard of 67 ppm.

EDITORS NOTE: Additional contacts on this issue:
City of Everett - Dale Preboski, (425) 257-8767
Washington Aggregates and Concrete Association (Bellevue) - Bruce Chattin, (425) 453-7832

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Arsenic Concentrations in Gravel Placed Beyond Everett Smelter Site

During routine testing of street sweepings in late 1997, the City of Everett discovered arsenic concentrations in this material greater than the MTCA residential cleanup standard (20 ppm). It was suspected that the source of arsenic was gravel used for roadways, alleys, or on road shoulders. One source of gravel that has been widely used in Everett and the surrounding area for road beds, street shoulders, and alleys is quarried in eastern Snohomish County in the Granite Falls area.

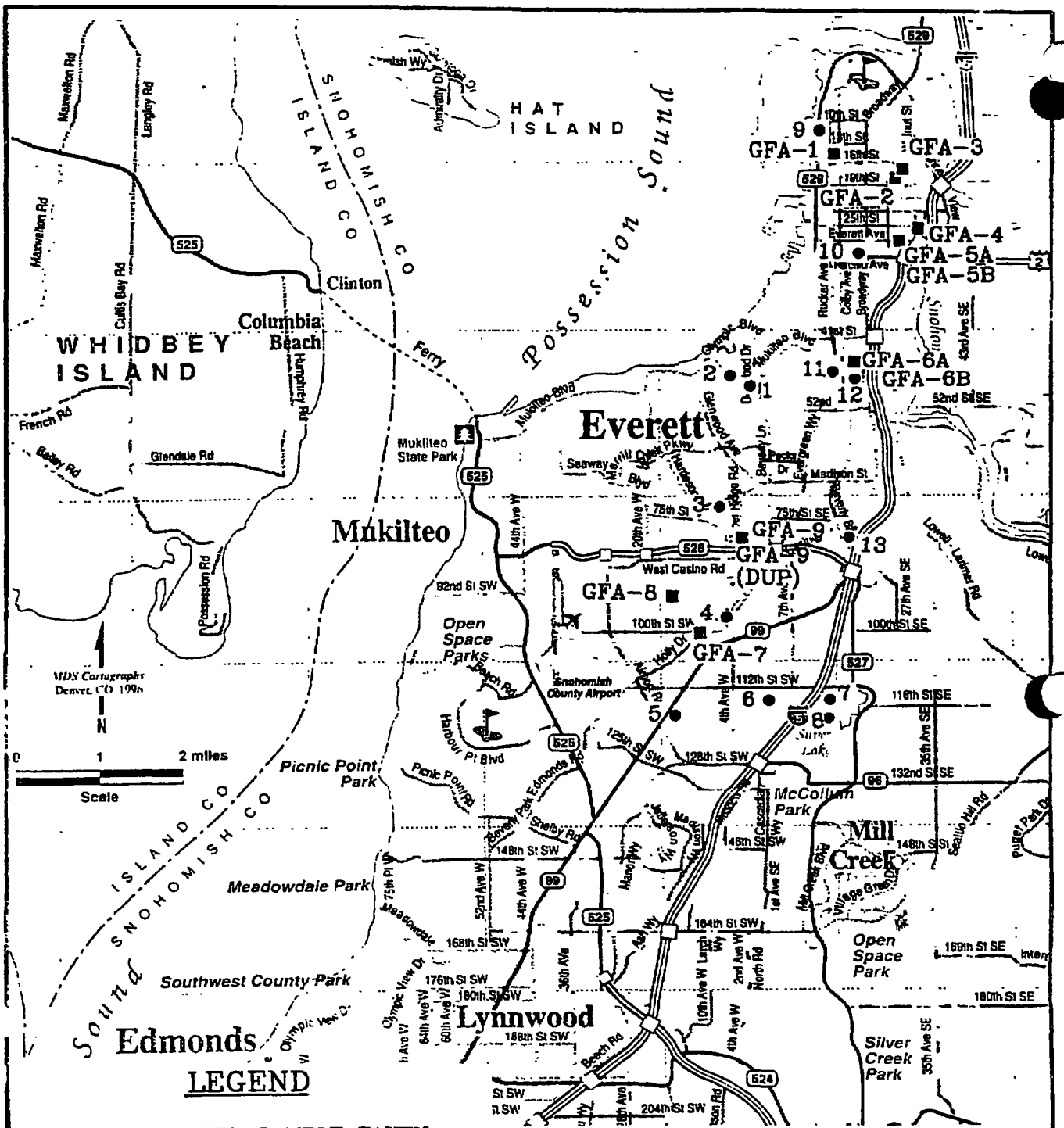
The City of Everett, in conjunction with the Department of Ecology, and Asarco have collected gravel samples from a number of locations close to and well beyond the Everett Smelter CPM boundary, as shown on the attached map (Figure 1).

- Asarco collected 13 samples on March 4, 1998 which were subsequently analyzed for arsenic. The locations and analytical results are shown in Table 1. The samples contain arsenic at levels ranging from 2.5 ppm to 48.0 ppm, with 5 of the 13 samples exceeding the 20 ppm MTCA residential clean-up standard.

- Separate analyses were performed by the City of Everett and Ecology for the samples they collected. These sample results were reported on March 23, 1998 and are presented in Table 2. Nine locations were sampled; two sites also had soil sampled below the gravel. Ecology's analytical results show a range of 5.7 ppm - 101 ppm arsenic, with 6 of 11 samples having greater than 20 ppm. Everett's results varied between 8.2 ppm and 161 ppm arsenic; 8 of 11 samples were over 20 ppm.

These results indicate a high likelihood that arsenic concentrations may be above 20 ppm in areas where gravel has been placed. The widespread use of gravel throughout the community, well beyond the Everett CPM boundary, raises the very real possibility that a definitive 20 ppm boundary for the area directly affected by and attributable to the former Everett Smelter cannot be determined. Further, continued use of gravel within the area that would be remediated to 20 ppm has the potential, over time, to raise arsenic concentrations in these areas above the residential clean-up level, negating the initial remediation.

Ecology has expressed concern that gravel with these concentrations of arsenic may pose risks to people or the environment. A working group has met to address Ecology's concern; it is comprised of Ecology, the Washington Aggregates and Concrete Association (WACA), local quarries, Snohomish County Health District, and Washington Department of Health. CH2M Hill has prepared a paper summarizing the current status of technical issues before the working group. This paper is not yet publicly available; however, once the paper is made available and reviewed, additional comments will be provided regarding the implications of widespread gravel distribution to the Everett Smelter remediation.



ASARCO INCORPORATED EVERETT SMELTER SITE EVERETT, WASHINGTON	EVERETT GRAVEL SAMPLING LOCATIONS	FIGU 1

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Consulting Scientists, Engineers and Contractors

Table 1 Everett Gravel Sampling Arsenic Data Summary

Asarco

Sample No.	Sample Location	Concentration (ppm)
1	Elm Street Park (south of Mukilteo Blvd at Elm Street)	21.0
2	Mukilteo Blvd between Elm and Ridgeway (north embankment)	23.0
3	Sievers Deucey Blvd (south side of entrance to CSR Associated's south pit)	2.9
4	Evergreen Way (west side of street south of 4th Ave - by Community Transit bus shelter)	48.0
5	111715 Highway 99 (near Sure Would Trucking, Inc.)	18.0
6	112th Street SE at 1st Ave SE	6.0
7	112th Street SE at Silver Lake Way (north side)	3.2
8	Silver Lake Park parking lot	3.8
9	11th Street SE at alley between Rucker Ave. and Grand Ave.	6.6
10	Parking lot on northeast corner of Hewitt and Lombard	2.5
11	Gravel alley between Colby and Hoyt at 47th Street	12.0
12	North entrace to funeral home parking lot off Broadway near 48th Street	27.0
13	Shoulder off Broadway near 75th Street Overpass (by newsstands)	43.0

Table 2 Everett Gravel Sampling Arsenic Data Summary

Department of Ecology and City of Everett

Sample No.	Sample Location	Type	Concentration (ppm) Ecology*	City of Everett**
GFA-1	Alley between 13th & 14th, Colby & Hoyt	Gravel	5.7	8.2
GFA-2	Alley between 16th & 17th, Virginia & Baker	Gravel	9.3	12.1
GFA-3	Alley between 15th & 17th, Cedar & Pine	Gravel	25.7	35.3
GFA-4	Alley between 25th & 26th, Chestnut & State	Gravel	29.9	47.7
GFA-5A	Shoulder on Cedar between Everett & California	Gravel	35.6	72.5
GFA-5B	Soil under gravel on Cedar St. shoulder	Soil	10.1	13.6
GFA-6A	Shoulder on Broadway between 41st & 52nd	Gravel	10.0	57.4
GFA-6B	Soil under gravel on Broadway shoulder	Soil	15.7	26.7
GFA-7	Shoulder on 9th Ave. W, 100th & Holly Dr.	Gravel	60.0	67.6
GFA-8	Shoulder on 18th Ave. W., 9700-9400 blocks	Gravel	101.0	161
GFA-9	Shoulder on Upper Ridge Rd. between 81st & 76th	Gravel	35.5	43.9
GFA-9(dup)	same as above	Gravel	32.3	34.7

These results are for field duplicates analyzed separately by Ecology and the City of Everett.
* The Department of Ecology analyzed the pulverized gravel samples.
**The City of Everett analyzed the fines sieved from the gravel samples.

Everett Crushed Rock Sampling Data Summary

March 23, 1998

Sample No.	Sample Location	Type	As (mg.kg) Ecology	As (mg.kg) Everett
N. Everett				
GFA-1	alley btwn. 13th & 14th, Colby & Hoyt	Rock	5.71	8.20
GFA-2	alley btwn 16th & 17th, Virginia & Baker	Rock	9.28	12.1
GFA-3	alley btwn 15th & 17th, Ceday & Pine	Rock	25.7	35.3
GFA-4	alley btwn 25th & 26th, Chestnut & State	Rock	29.9	47.7
GFA-5A	shoulder on Cedar btwn Everett & California	Rock	35.6	72.5
GFA-5B	soil under gravel on Cedar St. shoulder	Soil	10.1	13.6
	Average value	Rock	**21.2**	**35.2**
S. Everett				
GFA-6A	shoulder on Broadway btwn 41st & 52nd	Rock	10.0	57.4
GFA-6B	soil under gravel on Broadway shoulder	Soil	15.7	26.7
GFA-7	shoulder on 9th Ave. W, 100th & Holly Dr.	Rock	60.0	67.6
GFA-8	shoulder on 18th Ave. W., 9700-9400 blks	Rock	101.0	161.0
GFA-9	shoulder on Upper Ridge Rd.btwn 81st &76th	Rock	35.5	43.9
GFA-9 (dup)	same as above	Rock	32.3	N/A
	Average value	Rock	**51.6**	**82.5**
	Average value all samples	Rock	**34.7**	**58.8**

Arsenic (As) analytical results from crushed rock at Everett use sites, extracted by EPA Method 3050, Modified (by drying) digestive method, analyzed by EPA Method 206.2.

1.) At this time we do not have absolute assurance that all crushed rock sampled came from the Granite Falls area.

2.) N. end arithmatic mean for crushed rock samples is not significantly higher than the current cleanup standard (Ecology samples only). This suggests that crushed rock in these locations is not a significant As contributor to the area.

3.) S. end arithmatic mean for gravel samples is approximately 50 mg/kg (Ecology samples_ to about 80 mg/kg (Everett samples), which is significantly higher than the current MTCA residential cleanup standard.

4.) "Background" or soil samples from soil underlying are small in number. Definitive conclusions cannot be drawn. The results suggest, however, that there is not a significant contribution of As from crushed rock to underlying soil.

5.) The upper (log-normal) 95%, one-sided confidence interval for gravel analytical results (Ecology samples only) is 105.4 mg/kg. The mean value for all gravel samples is about 35 mg/kg.

6.) Since all samples are composites composed of at least 4 discreet subsamples, the potential exists for hot-spots to exist at up to four times the value reported in analytical results. The theoretical maximum As value is therefor ~400 mg/kg.

7.) Since the total metals analysis crushes the sample before analysis, the results may artificially alter the actual As available to the environment at any one time due to the difference in surface area available for leaching from the prepared sample over the gravel that is actually in the environment. Everett analysis is of natural fines in the crushed rock only, and probably more accurately describes the potential for As availability when crushed rock is placed.

8.) The actual fate of As in arsenopyrite in the environment is unknown. In theory it is relatively immobile, but mobilizing conditions may be common in western Washington.

2. Soil Nutrient Amendments

Manufactured fertilizers contain arsenic. In 1998 Ecology identified a particular fertilizer, Ironite, currently being used in the area. Information on this finding is described in the attached press release. Due to increased regulation in recent years, higher levels would be expected in soil amendments prior to around 1970.

FOR IMMEDIATE RELEASE

June 5, 1998

98-092

Contact: Greg Sorlie, Manager, Hazardous Waste & Toxics Reduction Program (360) 407-6702
Ron Langley, Public Information (425) 649-7009

Consumers Warned Arsenic-Laden Fertilizer Can Contaminate Yards

OLYMPIA - The Washington State Department of Ecology is warning consumers that they may be unwittingly contaminating their yards by using Ironite, an arsenic-laden fertilizer marketed as an "environmentally safe" product.

"We're concerned that people who regularly use Ironite on their lawns and gardens don't realize that they're putting a lot of arsenic on their yards," said Ecology Director Tom Fitzsimmons.

He noted that fertilizer regulators in Canada have not approved Ironite for sale because it has not been shown to meet fertilizer standards in that country designed to limit buildup of heavy metals in the soil. Those same standards were adopted this year by the Washington State Legislature and will be enforced by the state Department of Agriculture.

Fitzsimmons said Ecology doesn't expect Ironite to meet the new standards unless the company makes drastic changes in the product or its recommended use. In the meantime, Ecology is concerned that consumers will keep applying Ironite to their yards this summer without knowing important information about this product. "We want people to make an informed choice," Fitzsimmons said.

Ironite, which is sold to home and business owners to make lawns and other plants green, was analyzed by Ecology and found to contain arsenic at 4,460 parts per million (ppm). That is by far the highest concentration of arsenic measured in any of the more than 50 fertilizers tested by the state during the past year. Washington's findings confirmed test results brought to the state's attention by the *Seattle Times* and are similar to results of testing conducted by the state of California.

Ecology estimates that just one year's use of Ironite at the maximum application rate stated on the package could raise arsenic in a consumer's garden to three times the statewide average for arsenic in soil. The average statewide natural background level for arsenic in soils is seven parts per million.

"It makes no sense to spend millions of dollars cleaning up arsenic-contaminated sites in some parts of the state while homeowners unknowingly contaminate their yards elsewhere," Fitzsimmons said.

On May 8, the state Department of Health advised consumers that direct ingestion of even small amounts of Ironite could be toxic to a child. Health experts advise that Ironite, like all fertilizers and pesticides, should be stored out of the reach of children and pets.

In response, Ironite Products Company of Scottsdale, Arizona has agreed to add a caution statement to Ironite's label and has purchased newspaper advertisements that warn consumers to keep the product away from children.

The company has also agreed to remove label information that may encourage consumers to over-apply the product, including one statement that promotes the product as "Environmentally Safe," and another that says the product will not burn lawns "Even if you use 2 or 3 times the recommended amount."

State regulators last week, however, purchased a package of Ironite that still had the unchanged label. "We want to make sure that people know what is in Ironite," said Fitzsimmons.
"The product is still on the shelves carrying the old label, and we have no control over packages that people already own."

Consumers who no longer choose to use Ironite they have already purchased may take advantage of a money-back guarantee on the package label or safely dispose of it by taking it to their local household hazardous waste disposal site.

Return to Ecology's home page

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3. Pesticides & Herbicides

Arsenical pesticides and herbicides were used in the U.S. as early as 1890 and gained widespread use through the 1970s. Early pesticides included lead arsenate and calcium arsenate. Sodium arsenite came into wide use during the 1920s and 1930s as a pesticide bait as well as for crab grass control. Historically, pesticides/herbicides contained sodium arsenite in concentrations up to 52% (520,000 mg/kg). Due to concerns regarding accidental poisoning by sodium arsenite, in the late 1960s the USDA began restricting the sodium arsenite content in household products to 2% (20,000 mg/kg).

Other arsenical pesticides used during this period included ant powders and syrups containing arsenic trioxide and sodium arsenate. Historically, ant syrups contained up to 0.9% (9,000 mg/kg) sodium arsenate or up to 45% (450,000 mg/kg) arsenic trioxide. However, around 1970 the USDA restricted the arsenic trioxide content in household products to 1.5% (15,000 mg/kg). Currently, active registered ant products may typically contain up to 0.5% (5,000 mg/kg) arsenic trioxide.

The use of organic arsenical herbicides grew rapidly during the 1970s. These herbicides consisted of monosodium methanearsonate (MSMA), disodium methanearsonate (DSMA) and cacodylic acid or sodium cacodylate. Commercially available herbicides have historically been formulated with an MSMA content of up to 26% (260,000 mg/kg). MSMA continues to be widely used. It was the sixth most commonly used pesticide for industrial/commercial/government applications in 1994/95 with an estimated use of 3 - 4 million pounds (USEPA, 1997). Herbicides containing DSMA have typically been formulated with concentrations of up to 23% (230,000 mg/kg) while herbicides formulated with cacodylic acid and/or sodium cacodylate at concentrations of up to 33% (330,000 mg/kg).

4. Pressure Treated Lumber

One of the most commonly used preservatives for pressure treated lumber is chromated copper arsenate (CCA). Arsenic concentrations in lumber treated with CCA typically range from 0.15% (1,500 ppm) to 3% (30,000 ppm). Some examples of current information on arsenic levels in pressure treated wood are attached. The information includes Material Safety Data Sheets from current manufacturers and some active and inactive listings from California pesticide database. The information is not intended to be comprehensive, but to provide a general indication of arsenic levels in current and recent products. Historically, arsenic levels would likely have been higher before products were regulated.

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: Chromated-Copper-Arsenate (CCA) Pressure-Treated Wood
General Use: Treated wood products

MANUFACTURER'S NAME AND ADDRESS:

Exterior Wood
2685 Index Street
Washougal, WA 98671

TELEPHONE NUMBER(S):

(360) 835-8561

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS	CAS NUMBER	PERCENT	EXPOSURE LIMIT	(mg/m^3)
Chromium (III)	7440-47-3	<2**	OSHA-PEL (as Cr)	1.0
			ACGIH-TLV (as Cr)	0.5
Arsenic (V)	7440-38-2	<2**	OSHA-PEL (as As)	0.01
			ACGIH-TLV (as As)	0.01
Copper	7440-50-8	<2**	OSHA-PEL (dusts/mists)	1.0
			ACGIH-TLV (dusts/mists)	1.0
Wood dust* (regulated as a particulate)	None		OSHA-PEL (total dust	15.0
			(respirable fraction)	5.0
			ACGIH-TLV (softwood)	5.0
			ACGIH-STEL (softwood)	10.0
			WISHA-PEL (softwood)	5.0
			WISHA-STEL (softwood)	10.0

OSHA - Occupational Safety and Health Administration
ACGIH - American Conference of Governmental Industrial Hygienists
PEL - Permissible Exposure Limit
TLV - Threshold Limit Value
STEL - Short-Term Exposure Limit (15 minute exposure standard)

SARA Section 313 Chemicals: Arsenic, Chromium and Copper compounds

* A state-run OSHA program may have more stringent limits for wood dust. Please contact the state representative for further details.

** Based on wood retention of 0.6 pounds CCA per cubic foot of wood. Actual retention percentage may vary slightly due to differences in wood stock and treatment retention levels.

Exterior Wood, Inc.

MATERIAL SAFETY DATA SHEET
CCA Pressure-Treated Wood with Cedartone Prestain
Date Prepared: 10/11/95 REV. 02

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
Product Identifier: Chromated-Copper-Arsenate (CCA)
Pressure-Treated Wood with Cedartone Prestain
General Use: Painted CCA-Treated Wood Products

MANUFACTURER'S NAME AND ADDRESS:

Exterior Wood, Inc.
P.O. Box 206
Washougal, WA 98671 TELEPHONE NUMBER(S): (360) 835-8561

2. COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS	CAS NUMBER	PERCENT	EXPOSURE LIMIT (mg/m3)
Chromium (III)	7440-47-3	<2**	OSHA-PEL (as Cr) 1.0
			ACGIH-TLV (as Cr) 0.5
Arsenic (V)	7440-38-2	<2**	OSHA-PEL (as As) 0.01
			ACGIH-TLV (as AS) 0.01
Copper	7440-50-8	<2**	OSHA-PEL (dusts/mists) 1.0
			ACGIH-TLV (dust/mites 1.0
Wood dust* (regulated as a particulate)	None		OSHA-PEL (total dust) 15.0
			(respirable fraction) 5.0
			ACGIH-TLV (softwood) 5.0
			ACGIH-STEL (softwood) 10.0

OSHA - Occupational Safety and Health Administration
ACGIH - American Conference of Governmental Industrial Hygienists
PEL - Permissible Exposure Limit
TLV - Threshold Limit Value
STEL - Short-Term Exposure (15 minute exposure standard)
SARA Section 313 Chemicals: Arsenic, Chromium and Copper Compounds

*A state-run OSHA program may have more stringent limits for wood dust. Please contact the state representative for further details.

** Based on wood retention of 0.6 pounds CCA per cubic foot of wood. Actual retention percentage may very slightly due to differences in wood stock and treatment retention levels.

Exterior Wood Inc.
Material Safety Data Sheet

CCA Pressure Treated Wood with Cedartone Prestain
Date Prepared: 10/11/95 REV. 02

3. HAZARDS IDENTIFICATION
Inhalation:
Airborne treated or untreated wood dust may cause nose, throat or lung irritation and other respiratory effects. Burning treated wood can release toxic metals into ash and possibly smoke. Various species of untreated wood dust can elicit allergic respiratory response in sensitized persons.

Eye Contact:
Treated or untreated wood dust may cause mechanical irritation.

Skin Contact:

MATERIAL SAFETY DATA SHEET

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

TRADE NAMES (AS LABELED): CCA TYPE C PRESSURE TREATED WOOD

PRODUCT CLASS: NA

SYNONYMS: Pressure treated wood with Chromated Copper Arsenat

MANUFACTURER'S NAME:

ADDRESS:

EMERGENCY PHONE:

BUSINESS PHONE:

MSDS PREPARATION DATE: August 21, 1995

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			OTHER
			TLV mg/m^3	STEL mg/m^3	PEL mg/m^3	STEL mg/m^3	IDLH mg/m^3	
ARSENIC (as As_2O_5)	7778-39-4	0.15-3.0	0.5	NE	0.05	NE	NE	human carc. LD_{50} 48 mg/kg (oral rat)
HEXAVALENT CHROMIUM (as CrO_3)	7440-47-3	0.25-4.0	0.1 (as Cr(VI)	NE	0.1C (as CrO_3)	NE	NE	suspect human carc. LD_{50} (oral-rats) 80 mg/kg
Copper (as CuO)	1317-38-0	0.10-2.0	1.0 (8-hour TWA)	NE	1.0	NE	NE	LD_{50} 470 mg/kg (oral rat)
WATER and WOOD	7732-18-5	40-50	NE	NE	NE	NE	NE	NE

NE = bot established

3. HAZARD IDENTIFICATION

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:

INHALATION: Wood dust may be irritating to nose and throat. Can cause chest pains and chemical pneumonitis.

CONTACT WITH SKIN or EYES: Skin lesions commonly observed on hands at base of nails and on knuckles; these are usually not disabling. Conjunctivitis (of eyes) can result from mild exposure to wood dust.

SKIN ABSORPTION: Skin absorption is possible through wood splinters, causing skin ulcers.

INGESTION: Wood fibers may result in naasea, vomiting, abdominal pain and diarrhea.

INJECTION: Direct injection of this substance may cause effects similar to skin contact and skin adsorption, including lesions and ulceration.

JH BAXTER -- ARSENICALLY TREATED WOOD
MATERIAL SAFETY DATA SHEET
NSN: 551000N065104
Manufacturer's CAGE: 85359
Part No. Indicator: A
Part Number/Trade Name: ARSENICALLY TREATED WOOD

General Information

Company's Name: JH BAXTER & CO
Company's Street: 1700 SOUTH EL CAMINO REAL
Company's City: SAN MATEO
Company's State: CA
Company's Country: US
Company's Zip Code: 94402
Company's Emerg Ph #: 415-349-0201
Company's Info Ph #: 415-349-0201
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 14JUN88
Safety Data Review Date: 09NOV95
MSDS Serial Number: CBCQK

Ingredients/Identity Information

Proprietary: NO
Ingredient: WOOD
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: 1002428WO
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: COPPER OXIDE
Ingredient Sequence Number: 02
Percent: 0.5
NIOSH (RTECS) Number: GL7900000
CAS Number: 1317-38-0
OSHA PEL: 1 MG CU/M3
ACGIH TLV: 1 MG CU/M3

Proprietary: NO
Ingredient: ARSENIC PENTOXIDE (SARA 302/313) (CERCLA)
Ingredient Sequence Number: 03
Percent: 0.25
NIOSH (RTECS) Number: CG2275000
CAS Number: 1303-28-2
OSHA PEL: N/K (FP N)
ACGIH TLV: 0.01 MG/M3

Proprietary: NO
Ingredient: ZINC OXIDE (SARA 313) (CERCLA)
Ingredient Sequence Number: 04
Percent: 0.25
NIOSH (RTECS) Number: ZH4810000
CAS Number: 1314-13-2
OSHA PEL: 15 MG/M3 TDUST
ACGIH TLV: 10 MG/M3 TDUST

Physical/Chemical Characteristics

Appearance And Odor: WOOD IS DARK GREEN TO DARK BROWN, CAN BE MOTTLED GREEN-BROWN.
Specific Gravity: 0.9 (H*2O=1)

CCA TYPE C CONCENTRATE 50% WOOD PERSERVATIVE

62190- 2-ZA

ACTIVE

Registration Date: 05-FEB-91
Inactive Date:
Registration Specialist:

GARY VARNADO

Formulation: SOLUTION/LIQUID (READY-TO-USE)

Signal Word: POISON/DANGER

Company Information

HICKSON CORPORATION

CONLEY GA 30288

Ingredients Found:

9.25% of COPPER OXIDE (IC) (2231)
17% of ARSENIC PENTOXIDE (631)
23.75% of CHROMIC ACID (1188)
50% of INERT INGREDIENTS (0)

Active Sites Found:

WOOD PROTECTION TREATMENTS (ALL OR UNSPECIFIED) (64500) ||

Full Product Information Report (PIR)

Accuracy of this data is our goal! Please provide us with specific information regarding errors. Remember, this is California label information, not from US EPA master labels

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CCA TYPE C WOOD PRESERVATIVE

10465- 10-AA

INACTIVE

Registration Date:
Inactive Date: 30-APR-85
Registration Specialist:

DANNY SALDANA

Formulation: SOLUTION/LIQUID (READY-TO-USE)

Signal Word: DANGER (ONLY)

Company Information

CHEMICAL SPECIALTIES, INC.

CHARLOTTE NC 28217

Ingredients Found:

8.6% of COPPER OXIDE (IC) (2231)
19% of ARSENIC PENTOXIDE (631)
22.4% of CHROMIC ACID (1188)
50% of INERT INGREDIENTS (0)

Sites Found:

WOOD PROTECTION TREATMENTS (ALL OR UNSPECIFIED) (64500) ||

Full Product Information Report (PIR)

Accuracy of this data is our goal! Please provide us with specific information regarding errors. Remember, this is California label information, not from US EPA master labels

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CCA TYPE-C WOOD PRESERVATIVE

10465- 20-AA

INACTIVE

Registration Date: 26-FEB-88
Inactive Date: 18-JAN-90
Registration Specialist:

DANNY SALDANA

Formulation: SOLUTION/LIQUID (READY-TO-USE)

Signal Word: POISON/DANGER

Company Information

CHEMICAL SPECIALTIES, INC.

CHARLOTTE NC 28217

Ingredients Found:

11.4% of COPPER OXIDE (IC) (2231)
20.1% of ARSENIC PENTOXIDE (631)
28.5% of CHROMIC ACID (1188)

40% of INERT INGREDIENTS (0)

Sites Found:

LUMBER (SEASONED/UNSEASONED) (64501) || PESTICIDES FOR MANUFAC., REFORM., REPACK. USE (99000) ||

Full Product Information Report (PIR)

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CCA TYPE-C WOOD PRESERVATIVE 50%

10465- 26-AA

ACTIVE

Registration Date: 23-DEC-97
Inactive Date:
Registration Specialist:

DANNY SALDANA

Formulation: AQUEOUS CONCENTRATE

Signal Word: POISON/DANGER

Company Information

CHEMICAL SPECIALTIES, INC.

CHARLOTTE NC 28217

Ingredients Found:

9.25% of COPPER OXIDE (IC) (2231)
17% of ARSENIC PENTOXIDE (631)
23.75% of CHROMIC ACID (1188)
50% of INERT INGREDIENTS (0)

Active Sites Found:

WOOD PROTECTION TREATMENTS (ALL OR UNSPECIFIED) (64500) ||

Full Product Information Report (PIR)

Accuracy of this data is our goal! Please provide us with specific information regarding errors. Remember, this is California label information, not from US EPA master labels

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CCA TYPE-C WOOD PRESERVATIVE 60%

10465- 28-AA

ACTIVE

Registration Date: 24-APR-97
Inactive Date:
Registration Specialist:

DANNY SALDANA

Formulation: AQUEOUS CONCENTRATE

Signal Word: POISON/DANGER

Company Information

CHEMICAL SPECIALTIES, INC.

CHARLOTTE NC 28217

Ingredients Found:

11.4% of COPPER OXIDE (IC) (2231)
20.1% of ARSENIC PENTOXIDE (631)
28.5% of CHROMIC ACID (1188)
40% of INERT INGREDIENTS (0)

Active Sites Found:

WOOD PROTECTION TREATMENTS (ALL OR UNSPECIFIED) (64500) ||

Full Product Information Report (PIR)

Accuracy of this data is our goal! Please provide us with specific information regarding errors. Remember, this is California label information, not from US EPA master labels

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CCA TYPE-C WOOD PRESERVATIVE, 60% CONCENTRATE

10356- 13-AA

INACTIVE

Registration Date: 26-JUL-90

Inactive Date: 31-DEC-96
Registration Specialist:

DANNY SALDANA

Formulation: FLOWABLE CONCENTRATE

Signal Word: POISON/DANGER

Company Information

CSI

CHARLOTTE NC 28217

Ingredients Found:

11.4% of COPPER OXIDE (IC) (2231)
20.1% of ARSENIC PENTOXIDE (631)
28.5% of CHROMIC ACID (1188)
40% of INERT INGREDIENTS (0)

Sites Found:

LUMBER (SEASONED/UNSEASONED) (64501) || WOOD PROTECTION TREATMENTS (ALL OR UNSPECIFIED) (64500) ||

Full Product Information Report (PIR)

Accuracy of this data is our goal! Please provide us with specific information regarding errors. Remember, this is California label information, not from US EPA master labels

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KOPPERS CCA TYPE B WOOD PRESERVATIVE

61- 170-AA

INACTIVE

Registration Date: 05-JUL-77
Inactive Date: 01-AUG-90
Registration Specialist:

GARY VARNADO

Formulation: SOLUTION/LIQUID (READY-TO-USE)

Signal Word: POISON/DANGER

Company Information

KOPPERS COMPANY, INC

PITTSBURGH PA 15219

Ingredients Found:

7.84% of COPPER OXIDE (IC) (2231)
14.12% of CHROMIC ACID (1188)
18.04% of ARSENIC PENTOXIDE (631)
60% of INERT INGREDIENTS (0)

Sites Found:

LUMBER (SEASONED/UNSEASONED) (64501) ||

Full Product Information Report (PIR)

Accuracy of this data is our goal! Please provide us with specific information regarding errors. Remember, this is California label information, not from US EPA master labels

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OSMOSE K-33-C (50%)

3008- 36-AA

ACTIVE

Registration Date: 11-MAY-76
Inactive Date:
Registration Specialist:

PHIL ANDERSON

Formulation: SOLUTION/LIQUID (READY-TO-USE)

Signal Word: POISON/DANGER

Company Information

OSMOSE WOOD PRESERVING, INC.

BUFFALO NY 14209

Ingredients Found:

9.25% of COPPER OXIDE (OUS) (175)
17% of ARSENIC PENTOXIDE (631)
23.75% of CHROMIC ACID (1188)
50% of INERT INGREDIENTS (0)

Active Sites Found:

LUMBER (SEASONED/UNSEASONED) (64501) || WOOD PROTECTION TREATMENTS (ALL OR UNSPECIFIED) (64500) ||

H-5. Traffic Analysis

The following provides a estimate of risk associated with the Draft Cleanup Action Plan (draft CAP) for waste disposal and hauling backfill. Based on Asarco's evaluation of the draft CAP, a total of 599,400 tons of waste will be hauled during remedial activities. This estimate consists of 559,400 tons from the peripheral area and 40,000 tons from the fenced area. The result is a total of 33,950 truck trips traveling a total of about 1,379,200 miles for waste disposal. Similarly, a total of 27,513 truck trips traveling 1,650,780 miles will result from hauling backfill.

Waste Hauling (311,000 cy from peripheral area and 25,000 cy from fenced area).

Description	Volume	Truckloads	Mileage
Peripheral soil to fenced area for fill (by 10 cy)	25,000	2,500	5,000 (2 round)
Peripheral soil to stockpile for Tacoma (by 10 cy)	48,000	4,800	9,600 (2 round)
Peripheral soil to Tacoma (by 20 cy)	64,000	3,200	448,000 (140 round)
Fenced area soil to Subtitle C (by 20 cy)	25,000	1,250	850,000 (680 round)
Peripheral soil to stockpile for Subtitle D (by 10 cy)	222,000	22,200	66,600 (3 round)
		Total Mileage:	1,379,200

Note: Shipment of 222,000 cy from stockpile to Subtitle D is not included. Shipment is by rail.

Backfill Hauling (348,260 cy from local sources to the peripheral and fenced areas)

Description	Volume	Truckloads	Mileage
Backfill to peripheral area (35% by 20 cy)	109,000	5,450	327,000 (60 round)
Backfill to peripheral area (65% by 10 cy)	202,000	20,200	1,212,000 (60 round)
Backfill to fenced area for cap (by 20 cy)	37,260	1,863	111,780 (60 round)
		Total Mileage:	1,650,780

In 1998 Asarco retained the Transpo Group to perform a truck fatality analysis (see attached report). Data used for the analysis was discussed during mediation and was based on the use of trucks to haul waste to the Asarco Tacoma smelter and a Subtitle C facility and rail to haul material to a Subtitle D facility. At that time 489,288 tons of soil was estimated to be generated from a 20 ppm action level (scenario 1). This amount resulted in a total of 31,220 truck trips traveling a total of 1,123,228 miles. Based on national aggregate statistics on trucks, the conclusion resulted in a 1 in 33 chance for a fatal accident, a 1 in 2 chance of an injury accident, and a possibility of 2 property-damage-only accidents. The estimate did not include hauling backfill material.

The following compares Transpo's 1998 evaluation with the draft CAP estimate:

Evaluation	Tons of Material Hauled	No. of Truck Trips	Total Mileage
Transpo - 1998	489,288	31,220	1,123,228
CAP - 1999	1,226,268	61,463	3,029,980

This comparison shows that based on transportation data used in Transpo's analysis, the identified accident risk potential is as much as two times higher for the draft CAP than was originally calculated in Transpo's report. Extrapolating the data suggests a 1 in 12 chance of a fatal accident, a 1 in 2 chance for an injury, and the possibility of 6 property-damage-only accidents.

B3-296

Truck Fatality Analysis
A Comparison of Site Cleanup Alternatives

Prepared for:

Hydrometrics and Asarco

July 7, 1998

Prepared by:

The TRANSPO Group, Inc.
14335 NE 24th Street, Suite 201
Bellevue, WA 98007-3737
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The purpose of this analysis is to review the statistical safety effect of adding additional large trucks to the highway system. The analysis has been conducted to understand the change in highway accidents attributable to truck traffic that could occur as a result of two different site cleanup scenarios at the Asarco Everett facility. We understand that the results of this analysis may be used as a basis for assessing comparable risks due to increased exposure of truck traffic and the resultant accident risks to the traveling public. It should be recognized that the prediction of future traffic accidents can only be estimated based on past statistics, and the statistics are general in nature and may not perfectly fit the specific scenario and/or impacted roadways. Nevertheless, the statistical information can be a useful tool in comparing relative differences between site cleanup choices.

This assessment is organized to first present Methodology and Approach. Then Truck Accident Statistics are summarized as a basis for assessing the impact associated with the various analysis scenarios. Each scenario reviews the potential for fatal, injury and property-damage-only (PDO) accidents.

Methodology and Approach

Truck Accident Rate Definition. To facilitate the comparisons of accident data, use is made of accident rates. These rates are determined on the basis of exposure data such as traffic volume and the length of roadway under consideration. The most common accident rate is the "rate per 100 million vehicle miles traveled (R100MVM)." The R100MVM is the number of accidents, on the section of roadway under consideration, multiplied by 100,000,000 then divided by the vehicle miles traveled (VMT). The VMT is simply the average daily trips (ADT) multiplied by the number of days in the study period and the length of roadway. This is the rate that is then used in the analysis. This rate is used for fatal, injury and PDO accidents, which are defined below.

- **Fatal Accident:** Fatal accidents result in one or more persons killed as a result of the crash.
- **Injury Accident:** Injury accidents result in one or more persons being transported from the scene for immediate medical attention to injuries resulting from the crash, and there are no fatalities.
- **PDO:** PDO accidents result in neither death nor injuries but do involve damage to property.

Truck Accident Statistics Source. The statistics used in this analysis are from the Federal Highway Administration (FHWA) Office of Motor Carriers (OMC) and the National Highway Traffic Safety Administration (NHTSA). The statistical data in these reports is 1994 and 1995 data, which was readily available. More recent data may be available, however the overall conclusions reached would be similar, in any event. Based on these documents, large trucks are considered to be vehicles of gross vehicle weight (GVW) of greater than 10,000 pounds. As such the statistics used and presented in this analysis are an aggregate of vehicles weighing 10,000 pounds and greater.

Analysis Approach. The methodology behind determining accident potential due to increased truck volumes is derived from the accident equation presented in the *truck accident rate definition* above. This equation is rearranged so that the potential for accidents is equal to the VMT (total number of trips multiplied by total number of miles) multiplied by the national fatality rate (2.7 R100MVMT) divided by 100,000,000. The results provide raw statistics based on all fatal truck accidents that occur within the United States. These results can be further refined to reflect the potential for a truck accident based on the truck class (3-6, 7 or 8) and the truck configuration, whether it is a single unit or pulling a trailer.

General Statistics

Large trucks are involved in 8 percent of fatal crashes, 3 percent of injury and property-damage-only (PDO) crashes. Large trucks have the following accident rates (accidents per 100 Million Vehicle Miles Traveled – acc. Per 100MVMT):

- Fatality rate of 2.7 per 100MVMT;
- Injury rate of 56 per 100MVMT
- PDO rate of 212 per 100MVMT.

Table 1 provides some perspective on how the above numbers compare with other vehicle type accident frequencies.

Table 1. Vehicles Involved in Crashes by Vehicle Type and Crash Severity (1994)

	Crash Severity					
	Fatal Accidents		Injury Accidents		PDO[2] Accidents	
Vehicle Type	Number	R100MVM[1]	Number	R100MVM	Number	R100MVM
Passenger Car	30,273	2.1	2,742,000	188	5,155,000	353
Light Truck	16,353	2.3	893,000	125	2,025,000	284
Large Truck	4,644	2.7	95,000	56	361,000	212

Source: Traffic Safety Facts 1995, FHWA
1 *R100MVM = Rate Per 100 Million Vehicle Miles traveled.*
2 *PDO = Property Damage Only accidents.*

As shown, the fatality rate for large trucks exceeds the fatality rate for passenger vehicles and light trucks by 29 and 17 percents, respectively. This occurs even though the property damage only, injury, and, thus, total accident rates for trucks are lower than for passenger vehicles or light trucks. This is consistent with the fact that the severity of accidents involving heavy vehicles is greater than the severity of accidents involving light, more maneuverable vehicles.

Analysis Scenarios

Hydrometrics provided Transpo with two alternative scenarios for evaluation. Scenario 1 reflects the amount of truck activity that would be required to support the a cleanup scenario based on Ecology's plan; Scenario 2 reflects the level of truck activity associated with an alternative approach to site clean-up. They are described as follows:

- **Scenario 1: 20 ppm Residential and 1500 ppm Smelter without OCF.** This scenario would result in 489,288 tons of removed material, requiring approximately 31,220 trips, covering a total of 1,123,228 miles of truck travel.

- **Scenario 2: 100 ppm Residential and 1500 ppm Smelter and With OCF.** This scenario would result in less truck traffic. Approximately 239,800 tons of material would be removed in 13,145 truck trips covering a total of 662,284 miles. .

As indicated above, Scenario 2 would result in 18,075 fewer truck trips covering 460,944 fewer miles than Scenario 1. The life of the project is assumed to be the total miles of travel presented in the two scenarios, which is the basis of much of the analysis.

Potential Impacts

The potential impacts associated with this project are the increased potential for truck accidents, which are stratified by fatal, injury and property-damage-only accidents (PDO). The potential for each accident configuration is shown in Tables 2-4 respectively.

Table 2 presents the results of performing the fatal accident evaluation on the two scenarios. The fatality potential is based on the national average rate of 2.7 per 100MVMT, as described above.

Table 2. Potential for Fatal Accidents Due to Truck Exposure

Scenario	VMT (miles)	100MVMT (100 Million Miles)	Truck Fatality Rate[1]	Fatality Potential[2]
Scenario 1	1,123,228	0.01123228	2.7	0.0303
Scenario 2	662,284	0.00662284	2.7	0.0179
Difference [3]	-460,944	0.00460944	2.7	-0.0124

1 *Truck Fatality Rate – Source FHWA (See Table 1)*
2 *Fatality Potential – Number of fatalities predicted over life of project*
3 *Scenario 2 – Scenario 1 (effect of the choice to utilize scenario 2)*

This comparison demonstrates that, under Scenario 1, approximately 3/100th of one fatal accident would be predicted over the life of the project. In other words, there is a 1 in 33

chance of a fatal accident occurring under the Scenario 1 option. Under Scenario 2, this forecast would be less than 2/100th of one fatal accident or a 1 in 56 chance of a fatal accident occurring under this option.

Table 3 presents the results of performing the injury accident evaluation on the two scenarios. The injury potential is based on the national average rate of 56 per 100MVMT, as described earlier.

Table 3. Potential for Injury Accidents Due to Truck Exposure

Scenario	VMT (miles)	100MVMT (100 Million Miles)	Truck Injury Rate[1]	Injury Potential[2]
Scenario 1	1,123,228	0.01123228	56	0.6290
Scenario 2	662,284	0.00662284	56	0.3709
Difference [3]	-460,944	0.00460944	56	-0.2581

1 *Truck Injury Rate – Source FHWA (See Table 1)*
2 *Injury Potential – Number of injuries predicted over life of project*
3 *Scenario 2 – Scenario 1 (effect of the choice to utilize scenario 2)*

This comparison demonstrates that, under Scenario 1, approximately 6/10th of one injury accident would be predicted over the life of the project. In other words, there is approximately 1 in 2 chance of an injury accident occurring under the Scenario 1 option. Under Scenario 2, this forecast would be 3/10th of one accident or approximately 1 in 3 chance of an injury accident occurring under this option.

Table 4 presents the results of performing the PDO accident evaluation on the two scenarios. The PDO potential is based on the national average rate of 212 per 100MVMT, as described earlier.

Table 4. Potential for PDO Accidents Due to Truck Exposure

Scenario	VMT (miles)	100MVMT (100 Million Miles)	Truck PDO Rate[1]	PDO Potential[2]
Scenario 1	1,123,228	0.01123228	212	2.3812
Scenario 2	662,284	0.00662284	212	1.4040
Difference [3]	-460,944	0.00460944	212	-0.9972

1. *Truck PDO Rate – Source FHWA (See Table 1)*
2. *PDO Potential – Number of PDO accidents predicted over life of project*
3. *Scenario 2 – Scenario 1 (effect of the choice to utilize scenario 2)*

This comparison demonstrates that, under Scenario 1, there is the potential for at least 2 PDO accidents occurring over the life of the project. Under Scenario 2, this forecast would indicate the possibility of at least 1 PDO occurring over the life of the project.

Table 5 shows a summary of the potential for each accident category within the two scenarios.

Table 5. Summary of Accident Potential

Scenario	Fatal Accident Potential	Injury Accident Potential	PDO Accident Potential
Scenario 1	0.0303	0.6290	2.3812
Scenario 2	0.0179	0.3709	1.4040

The data for fatal, injury and PDO accidents suggests a 41 percent lower risk of a truck-related accident under a haul route choice of Scenario 2, vs. Scenario 1. While differences in local data or haul route specific factors could occur, they would have a marginal effect on the overall magnitude of the comparative analysis and thus they data presented above would remain valid.

In summary, for Scenario 1 there is a 1 in 33 chance for a fatal accident, a 1 in 2 chance of an injury accident and a possibility of 2 PDO accidents. For Scenario 2, there is a 1 in 56 chance of a fatal accident, a 1 in 3 chance of an injury accident and the possibility of at least 1 PDO accident. In a general sense, the possibility of a fatal, injury or PDO accident is almost two times greater with Scenario 1 than with Scenario 2.

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July 13, 1998

16004-0033

Via FedEx

Ms. Mary Burg
Program Manager
Toxics Cleanup Program
Washington State Department of Ecology
P.O. Box 47600
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Re: ***New Scientific Information Relevant to the Everett Smelter Cleanup Levels for Arsenic and Lead***

Dear Mary:

During our mediation sessions in Everett, Asarco advised Ecology, the Community, and Local Government that significant new scientific information has developed in the period since Ecology adopted its cleanup standard regulations that Ecology should consider in determining appropriate cleanup levels for the Everett Smelter site. In view of the importance of this information to the determination of cleanup levels, as well as its central role in the continued mediation process, Asarco recently suggested to Ecology, the Community, and Local Government that we felt it was important for us to let you know, with as much specificity as possible, to what we have been referring. Therefore, this letter, and the attached documents, follow up on our previous discussions and provide the basis for Asarco's position in greater detail. (Some of this information was provided earlier in the Appendix J, Risk Assessment Addendum, submitted to Ecology in 1995, as well as in other submissions. Additional significant information has come to light since then).

In this letter, and in the attached materials, we provide you with a very specific description of this scientific information (as well as many of the original documents and articles from the literature) to facilitate your consideration of the appropriate cleanup level and action level for Everett. These materials include: (a) declarations from six prominent scientists attesting that use of Methods A and B to derive a soil cleanup level of 20 ppm for arsenic and 250 ppm for lead is not consistent with contemporary scientific information; (b) a collection of key scientific publications of particular relevance to the Everett cleanup levels for arsenic and lead; (c) a fuller bibliography of the scientific literature on these subjects; (d) a collection of key documents from the Ruston, Everett, and Anaconda sites addressing the public health issues arising from exposure to arsenic in soil; (e) a collection of federal materials flowing from EPA's re-evaluation of the toxicology of arsenic under the Safe Drinking Water Act and other federal programs; and, (f) several key EPA documents discussing the protective level for lead in soil. These materials, and the issues to which they relate, are described in more detail below.

We specifically request that Ecology consider this new scientific information when establishing cleanup levels for Everett as required by WAC 173-340-702. In addition, although we want to discuss these materials in the context of the mediation, Asarco formally submits them to Ecology and asks that they be incorporated into Ecology's Everett files and made part of Ecology's official record with respect to the site. In conformity with WAC 173-340-840, we submit this letter and the attached scientific materials in triplicate. We are enclosing one complete copy for you, are sending two complete copies to Dave South, and copies of the letter and the Experts' Declarations to all other mediation participants. We will make one complete copy of the material available at the Everett Information Center.

Asarco is willing to do anything it can to help Ecology analyze these materials as they relate to selection of an appropriate cleanup level for Everett. In particular, we offer to invite the scientists who prepared the enclosed declarations, and helped gather these materials, to make a presentation to Ecology and to the Science Advisory Board on these issues. Indeed, given the scientific and technical nature of these issues, we strongly recommend that the Science Advisory Board be included in the evaluation process.

In the balance of this letter, we describe, first, the organization of the attached materials and second, the conclusions that flow from the documents relative to the appropriate soil cleanup levels.

SCIENTIFIC MATERIALS

The attached scientific materials are organized as follows:

Tab A. Declarations of Experts. The six attached declarations can be briefly summarized as follows:

(1) Dr. Barbara Beck, a toxicologist who has published extensively on both arsenic and lead toxicity, explains why the Method A values and Method B formula do not comport with current science, particularly as applied to arsenic and lead in soil.

(2) Dr. Kenneth Brown (who did the original statistical analysis for EPA in 1988 on which EPA's cancer slope factor is based) describes his conclusion, published in a peer-reviewed article last year, that EPA's arsenic slope factor cannot appropriately be used for risk assessment in the United States because, among other reasons, EPA's assumptions about exposures used to calculate the cancer slope factor for arsenic are not consistent with the actual arsenic concentrations in the Taiwanese wells. Since the actual levels of exposure were much higher than EPA estimated, the cancer slope factor clearly overstates risk at low dose.

(3) Dr. Daniel Menzel, a toxicologist who has done extensive work on the biological mechanisms by which arsenic acts in the body, explains why EPA's default assumption of linearity is inconsistent with current scientific knowledge about the biological mode of action for arsenic in the cell.

(4) Dr. Joseph V. Rodricks, author of Calculated Risks, a text published by Cambridge University Press on the toxicity and human health risks of chemicals in our environment, explains why Ecology's Method B formula and Method A table, as applied to arsenic, are not consistent with current science and

substantially overstate actual risk. He also demonstrates that the exposure to arsenic in soil used in the Method B calculations is trivial compared to lifetime exposure to the normal levels of arsenic found in our diet and drinking water, and would remain trivial if the soil cleanup level were set at 100 ppm or higher.

(5) Dr. Rosalind Schoof describes why Ecology's Method B formula and Method A value for arsenic are inconsistent with current knowledge about actual exposure from arsenic in soil as measured in a number of contemporary studies.

(6) Dr. Joyce Tsuji, who was closely involved with the Ruston cleanup, and was principal author of the Everett Risk Assessment Addendum to the Remedial Investigation, explains why there is no scientific basis to adopt a stricter soil cleanup level for Everett than was utilized by EPA, and endorsed by Ecology, at Ruston.

Tab B. Arsenic and Risk Assessment Bibliography.

This document is a detailed summary of the scientific literature on arsenic with a focus on publications in the period after 1990, when Ecology formulated its cleanup standard regulations. In other words, it specifically incorporates the "new scientific information" relevant to arsenic and risk assessment.

The bibliography is topically organized to make it more useful to the Department. The topics included are:

(1) Background exposures--levels of arsenic exposure from diet, drinking water, and background soil exposures;

(2) Biological markers of exposure and effects--primarily discussing urinary arsenic as a marker of arsenic exposure;

(3) Carcinogenesis(General)--current understanding of chemical carcinogenesis with an explanation of the distinction between initiators, promoters, and progressors, and the relevant differences in biological mode of action on risk assessment;

(4) Epidemiology of arsenic with separate listings for articles on skin cancer and internal cancers and other arsenic health effects;

(5) Arsenic essentiality--articles discussing necessity of arsenic as a nutrient in animals and humans;

(6) Modes of action--analysis of biological modes of arsenic action that could lead to cancer and implications for linear vs. non-linear risk modeling;

(7) Pharmacokinetics/biomethylation--analysis of de-toxicification of arsenic in humans and implications for risk assessment;

(8) Reviews, books and conferences on arsenic;

(9) Remediation risks--discussion of human health impacts from accidents arising in remediation and in transportation of excavated soils to a disposal facility;

(10) Risk assessment--linear vs. non-linear analysis of arsenic risk and other arsenic risk assessment issues;

(11) Soil arsenic exposure--studies of the extent of actual arsenic exposure from arsenic in soil relative to other sources of arsenic; and,

(12) Other sources of arsenic in the environment.

In addition, bibliographies or reference lists are attached to or incorporated into the declarations of Drs. Beck, Schoof, Rodricks and Tsuji. Finally, there are additional bibliographies attached to other documents included in the submission, including to the Eastern Research Group Expert Panel report in Tab F.

Tab C. Key scientific articles on arsenic and risk assessment.

We have gathered hard copies of key articles and materials that bear on derivation of a soil cleanup level that is consistent with current scientific knowledge about arsenic, currently accepted methods of assessment of risks from

carcinogens, and other important issues. These articles are organized alphabetically by first author, and are preceded by a table of contents that lists each article individually by author and title. Reference to the Bibliography in Tab B will facilitate classification of the articles by subject matter. Obviously, many of the articles address more than one subject matter area. We have tried to provide you with copies of the major articles on which our experts are relying. In certain cases we have provided you with excerpts or chapters; for example, we enclose Casarett and Doull's chapter on Chemical Carcinogenesis from the newest edition of their text, Toxicology. We have not provided copies of full texts such as Abernathy et al, Arsenic Exposure and Health Effects (1997),because we assume you already have a copy or it is readily available.

Tab D. Ruston documents.

EPA, with Ecology's concurrence, concluded that a soil action level of 230 ppm for arsenic was protective of human health in the residential area of Ruston near the Tacoma smelter. The key documents that underlie that conclusion are highly relevant to the Everett cleanup, and to the selection of the appropriate cleanup and action levels, and are provided (although they are presumably already in Ecology's Ruston files).

Tab E. Anaconda documents

Recently, based on detailed bioavailability and urinary arsenic studies and other information, EPA approved a residential soil cleanup level for Anaconda of 250 ppm. Included in Tab E are the Baseline Risk Assessment and ROD explaining the scientific basis for EPA's conclusion that this level is protective of human health, including children exposed to arsenic in soil. In addition, the Anaconda data is discussed in the declarations in Tab A and in various articles included in Tab C.

Tab F. Important EPA materials on arsenic and risk assessment for carcinogens.

EPA has substantially revised its methodology for analyzing carcinogenic risk since its original arsenic cancer slope analysis was published in 1988. In

particular, in 1996 it published new guidelines for cancer risk assessment, included here, and published numerous materials concerning its doubts and uncertainties about its cancer slope factor for arsenic and the appropriate MCL for arsenic. These materials are also included. We have also included certain key documents concerning the arsenic risk assessment. They include the original 1988 EPA Report on arsenic, and a copy of the 1997 Eastern Research Group Report on the EPA Expert Panel on Arsenic Carcinogenicity: Review and Workshop. In that report, a panel of distinguished scientists selected by EPA to advise it on arsenic risk assessment, reached a consensus conclusion that arsenic has a sublinear dose-response relationship and may exhibit a practical threshold. We also enclose a current printout from the IRIS database on arsenic which reports the Eastern Research Group consensus conclusion and discusses other problems with EPA's reported cancer slope factor. A table of contents listing these federal materials separately appears at the beginning of the Tab. Finally, we enclose a memorandum prepared by Heller Ehrman White & McAuliffe that summarizes key quotes from these federal documents, regarding problems with arsenic risk assessment and uncertainties about the arsenic cancer slope factor.

Tab G. EPA materials on lead in soil

The Method A soil cleanup level for lead in soil is inconsistent with current EPA models and guidance on what level of lead in soil can create a health risk to children. Based on its studies, EPA has established a screening level of 400 ppm for lead in soil below which neither remediation nor further analysis is required because of the lack of impact on blood lead levels of children. Ecology's conclusion that there is an impact on blood lead levels at any level above 250 ppm (which was apparently calculated in 1990) is inconsistent with current methodology and analysis on lead.

Tab H. Other sources of arsenic in the environment.

Included is documentation of other sources of arsenic that could contribute to arsenic levels in residential soils.

Tab I. Other site-specific issues.

The following analyses by Asarco's technical consultants are included, with attachments, to address specific scientific and technical issues that have arisen in the context of the Everett Smelter Site remediation.

(1) Residential Soils Sampling

This section analyzes Ecology's three-part decision rule for sampling in order to measure compliance with a cleanup level, and contains a statistical analysis substantiating that, if a cleanup level of 20 ppm were selected based on Method A for arsenic, the rule could result in as many as 48% of the sampled properties requiring remediation solely based on background levels of arsenic naturally present. The statistics were derived from Ecology's own 1994 data set used to calculate arsenic soil background for Puget Sound.

(2) Vegetation as containment for residential soils.

This section substantiates the use of lawn or other vegetative cover to provide effective containment for low levels of contamination left on site.

CONCLUSIONS REGARDING SOIL CLEANUP LEVELS

The new scientific information presented with this letter leads to the following conclusions, among others, relevant to setting appropriate action and cleanup levels for the Everett Smelter site:

(1) Ecology's current Method B formula is based on EPA's 1986 cancer risk assessment guidelines which EPA has now rejected as no longer consistent with current science. In particular, in EPA's 1996 proposed guidelines, the agency recognizes that use of a default assumption of low dose linearity is appropriate only for a limited class of carcinogens, called initiators, that directly cause somatic changes in DNA. Other carcinogens, generically called promoters and progressors, evidence a sublinear dose-response relationship. Ecology's Method B approach must be updated to address chemicals, like arsenic, that are not cancer initiators.

(2) EPA's IRIS cancer slope factor for arsenic, which Ecology's Method B formula directly incorporates as a cancer potency factor, is invalid. EPA's calculation assumed levels of exposure which are inconsistent with the actual exposures in Taiwan. The cancer slope factor bears no reasonable relation to arsenic's actual cancer potency and both overstates risk at low dose and understates risk at high dose, thus rendering extrapolation to the U.S. population inappropriate.

(3) The assumption of linearity of arsenic risk at low dose is false. There is no known biological mechanism by which arsenic could have that effect, i.e., it does not cause somatic changes in DNA, and the potential biological mechanisms by which it might affect cancer risk are all associated with a sublinear dose-response or the existence of a practical threshold below which arsenic has no adverse affects.

(4) Arsenic is a demonstrated essential element in animals and the evidence indicates it is likely essential to humans as well. Ecology's formula classifies exposures to arsenic that are below the required nutritional value of arsenic in humans (based on extrapolation from demonstrated essential levels in animals) as creating unacceptable risks to human health.

(5) Humans methylate inorganic arsenic to organic forms that are quickly eliminated through the urine. This is understood to be a de-toxifying mechanism, and is inconsistent with treating all ingested arsenic as toxic. The existence of this protective mechanism, which may be overcome at high dose, further supports the conclusion that arsenic likely has a threshold below which it has no adverse effect on human health or on cancer risk.

(6) Several recent studies demonstrate that at levels below 250 ppm or higher, arsenic in soil does not appreciably affect urinary arsenic levels in persons living there compared to "background" urinary arsenic attributable to other natural sources of arsenic such as drinking water and diet. Urinary arsenic is recognized as a valid biomarker of arsenic exposure in populations.

(7) Even using Ecology's assumptions in the Method B formula, the lifetime arsenic exposure attributable to arsenic in soil at the levels under

consideration is insignificant compared to lifetime exposure to "background" levels of arsenic in our diet and drinking water.

(8) The lack of epidemiological evidence of arsenic carcinogenicity at low dose, despite the large numbers of persons exposed at such levels, corroborates that the cancer slope factor used in the Method B formula overstates risk.

(9) The Taiwan data are inapplicable to the U.S. population, not only because of problems with the cancer slope factor and the default assumption of linearity discussed above, but also because of significant differences between the Taiwanese and U.S. populations. These differences include elevated arsenic levels and protein deficiency in the Taiwan diet (which may affect the ability of those persons to methylate arsenic) and significant exposures to other carcinogens in the Taiwanese drinking water studied by Tseng. None of these factors is considered by Ecology even though they are discussed in the IRIS database on which Ecology relies.

(10) Except for differences in their respective cancer slope factors, the Method B formula essentially treats all carcinogens the same to calculate soil cleanup levels associated with a particular risk level. However, arsenic is an anomalous chemical carcinogen because it lacks any carcinogenic effect in animals, because it is a natural element with significant background exposures, because it is most likely essential to humans, and because it does not cause somatic DNA changes. It is not consistent with current science to treat all carcinogens as though they operate through the same biological mechanism or are otherwise alike.

(11) Since arsenic is a late stage carcinogen, and not an initiator, the assumption built into the Method B formula that a six year exposure in childhood creates a proportional lifetime risk of cancer is false, as applied to arsenic. In fact, exposure to arsenic in childhood should have a disproportionately lower risk because children have been exposed to fewer natural and anthropogenic carcinogens than adults and therefore have fewer "initiated" cells on which arsenic, or any other cancer promoter or progressor, could act.

(12) Ecology's Method A value for lead (250 ppm) is much lower than screening levels utilized by EPA (400 ppm) to identify the concentration in soil below which no further investigation or other action is required because of the lack of effect on blood lead levels in children. Soil levels below 400 ppm are not associated with elevated blood lead levels in children associated with public health risk.

(13) Given the lack of human health benefit from reducing soil action levels for arsenic below the 100 ppm to 250 ppm range, it is critical that Ecology evaluate the human health risk inherent in the remediation itself, particularly given the large soil volumes containing arsenic at levels above 20 ppm but below the 100 ppm to 250 ppm range at Everett.

(14) Vegetation is an effective containment methodology that minimizes exposure to arsenic in soils.

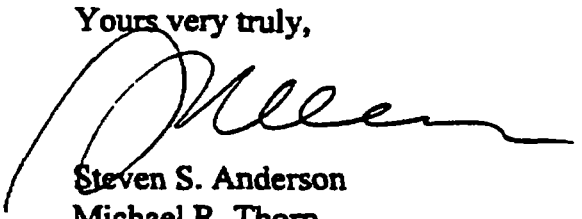
(15) Remediation to the MTCA Method A level of 20 ppm would achieve no meaningful additional public health protection for the significant additional expense.

(16) Ecology's three-part decision rule, coupled with application of a cleanup level of 20 ppm based on Method A, could result in as many as 48% of the Everett residential properties requiring remediation <u>based solely on the influence of background levels of arsenic</u>. This calculation was performed by using the data set used by Ecology to calculate natural background for Puget Sound in 1994. The reported values were grouped at random in sets of 10 (conforming to the number of samples in the test protocol for a single property). Forty-eight percent of the random groups would exceed the MTCA Method A level of 20 ppm for arsenic under the test protocol and would require remediation even though they were all selected to represent natural background.

Asarco continues to hope that it remains possible to find a mutually acceptable solution for Everett that is consistent with current scientific information on arsenic and lead. Please do not hesitate to call us if there is

anything that we can do to facilitate your consideration of the issues discussed in this letter and in the attached materials.

Yours very truly,



Steven S. Anderson
Michael R. Thorp
Alison J. Freeman-Gleason

Enclosures (one set)

cc: Mary Sue Wilson, Esq. (w/Tabs A and B)
David South (w/Enc. - two sets)
Thomas Aldrich (w/Enc. - one set)
Mediation Participants (w/Tabs A and B)
Elaine Hallmark (w/Tabs A and B)
Busse Nutley (w/Tabs A and B)

The remainder of Attachment H-6 is contained in the 13 notebooks of information related to arsenic submitted with Asarco's comments on the Everett Draft CAP, attached hereto.

81.

B3-317

CITY ATTORNEY'S OFFICE

February 26, 1999

Toxics Cleanup Program
Washington Department of Ecology
3190 – 160th Avenue SE
Bellevue, WA 98008-5452

RE: COMMENTS ON DCAP/DEIS
EVERETT SMELTER SITE

Gentlemen:

The City of Everett appreciates the Department of Ecology's work on this project and its goal to bring about a meaningful cleanup to this site as soon as possible. It has been a long process for everyone involved. The City and its residents look forward to the cleanup.

Many elements of the draft cleanup plan, particularly the basic preference for the consolidation alternative, are well articulated and explained in the document; assuming the volume estimates and associated impacts are accurate.

The City, however, still has many of the concerns we have voiced since the outset of the process and the understandings we had thought we reached in the scoping process for the DCAP/DEIS have not been addressed in the document. The City does not want to see the cleanup process delayed. The City has worked with those involved in this to accomplish a process to get these properties cleaned up as soon as possible. The City believes these concerns can and must be addressed in a timely manner and is requesting Ecology's commitment to do so prior to issuance of the final plan or a responsiveness summary.

Among the particular concerns of the City are:

218 1) Combined CAP/EIS and Land Use. The document was to have been a combined MTCA/SEPA/GMA document that would provide the documentation for the City's land use decision as well as Ecology's cleanup decision. The separate "SEPA evaluation" section in the DCAP (Section 5.3) and the separate DEIS do not add much in the way of useful comparative environmental analysis of the alternatives. In fact at least 12 of the 14 elements of the environment discussed (including transportation) note that there is not significant difference among the alternatives. The only element that appears to indicate a potentially significant difference is "earth," which is really about "land use" (views). This is in distinct contrast with

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the elucidating analysis on pages 68-95 of the DCAP addressing real environmental differences among the alternatives.

337 The environmental impact sections do not address basic land use and infrastructure considerations for interim or future reuse, as we discussed and requested. The document as written does not integrate the necessary analysis under GMA and SEPA as had been agreed in the scoping process.

338 Leaving the site in a condition compatible with the neighborhood, preserving future land use options, and facilitating the ability to put the site back to productive use are essential elements of an acceptable final cleanup plan that have not been sufficiently addressed in the draft plan. Indeed, different land uses may require different responses and should be noted in the CAP/EIS.

339 With cooperation from Ecology staff, the City believes it is still possible to document and incorporate the analysis that has been conducted to date and for this information to be included in the final CAP/EIS without delaying the cleanup process. Failure to do so will likely delay the cleanup since the proposed consolidation facility does not appear to be consistent with the current comprehensive plan designation for the site. The City is providing a summary of the
340 land use plan changes that would be necessary to accommodate the range of land uses considered for this site (see attached Exhibit A). We believe the land uses described in the Exhibit are consistent with the range of land uses discussed by the Land Use Committee under the mediation.

This exhibit describes the existing land use designations and the processes that would be needed to revise them. It provides a starting point for the land use analysis that needs to be incorporated into the final CAP/EIS to enable the City and Ecology to make their respective decisions. We request a commitment by Ecology to meet with us and to work together to ensure that the additional analysis needed and recommended land use actions will be included in the final CAP/EIS, coordinated with continued, timely review by our Planning Commission, as both Ecology and the City had promised the public during the scoping process.

341 At page 27, the statement "The City of Everett is not interested in maintaining more park/open space." is not correct. This statement was incorrectly contained in the Smelter Site Land Use Committee meeting notes for December 2, 1997. The statement was corrected in the meeting notes (page 2 of 17) for the December 12, 1997 meeting which were distributed on January 8, 1998 which correctly stated: "The City of Everett is not interested in maintaining a park on this site due to environmental concerns and potential liability issues. The City of Everett is not interested in purchasing the property. This site is not in the parks master plan and does not fit within current plans for expanding the park system."

342 <u>§6.7 (pages 88, 90, 95) Institutional Controls</u>. The document assumes that the City will assume the responsibility, cost and potential liability for a substantial effort in implementing institutional controls. The City has consistently stated its willingness to work cooperatively with Ecology to

342 cont. develop a program of institutional controls that allocates responsibilities among Ecology, the Snohomish Health District, the City, and other necessary parties, with appropriate indemnity and financial assurances. However, the City, Ecology and the Snohomish Health District have not yet developed a cooperative program for institutional controls and this needs to be accomplished before the issuance of a final clean up action plan.

343 There are no agreements, tentative agreements, memorandum of understanding, or detailed discussions between the City of Everett and any other party regarding the City of Everett implementing, managing or participating in any institutional control. Any such agreement will require approval by the Everett City Council with appropriate indemnity agreements and financial assurances. A mechanism for the implementation of institutional controls must be developed. The City continues in its willingness to work with Ecology and the Snohomish Health District to meet this objective, but the final cleanup plan cannot simply assert these commitments and institutional controls without first working out an acceptable plan with the agencies Ecology is looking to for assistance. At a minimum, a schedule and process for resolving these issues must be established and agreed. The City does not want to be placed in the untenable position of delaying the cleanup.

344 Are differing institutional controls contemplated for different areas of the CPM area?

345 2) §6.7.2 Permit Overlay. There are no agreements between the Department of Ecology, Snohomish Health District and the City of Everett for the planning, implementation, management or participation in a system of permit overlays. This will require approval by the Everett City Council with appropriate indemnity agreements and financial assurances.

A specific procedure acceptable to the City for future permit review should be identified in the Final EIS. The City stands ready to work cooperatively with the Department of Ecology to define a specific implementation process for the permit overlay control.

346 It should be noted that some activities in the subject area might not require City permits. How would the institutional controls be implemented for these activities? How are specific requirements regarding limitations/requirement for development or site modification activities going to be defined? What about SEPA exempt activities? What agency is going to be responsible to see that the institutional controls are implemented during future land use activities?

In addition, the specific geographical area where the institutional controls apply should be clearly identified on a map. It is not clear from the existing documents.

347 3) §6.7.2 Soil sampling. The DCAP assumes that sampling will be done during redevelopment of properties (page 96). However, there is no mechanism for such sampling. Likewise there is no program to assist residents in future sampling when they do small projects on their property. There is no program for maintenance and utility work sampling or confirmation sampling. The Department of Ecology should develop a program to facilitate these sampling requirements,

347 cont. including sampling plans and methodology. There is no statement as to which agency will supervise the compliance with any sampling requirement, i.e. the Snohomish Health District, Department of Labor and Industries, Ecology or the City of Everett. This section implies that the City of Everett will be responsible for compliance through its permitting authority. There is no agreement for this. Any such agreement would require City Council approval with appropriate indemnities and financial assurances.

348 4) §8 Scheduling. There is no schedule for the planning and implementation of the institutional controls. This section addresses primarily the tasks of sampling and soil removal.

349 5) §6.2.4 (page 91) Independent Actions. The City developed independent interim actions for essential public projects on Marine View Drive and Legion Golf Course in close consultation with Ecology. The draft cleanup plan inappropriately defers acknowledgement of these actions to the future.

After considerable effort and oversight, the City completed the agreed upon work and submitted a final independent remedial action report and request for a no further action letter to Ecology last December, as had been previously discussed with Ecology. It is important for Ecology to complete this process prior to the issuance of the final cleanup action plan. The City was assured that if these actions were carried out as planned, they would be incorporated into the cleanup plan. The City would appreciate Ecology's prompt issuance of the no further action letters for these projects and the incorporation of these actions as part of the final cleanup plan.

The City is also concerned that without completion of this process future public park projects or roadwork such as the extension of Marine View Drive will be delayed because they will not have the benefit of accepted, responsible management approaches to dealing with existing contamination in the area.

350 6) §6.7 4 Worker Protection Program. The DCAP proposes a study program and an informational program. Will this information program include providing any education/training and/or protective equipment required by the Washington Department of Labor and Industries and other government agencies? If not, what organization will be responsible for this? There is no provision for the mitigation measures set forth in the DEIS 4.5.2.5 (page A4-26), e.g. protective clothing. There is no provision regarding any necessity for sampling to determine the degree of worker protection. There is no provision for the financial consequences to employers and property owners in providing this.

351 7) §§6.7.5 & 6.7.6Soil disposal program. The City previously commented on Ecology's enforcement order establishing the expanded soil disposal program. There is no mention in this section that the program applies to public entities such as the City and PUD for utility and infrastructure projects. This needs to be reconfirmed in the CAP. In addition, some emergency utility projects may generate soil volumes that exceed what is practical to put into barrels. The program needs to be able to accept soils delivered in dump trucks as well. Who is then responsible for transferring a dump truck load of soil into 30+ barrels?

352 8) §6.7.11 Citizen's Advisory Committee Program. There is no discussion of the composition of the Citizen's Advisory Committee or the inclusion of local government agencies and utilities. The selection of the committee is not discussed, nor are there provisions for its governance or support. There should be provision for its implementation.

353 9) §6.7.14 Financial Assurances. There is no provision for interim provision of funding for institutional controls prior to such time as ASARCO agrees or is ordered to make such payments and assurances.

354 10) Water and Drainage Issues. The City previously commented on Ecology's enforcement order that we would need assurances that the water quality levels being established in the cleanup plan would not adversely affect the City's treatment facilities or subject the City to potential costs or liabilities, particularly with the pending ESA listing and Snohomish River TMDL. No such analysis or assurances appear to be provided in the DCAP/DEIS, and they are an essential component of any final cleanup plan. The cleanup plan needs to address this both for consistency with applicable laws (including consideration of the department's own proposals on water quality criteria), and to ensure coordination between Ecology's toxic cleanup and water quality programs. The City is concerned by the concentrations of surface water contamination reported (§§2.4.3 and 7.2.3). Also of concern are the concentrations of ground water contamination reported (§2.4.4 page 21) that it is possible that groundwater with elevated arsenic levels is migrating along the fill-till contact and draining into the Lowland Area. (Also, §2.4.5, page 22; §7.2.4 page 106).

Research by City staff has found a correlation between rainfall and arsenic loading to the Everett WPCF. Studies at the Asarco smelter site has shown that the arsenic discharge is almost completely in the dissolved form and the loading is directly related to the duration of the rain event. The lead loading is mainly related to the sediment loading and is directly related to the intensity of the rain event. Both of these loadings to the combined sewers will need to be controlled during the cleanup phase. The main sources are: runoff due to rainfall, equipment cleanup, personnel showering, laundry, losses from trucks hauling contaminated soils, and fugitive emissions. Each of these can be controlled through adequate engineering and operation at the cleanup site. The Department of Ecology needs to incorporate specific institutional controls on the Department of Ecology's or its contractors' cleanup work. The City will assist in identifying specific measures in consultation with Ecology.

The Department Ecology is developing an interim approach for including arsenic limits in NPDES permits, which the City may find very difficult to meet if significant levels of arsenic are accepted from this site. Consequently, the City will need assurances that the surface water cleanup levels specified in section 4.1.4 are met via a monitoring program and that Everett citizens will not have to assume any financial burden associated with failure of the cleanup plan to achieve the surface water cleanup levels. Ecology should not put the citizens of Everett in the position of paying for a lack of coordination between two of its programs. The removal of arsenic in the treatment wastewater treatment process is very costly.

355 The terms surface water, ground water and storm water should be defined in the document. In the final version a glossary or definitional section should be included.

356 §4.1.3 Ground Water: The City may be interested in the future use of ground water for irrigation purposes at Legion Park and Legion Golf Course.

357 §§4.1.5, 6.6 and 7.2.5 Storm Drain Sediment: The City currently composts and recycles storm drain sediments. The Snohomish Health District requires that these sediments meet MTCA Method A soils levels (Arsenic:20 mg/Kg, Lead: 250 mg/Kg, Cadmium: 2 mg/Kg), despite the fact that the table was not designed for this purpose, and there is an explicit caution in the Ecology MTCA Rules about using these levels for other purposes. Storm drain sediments cleanup levels should reflect the standards currently imposed upon the City by the Snohomish Health District or there should be a mechanism to reimburse the City for any additional expenses incurred to dispose of the sediments in question if the MTCA cleanup levels are not met. Alternatively, the Snohomish Health District could adopt the State composting guidelines (Arsenic: 20 mg/Kg, Lead: 150 mg/Kg, Cadmium: 20 mg/Kg). These guidelines should then be used as the storm drain sediment cleanup levels.

How will the monitoring of storm drain sediment be accomplished, i.e. by whom, and how will the costs paid? If sediments exceeding cleanup levels are found, who will remove and dispose of these materials? What consideration has been given with respect to contamination levels in storm water and storm drain sediments that in themselves may be below the action level but may have an adverse impact on the City of Everett sewerage system and/or discharges? (§4.1.4, §6.5, Performance monitoring §§7.2.3, 7.2.4 and 7.2.5, pages 105, 106) Unacceptable accumulations of heavy metals in the biosolids will be reached in the sewage treatment process and the City will be unable to continue with current disposal methods, i.e. the creation of fertilizer for sale and for its own use.

358 §5.3.2.13 On-Site Containment and Consolidation provide for a leachate collection system and ground water interceptor trench, respectively. However, there is no indication how the liquids collected will be treated or disposed. They may not be appropriate for the City of Everett combined sewer or acceptable to the City of Everett.

As with many of the above comments, we also note there are related sections of the DEIS on this issue:

359 DEIS (page A3-5) Speaks of groundwater collected by a trench in a containment or consolidation facility being discharged to a storm drainage outfall downgradient of the site. Is this intended to be a City of Everett storm drain? What contingency plan exists if this liquid proves to be unacceptable to the City of Everett? There is some consideration given at DEIS page A3-19 of this issue.

DEIS (page A3-17) Assumes that surface water will be acceptable in the City of Everett storm sewer and wastewater treatment plant. The City of Everett wastewater treatment plant is not designed for the removal of this type of contamination. This liquid may become unacceptable at some point in the future as environmental regulations become stricter on the discharge of contaminates.

DEIS (A3-17) What would be an appropriate off-site treatment facility for the leachate that is collected?

360 11) Parks. Page 13, Zoning. The zoning map incorrectly shows Wiggums Park, Legion Park and Legion Golf Course as R-1 zones. These are actually in Park zones.

361 DEIS 4.9.2.3 Mitigation measures for impacts on City of Everett Parks. The remediation and mitigation plans need to be developed in conjunction with the City of Everett Parks Department. It must be noted that there are limits to the extent that geofabric and additional soils may be placed over the root system of a tree before such will kill or injure the tree. These should be address in the final cleanup plan.

12) Additional items:

362 §2.3 and Table 2.1 The designation of the area as Southeast (of Broadway) is confusing in that the area is generally referred to as Northeast Everett.

363 The City has made few specific comments on the DEIS because the cleanup plan and related future land use decisions are clearly the agencies' focus at this stage of the process, and the EIS work has not been integrated as we had understood it would be. We note that the document needs to address possible impacts in view of the Endangered Species Act. We would also note that where the cleanup plan is revised to address the critical issues noted in this comment letter, the EIS would need to reflect the analysis and revisions (which would have been simpler to accomplish in a single document). One example is the section on the effects of institutional controls:

364 DEIS 4.14.2.1 (pages A4-58, 59) Impacts and mitigation on City of Everett. Additional impacts of institutional controls and permit overlay may include additional equipment and software. Also, there are impacts in the areas of worker protection equipment and training; the need for on-going testing and sampling; the need for long-term record management; and addressing liability issues related to these items.

365 DEIS A single integrated MTCA/SEPA document would be preferable, however, we have no desire to delay implementation of the cleanup. Recognizing that the draft documents have been issued in their current form, we recommend that an environmental summary per the SEPA rules be included in the final CAP, synthesizing the key considerations in Section 6 of the CAP to highlight the environmental choices and the basis for preserving or foreclosing certain options

for the future. This might also provide an example for other sites in Everett and elsewhere in the state where cleanup and future land use considerations are interrelated.

Thank you for your consideration of these comments. Consistent with MTCA and SEPA, we request that Ecology consult and meet with the City prior to preparing its responsiveness summary or final CAP/EIS to develop an approach, a schedule, and an assignment of respective staff responsibilities to resolve the continuing concerns that have been identified in this letter.

We look forward to working cooperatively with Ecology to produce a final CAP/EIS that will meet both of our needs, move both cleanup and comprehensive plan revisions forward promptly, heal the community, and allow residents of Northeast Everett to use their property in a normal fashion.

Very truly yours,

Submitted electronically
by email

MARK SOINE
EVERETT CITY ATTORNEY

EXHIBIT A

Following is the recommended language to be included in the land use analyses. This provides a starting point for the necessary analysis to address future site use options to be allowed, infrastructure, topography, landscaping buffer, interim conditions prior to redevelopment, and related future land use considerations. This analysis will in turn provide the foundation for a comprehensive plan amendment to enable both the cleanup and future reuse of the former smelter area and adjacent areas.

Land Use:
The site is currently designated 1.3 (single family detached, 10-12 dwellings per gross acre) by the City's comprehensive plan land use map. The site and the contiguous area are zoned R-2, single family medium density. Therefore, land use plan changes for the former arsenic trioxide production area (the fenced area) would be required for any reuse of the site other than single family residential development. Since access to the site is limited due to topography, reuse of the site will likely require access from east Marine View Drive. Any use other than single family would impact existing single-family uses to the south and west of the site. Therefore, any change in the land use designation of the site must consider that larger area bordered by Balsam Lane on the west, East Marine View Drive on the east, SR 529 on the north, and Butler Street on the south (see Map ___).

- Park / Institutional. To allow the site to be reused as a park would require, at the minimum, a special property use permit in the R-2 zone. Parks are a permitted use in R-2, subject to approval of the Hearing Examiner through a public hearing permit process. If the City were to own the park and wishes to apply the Park zone as it has for other city-owned park properties, a comprehensive plan amendment and rezone would also be necessary.

  Institutional uses, such as a public school or government service, may be possible as a special property use in the existing R-2 zone, with a similar hearing process as mentioned above for a public park. No rezone or comprehensive plan amendment would be required.

- Commercial Office. A commercial office development would require both a comprehensive plan amendment and rezone. This process would require an application as part of the City's annual comprehensive plan docketing process. Plan amendments and rezones would be reviewed by the Planning Commission and City Council. The B-2(B) (Office) zone allows multiple family residential use as a permitted use. If residential use is to be prohibited, a performance agreement rezone would be necessary to limit residential, or any other non-office use that is otherwise allowed in the B-2(B) zone.

- Mixed Office and Park. The processes described above for Park and for Commercial Office would apply. A comprehensive plan amendment and rezone application for the commercial office could be expanded to included designation of a park use in the comprehensive plan, with implementing rezone to Park.

- Mixed Use Office and Residential. The process described above for Commercial office would apply to a mixed office and residential development. As mentioned above, the B-2 (B) zone allows for residential use, either as a stand-alone use or as a mixed-use building or project. If the desire were to designate one portion of the site for office and a separate portion for only residential use, two different plan designations and zones (B-2 (B) for office and R-3L or R-3 for multiple family) would be appropriate.

82.

B3-327

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

Monitoring. Much additional sampling will be performed to design and monitor the effectiveness of cleanup actions. Soil sampling at peripheral area properties and the smelter fenced area will be performed to determine which soils will be excavated and replaced. A quality control program for clean backfill soils will be established. After cleaning inside homes, following soil removal and replacement, house dusts and carpet dusts will be sampled. Additional soil sampling over a larger area will be conducted to confirm or, if necessary, revise the site boundary. Long-term, periodic sampling of ground water, surface water, and storm drain sediments will be performed to evaluate the effectiveness of cleanup actions. Resampling of soils at selected remediated properties will be done during 5-year reviews of cleanup actions to assess whether recontamination is occurring. Air monitoring will be performed during cleanup actions to evaluate dust control measures.

Make your opinion count! Please send your comments to Ecology (you can use the bottom of this notice or a separate sheet of paper) at: Washington State Department of Ecology, Toxics Cleanup Program, Everett Smelter Site Cleanup, 3190 160th Avenue SE, Bellevue, WA 98008-5452. You can also turn in comments at the community Workshops on February 16th and 20th.

212 I SUPPORT THE PROPOSAL
THANK YOU

John M. Carpenter

JOHN M. CARPENTER
1525 VIRGINIA AVE #1
EVERETT WA 98201

83.

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213 I would like to support the above proposed actions.

Thank you,
Karen Carpenter

Karen Carpenter
1525 Virginia Ave #1
Everett, Wash
98201

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214 As a retired worker who loves to garden I am concerned about working in contaminated dirt. Every effort should be made to clean up.

William H Deaker

85.

A number of long-term institutional control programs overseen by the City of Everett and the Snohomish Health District will be established to address this remaining site contamination and to monitor the continued effectiveness of containment measures. Institutional controls will include such programs as public education; a site database with information on soil contamination at individual properties; permit overlays (attaching enforceable conditions on city permits for actions that could lead to contaminant exposures); disposal programs for contaminated soils generated by property owners; testing of community residents for contaminant exposure; and evaluations of the effectiveness of cleanup actions. A Citizens' Advisory Committee will be established.

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215 We are very concerned with cleaning plans for the Asarco contamination area. We hope that every effort be made for the responsable persons to return the area to a Healthy livable place

Joyce Otto Dohn

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86.

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FEB 26 1999

DEPT OF ECOLOGY

Snohomish County
General Services
Planning & Construction

Robert J. Drewel
County Executive

M/S # 404
3000 Rockefeller Avenue
Everett, WA 98201-4046
(206) 388-3718
FAX (206) 388-3791

February 26, 1999

Mr. David South
Washington State Department of Ecology
Toxics Cleanup Program
3190 160th Avenue SE
Bellevue, Washington 98008-5452

RE: Everett Smelter Site Draft Cleanup Action Plan (DCAP) and Draft Environmental Impact Statement Comments (DEIS)

Dear Mr. South:

We are writing on behalf of Snohomish County, as an owner of property within the peripheral area of the Everett Smelter Site to comment on the Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Everett Smelter Site.

We are supportive of Alternative D, the Consolidation Alternative, indicated in the Draft Environmental Impact Statement. Basically, we interpret this Alternative as follows:

All soils with contamination above 3000 ppm arsenic in the fenced area are to be disposed of off site at a legal disposal site for hazardous waste. Those remaining soils do not fail the TCLP test and therefore are not susceptible to leaching into the surrounding ground water.

The remaining excavated hole (in the fenced area) is to receive excavated soil from the Peripheral area with contamination between 20 ppm and 3,000 ppm arsenic that is compacted, capped with a geo membrane that is then protected and covered by two feet of clean fill and vegetated and/or landscaped.

Subsequent land use could be a park, low-density office (1-2 stories) with parking and potentially multi-family residences.

The Peripheral area would be cleaned up to at least 12" below the existing surface if soil samples exceed 20 ppm arsenic. Below 12", 60 ppm arsenic soil would be allowed with a marker to identify the arsenic contaminated soil. Below 24" (and lower) 150 ppm arsenic would be allowed to remain in place.

Existing sidewalks, streets, structures and large trees would remain in place even though higher levels of arsenic contaminated soil exists until such time as redevelopment and/or repair work would cause the contaminated soils to become exposed.

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Institutional Controls would be in place and be administered by both the Snohomish Health District and the City of Everett Public Works Dept. in perpetuity.

254 Snohomish County is supportive of the Consolidation Alternative being prepared by DOE. The Consolidation alternative appears to be well thought out and considers balancing both protective measures to the community with the realities of actual clean up work and the associated costs. Based upon the county's participation in the Mediation Process, we recognize that Ecology has given careful consideration to all of the issues that were addressed in that process.

255 Further we find that the Consolidation Alternative is consistent with the cleanup of arsenic contaminated soils performed by Snohomish County as an independent remedial action at the Denney Juvenile Justice Center/Denney Youth Center property located within the peripheral area. We note that the Draft Cleanup Action Plan addresses this site and our independent cleanup in section 6.2.4 on page 91. We suggest that the Final Cleanup Action Plan indicate that the cleanup at the DJJC site is consistent with and substantially equivalent to the cleanup actions proposed in the Final Plan and that no further action is required at the DJJC site. We note that the data presented in Exhibits 2 and 3 showing arsenic concentrations on a map of the peripheral area indicate that the DJJC site does not require further cleanup under the standards in the proposed plan. The documentation that the County has supplied to Ecology regarding our clean-up, including but not limited to the Cleanup Actions Summary Report, Denney Youth Center dated May 26, 1998 prepared by AGI also supports a finding in the Final Cleanup Action Plan that the County's independent remedial action has accomplished a cleanup consistent with that proposed in the plan.

Our review of the Draft Cleanup Action Plan leads us to offer several other comments and suggestions. First, we presume that further development of the Consolidation Alternative, if approved, will result in more detailed specifications and working procedures. Here are issues we feel need to be addressed:

Additional discussion or clarification is needed regarding how and by whom the final clean up action plan is to be approved. Is it by Ecology alone? Or, is there a board or group of hearing examiners that make the final decision?

256 Over time, homes and businesses in the ESS area will be remodeled demolished and properties redeveloped. The same is true for streets, driveways, alleys and sidewalks. As these actions occur, the clean up plan needs to address the additional costs that a property owner would incur above and beyond that for normal construction activities. Essentially, the property owner should not bear these additional expenses. The potentially liable party needs to bear the additional cost burdens for dealing with and disposing of soil greater than 20 ppm arsenic for any and all redevelopment within the ESS.

257 A permanent marker below the re-established grade to provide warning in the future to property owners, contractors and workers is a good means to assure both worker safety compliance and legal/proper disposal methods are used. Without such a marker, leaving arsenic soils above 20 ppm at the 12" below grade level would just perpetuate contaminated soils being brought to the surface. Without a marker, soils with arsenic greater than 20 ppm would need to be removed down to the 18" and/or 24" below grade level. Typically, most simple building foundations are constructed

257 cont. with the bottom of footing elevation at 24" below grade. Please confer with the City of Everett Building Dept. As you are aware, construction sites (especially residential) are very attractive nuisances to grade school children.

258 Existing structures with crawl spaces over contaminated soils need to have specific care regarding the proper installation of protective linings, presumably a heavy gauge plastic. Still, all seams should be well lapped and taped and sealed to adjoining foundation walls. Otherwise, the service worker will be subjected to both severe ingestion and skin contact with the contaminated soils.

259 A bottom liner or clay bedding for the Consolidation Alternative should be investigated to determine the additional marginal cost of this added protection for the community. Its significance versus cost ought to be reviewed.

260 Future Land Use alternatives should probably limit structures to lightweight building components (wood frame or light gauge metal) of no more than two stories with wide footings to protect the cover membrane from abrasion/puncture.

261 Transportation concerns that should be addressed include; truck wheel wash; street/gutter and sidewalk clean up, covered truckloads and most of all trucker education of grade school pedestrian routes and schedules. Perhaps an education process through the grade schools should occur at the start of each school year and again in April throughout the years of clean up construction activities.

262 Overall, we find that the Consolidation Alternative is both protective and viable. We are pleased to see that the hazardous waste is to be removed from the residential area, residences and businesses cleaned up in the peripheral areas and that residents could continue their lives with assurances against unwanted/uninvited exposure to arsenic in their yard, homes and community.

We look forward to the neighborhood clean up process commencing.

Sincerely,

RICK REININGER
Snohomish County
Project Manager

CC: Joni Earl
Carol Weibel
David Lenci
Kirk Bailey

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DEPT OF ECOLOGY

COMMENTS

on the

EVERETT SMELTER SITE

INTEGRATED DRAFT CLEANUP ACTION PLAN

and

DRAFT ENVIRONMENTAL IMPACT STATEMENT

for the

UPLANDS AREA

FEBRUARY 26, 1999

Submitted by:
David and Jeanne Taylor
538 & 556 East Marine View Drive
Everett, Washington 98201-1235
(425) 259-1591

To: Department of Ecology
From: David and Jeanne Taylor
Date: February 26, 1999
Re: Integrated Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Uplands Area, Everett Smelter Site, Everett Washington

263 This draft document represents the future of a residential neighborhood in Northeast Everett. The proposed cleanup actions will NOT "protect current and future generations from potential threats to human health and the environment" as stated by Stephen Alexander, DOE Toxics Cleanup Program, January 26, 1999.

The Draft Environmental Impact Statement

The Draft Environmental Impact Statement (DEIS) prepared for this site very clearly defines the expected impacts of each of four alternatives:

A. No Action
B. Off-Site Disposal (preferred by residents)
C. On-Site Containment Facility
D. Consolidation (recommended by Ecology)

264 Ecology has proposed the selection of Alternative D, Consolidation, which includes off-site disposal of only the most contaminated soils and the construction of a Consolidation Facility on the Former Arsenic Trioxide Precessing Area (FATPA) to accommodate large volumes of less, yet still highly, contaminated soils, up to 3000 mg/kg or 150 TIMES the cleanup level of 20 mg/kg established for Arsenic in accordance with Model Toxics Control Act regulations.

THE ALTERNATIVE PROPOSED BY ECOLOGY IS UNACCEPTABLE.

Consider the short-term and long-term impacts, as outlined in the DEIS, of Alternative B, Off-Site Disposal, in comparison to those of the Alternative D, Consolidation, as recommended by Ecology, on each of the areas studied:

Earth

• "Minimal" topographical changes would occur with Off-Site Disposal as the site "would be graded to match existing conditions as much as possible."

265 • Topographic impacts would be significant with Consolidation including a change in grade of "approximately 4 feet above the existing grade" causing "impeded" views from nearby residences.

Air Quality

266 • Impacts from truck and equipment emissions "would be similar" for both alternatives and "would not exceed the annual major source thresholds and would not be considered significant."

• The level of contaminated "fugitive dust emissions" would also be similar for both alternatives and "may represent the greatest health impact to the public."
• However, Off-Site Disposal, would eliminate this health risk for future generations, while Consolidation would still present the potential for future contaminated dust emissions.

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Surface Water

• Short-term effects would be similar for both alternatives.

• The long-term effect of Off-Site Disposal "is expected to result in a decrease of contaminant transport to the storm water system, the lowland area, and the Snohomish River."

• While Consolidation is expected to have the same effect, the possibility exists for "negative impacts to the surface water should the impermeable cap ever fail."

• Off-Site Disposal eliminates this future potentiality.

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Groundwater

• Short-term impacts would likely be insignificant for both alternatives.

• The long-term effect of Off-Site Disposal "would significantly reduce the potential for future leaching and infiltration of contaminants to water-bearing zones."

• Although expected to "decrease any movement of site-related contaminants to the groundwater," with Consolidation, the potential exists for "negative impacts to groundwater should the impermeable cap ever fail."

Environmental Health

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• "Short-term risks to construction workers involved in excavation and transport of contaminated soil could occur," with both alternatives, but "be minimized" through protective measures.

• Off-Site Disposal would significantly reduce "future risks to community residents" and workers because "accessible contaminated soil" would have been removed.

• Long-term protection could not be guaranteed under Consolidation "if failure of the cap were to occur." The "most sensitive subpopulations (i.e., a chemically-sensitive child who ingests a large amount of contaminated soil after breach of containment) may not be fully protected."

Land Use

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• The Off-Site Disposal Alternative "would have a beneficial impact on existing land use conditions." The Former Arsenic Trioxide Processing Area would be "suitable for any land use, including residential." Existing land use restrictions would also be removed from the Peripheral Area "representing significant improvements in land use conditions."

• Under the Consolidation Alternative, the Former Arsenic Trioxide Processing Area "could probably not be developed for single-family residences." For other land uses, "adequate institutional controls" would have to be assured.

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Housing

• "The site could be developed for residential use (single-family or multi-family) following remediation" under the Off-Site Disposal Alternative. This would have a beneficial impact on the

271 cont.

Everett housing supply, especially with housing in demand by the nearby Navy Home Port, and restore the neighborhood to it earlier ambiance. This alternative "would be expected to result in increased property values" in the immediate vicinity as compared with current conditions.

• "Multi-family residential use" could only exist under Consolidation "if adequate institutional controls could be assured." However, an increase in property values "would probably be less than for the Off-Site Disposal Alternative, because contaminated soil would be left on-site." It should be considered that under this alternative, because of the notoriety of the site, property in the area may never regain its expected value.

272

Aesthetics, Light and Glare

• Short-term aesthetic, light and glare impacts would be similar for both alternatives.

• The long-term aesthetic impact after the implementation of Off-Site Disposal would be extremely positive. The neighborhood would retain its breathtaking views, regain its viability, and lose the negative stigma it has endured these past eight years.

• As waste would remain on-site under Consolidation, redevelopment may not occur as quickly as would be hoped. The "increased elevation would change the nature of the existing views" and may also "impede the territorial views."

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Parks and Recreation

• The impacts to the three parks associated with both alternatives would be "identical."

• If cleaned up under the Off-Site Disposal Alternative, the Former Arsenic Trioxide Processing Area should be considered for use as a park facility. This was the remediated use originally promised to the residents who sacrificed their homes. The park could be publicly or privately funded.

• The option of designating the site for parkland is highly unlikely under the Consolidation Alternative because of liability issues with the contamination left on-site.

274

Transportation

• Although significantly more truck and/or rail trips would be required to satisfy Off-Site Disposal than Consolidation, the benefits of this temporary inconvenience would be greatly outweighed by the permanent solution afforded the neighborhood. The residents of the Everett Smelter Site have patiently waited, amid continued assurances of an eminent cleanup, for the past eight years; a few more months is not going to matter.

275

Noise

• Noise impacts, caused primarily by increased truck traffic and heavy equipment, would be significant under both alternatives, although likely last a shorter amount of time under Consolidation because of less soil removal and replacement. Again, the positive benefits of a permanent solution with Off-Site Disposal outweigh the negative impacts.

276

Public Services and Facilities

• Necessary public services would increase during remediation under both alternatives.

• Implementation of the Off-Site Alternative would have less long-term impact on public services than Consolidation because institutional controls would not be necessary.

• The City of Everett's tax revenues would be positively impacted by an increase in property values due to a complete cleanup with Off-Site Disposal and negatively impacted by a decrease in property values under Consolidation due to the stigma and fear associated with the toxic contamination left on-site.

277

Maintenance

• With the Off-Site Disposal Alternative, "there would be no need for continued maintenance of the soil cover or fencing that now exists."

• The system designed under the Consolidation Alternative "would require routine inspection and maintenance" for perpetuity, the responsibility of Asarco or Ecology. A breech of this responsibility, which could occur sometime in the future due to a number of factors including bankruptcy or elimination, would put future generations in jeopardy of reliving our neighborhood's nightmare.

278

Other Governmental Services or Utilities

• Consolidation would require the implementation of a long list of very expensive institutional controls which would be administered by the City of Everett, the Snohomish Health District, and the Department of Ecology. These controls could potentially be in effect and be financially draining for hundreds of years. And, if no longer funded sometime in the future, recontamination could occur. Is this the legacy we want to leave to our children?

• Off-Site Disposal would virtually eliminate these costly measures because all of the contaminatwould be gone.

Conclusion

The DEIS clearly shows that Alternative B, which mandates Off-Site Disposal of all "accessible" contaminated soils, will provide the least long-term impact and virtually eliminate the need for expensive "institutional controls" that must remain in place for perpetuity. With current technology, all of the contaminated soils left by the former smelter can become "accessible."

The Draft Cleanup Action Plan

The Draft Cleanup Action Plan explains the reasoning behind the selection of the Consolidation Alternative by Ecology as best-suited to this particular site in order to maintain protection of human health and the environment and outlines the steps necessary to implement this chosen alternative by Ecology and/or Asarco.

As noted in our comments on the DEIS and in Ecology's document on page 67, the Off-Site Disposal Alternative "would have the greatest long-term beneficial impacts." It "would significantly reduce public health risks, and have beneficial impacts for land use, housing, water quality, and possibly air quality." This alternative would also restore a neighborhood haunted by the nightmare of the past eight years, and mourning the loss of friends and neighbors.

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Selection and Justification of Remedy

Public participation is supposed to be an integral part of this process. Yet the comments that were received during the public comment period, stated on page 56 of the Ecology's document, overwhelmingly "made it clear that the public was opposed to the construction of a consolidation facility with the proposed grade changes. In addition, the public opposed leaving highly contaminated soils and other smelter residuals within the residential neighborhood."

These comments, from those who have suffered physical, psychological, emotional, and financial injuries, and who stand to lose the most if a "complete" cleanup in not implemented, have seemingly been ignored. Ignored in favor of industry giant, Asarco, who operates smelters around the world, polluting the air and soil of those who cannot fight back while realizing tremendous profits. Why should we, as innocent victims, be punished for a crime someone else committed? Often, it doesn't seem Ecology is on the side of those it represents.

280

We are assuming that a Cost-Benefit analysis has been calculated, comparing the current and future costs of Ecology's (or Asarco's) alternative, Consolidation, to the people's preferred alternative, Off-Site Disposal. What may represent the best alternative for short-term cost savings, may not be representative of long-term cost savings. Please answer the following questions:

- Was the analysis calculated using the "worth" method or the "direct expenditures/opportunity cost" approach?
- What period of comparison was used? 10 years? 100 years? 1000 years?
- Were negative effects counted as lost benefits?
- Did you take into consideration the possibility of system failure?
- What was the result?

It is difficult to believe that the Off-Site Disposal Alternative, which would incur a one-time initial cost, would be more expensive that the Consolidation Alternative which includes, but may not be limited to, the following extremely intrusive, stigma-inducing, labor-intensive institutional controls:

- Deed Covenants
- Permit Overlay
- Database and Web Page
- Worker Protection Program
- Small Quantity Soil Disposal Program
- Large Project Soil Disposal and Management Program
- Public Education Program
- Exposure Testing Program
- Environmental Investigations
- Effectiveness Evaluation
- Citizen's Advisory Committee Program
- Dispute Resolution Program
- Contingency Plans
- Financial Assurances

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SNOHOMISH HEALTH DISTRICT

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March 1, 1999

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DEPT OF ECOLOGY

DAVE SOUTH
WASHINGTON STATE DEPARTMENT OF ECOLOGY
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Dear Mr. South:

Thank you for the opportunity to review your Draft Cleanup Action Plan (DCAP) for the Everett Smelter Site. It's obvious that you and your associates have worked hard on this draft and that you addressed most of the issues we brought to your attention after reviewing a preliminary draft. We understand that there is still much more work ahead before the cleanup can be completed. We look forward to reviewing the Engineering Design Plans, Health and Safety Plans (also known as the Protection Monitoring Plan), Performance Monitoring Plans (also known as the Sample Plan), Conformation Monitoring Plans (also known as the Quality Control and Institutional Controls Plan), and we look forward to seeing an improved project schedule. We trust that you will incorporate the following issues in those plans which we believe were not discussed in enough detail in the DCAP:

281 First, we anticipate reviewing the Engineering Design Plans for the problem waste landfill (consolidation facility), and assume these plans will include construction plans and specifications as required under the Model Toxics Control Act (MTCA), WAC 173-340-400. Although we understand that a solid waste permit from the Snohomish Health District is not needed because of the MTCA provisions, we are still interested in reviewing the design for the consolidation facility to insure that it meets the technical requirements of the Washington State Minimum Functional Standards for Solid Waste Handling. We envision the plans will include a thorough geotechnical investigation which will demonstrate that the design meets the requirement of a clay liner below the facility. Other requirements that must be addressed include the minimum number of four groundwater monitoring wells around the facility. In addition, the facility design must have had considered the potential for methane gas production.

282 Second, the Health and Safety Plan should address who is in charge of safety at this site. The Health and Safety Plan should include a section outlining organizational responsibilities during cleanup. However, the plan should also address non-cleanup related work on the site as well. The Washington State Department of Labor and Industries (L&I) asked that a site wide safety and health program be established. It is not clear if the worker protection program described in section 6.7.4 of the DCAP, under the Institutional Controls, satisfies the request by L&I. As we have stated before, the Health District will attempt to inform employees and employers of the health and safety guidelines issued by L&I. We will help collect air sampling data, but we do not intend to issue safety equipment, or take responsibility for the research or other statutory requirements deemed necessary by L&I.

283 Third, the Performance Monitoring Plans should include details concerning sampling and construction documentation. The plan should include testing of all media of concern, including soil, air, water, vegetative waste, food harvested in the area, sediment and dust. The report should be

381 cont. residential parcels. If they weaken or disappear over time, then a long-term management and deferral of action decision could be changed into a *de facto* no action decision.

379 I support Ecology's proposal to have a Citizen's Advisory Committee review overall site cleanup actions, including institutional controls, on a continuing basis and make recommendations to Ecology for changes to improve effectiveness. I also support the
380 periodic monitoring of the long-term effectiveness of on-property containment of residual soil contamination, through repeated sampling of "selected" surficial soils for possible recontamination. Ecology should provide some minimum specifications for the resampling
381 cont. program within the CAP, lest de minimis sampling programs be considered which would not be useful in monitoring long-term community protectiveness. During the MTCA PAC process, the point was raised and emphasized (by Rod Brown, among others) that if institutional controls are to be used as an element of cleanup actions, they should be subject to the same standards for demonstrating long-term effectiveness as any engineering measures would be. Periodic resampling of surficial soils, to document that they remain below applicable cleanup standards, should be part of that demonstration for the Everett Smelter site, especially given the large number of activities that potentially disturb residential property soils.

13. 382 See CAP section 7.2.2, Site Boundary Study: the CAP states that a boundary study will be performed based on transects as discussed in the mediation Technical Work Group workbook on alternatives. A detailed study protocol is to be developed as part of a compliance monitoring plan. The principle for any boundary study should be the collection of adequate confirmatory negative evidence that significant contamination does not occur beyond the site boundary. Recent results from soil sampling on Maury Island and at University Place, some 5 to 7 miles from the former Tacoma Smelter site, are instructive with respect to boundary issues. Soil arsenic concentrations at both locations exceed the 230 ppm cleanup action level for the Ruston/North Tacoma Superfund site, despite their distance from the current site boundary. The spatial coverage of any boundary study should extend well beyond one or two properties past the current boundary to provide adequate information. Spatial heterogeneity in soil arsenic concentrations, especially given property-specific histories of soil disturbing activities, needs to be recognized. One or two properties that are below cleanup standards is an insufficient basis to define a boundary.

14. 383 The CAP notes that lead is identified as a probable human carcinogen (see page 111 and elsewhere), as EPA has noted based on results from animal studies. No cancer potency factors have been developed by EPA for lead. EPA notes substantial uncertainties regarding lead carcinogenicity data; if lead is in fact a carcinogen, it appears to be a weak one (low potency). The CAP should state that lead cleanup standards are evaluated based on non-cancer health effects (e.g., neurobehavioral toxicity), using blood lead levels as a biomonitoring indicator for those non-cancer effects.

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South, David

From:	Laurie Valeriano [lvaleriano@watoxics.org]
Sent:	Wednesday, March 03, 1999 6:49 AM
To:	DSOU461@ECY.WA.GOV; SLEE461@ECY.WA.GOV
Cc:	jonstier@mindspring.com; doris.cellarius@sfsierra.sierraclub.org
Subject:	Asarco everett

E-mail MEMORANDUM

To: Tom Todd & Susan Lee, Washington Dept. of Ecology
Fr: Laurie Valeriano, Washington Toxics Coalition
Jon Stier, WashPIRG
Doris Cellarius, Sierra Club

Date: March 24, 1999
RE: Asarco Cleanup Action Plan

We apologize for submitting these comments a few days late. Thank you for providing extra time for us to review and comment on the Asarco Everett cleanup action plan.

We fully support Ecology moving forward with the cleanup action plan. This is long overdue and we hope that Ecology will seek additional funding to move forward with cleanup and aggressively seek reimbursement from the PLP. 286

While we applaud Ecology in taking this next step in developing a cleanup plan, we are concerned that it does not meet some of the requirements in MTCA. According to MTCA, a cleanup must be permanent to the maximum extent practicable and this is really what the Northeast Everett community deserves. This cleanup action plan falls far short of permanent. It leaves a substantial amount of contamination for the community to live with and relies too heavily on institutional controls. 287

In order to move towards a more permanent solution we would like Ecology to establish the remedial level for the different depths in the periperal area at 20 ppm. While we understand that you have tried to address the community's concern and establish a remedial level of 20 ppm up to one foot, we believe that in the long run it makes more sense to remove as much of contamination as possible the first time so the expense of monitoring, sampling and maintaining institutional controls is minimized, the potential for future contamination and migration is minimized, the health of the community is protected and the peace of mind of the community begins to be restored. 288

Under the plan a significant amount of contamination may be left below 2 feet, which will have to be monitored into the future. The current plan for institutional controls is not clear as to what will happen if there are problems found with monitoring and it appears as if the only check on whether they are working is the 5 year periodic review. We are concerned with relying on the 5 year review mechanism, because we do not think they occurring. We are further concerned that dwindling resources at Ecology fewer staff will make this review difficult every 5 years. 289

It is also of great concern to us that contaminated soils will be piled up in the smelter area in the community and then be capped and graded. We do support the removal of the highly contaminated soils, but believe that more of the soils should be removed or treated because it is in the middle of a 290

residential community. The Department has gone as far as to say that the all soils in the peripheral areas, whether commerical or residential will be treated the same, but then the community is left with a significant amount of contamination in the smelter area that prevents the restoration of single family residences. We do not believe it is appropriate for Ecology to implement a cleanup that will prevent a community from restoring the land-use to single family residential. 290 cont.

Finally, we are concerned that there is no comprehensive schedule to implement this plan. We fully support Ecology moving forward with a cleanup, but there really needs to be assurance that activities will move forward on a timeline and milestones will be met. Including a restoration timeframe in the cleanup plans is an important requirement of MTCA and essential for the community. We request that a more comprehensive schedule be included in the final plan. 291

We appreciate the opportunity to comment on this important cleanup in Washington State. If you have any questions, please feel free to contact Laurie at 206-632-1545x14.

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Washington State Department of Ecology
Northwest Regional Office
Toxics Cleanup Program
Everett Smelter Site Cleanup
Attention: Susan Lee, Public Involvement
David South, Site Manager
3190 160th Avenue SE
Bellevue, Washington 98008-5452

March 9, 1999

Gentlemen:

Re: Draft Cleanup Action Plan and Draft Environmental Impact Statement
Everett Smelter Site, Everett, WA
Public Comment Period
Review Comments

As the technical consultant to the Northeast Everett Community Organization (NECO), as well as other affected community residents from the Northwest Everett Neighborhood Association and the Everett Housing Authority, I have reviewed Ecology's January 26, 1999 Draft Cleanup Action Plan and Draft Environmental Impact Statement for the Everett Smelter site. This letter provides Ecology with my technical review comments. Individual citizens from the affected communities will be submitting their own comments separately.

Please feel free to contact me to discuss any of my review comments. I have numbered the comments that follow for ease of reference.

335 1. Exhibit 1, Land Use Map: the Everett Housing Authority multi-family housing west of Hawthorne Street is not shown correctly (compare EIS Figure 4-5, which shows the correct multi-family residential land use for that area). This multi-family housing includes

335 cont. a large number of children, identified in the CAP as a sensitive subpopulation.

366 2. See EIS Figure 4-7: the recreational area of Legion Park, on the northwest corner of the golf course, should also be noted as a park/recreation area within the current site boundary (compare EIS Figure 4-5).

367 3. Future land use at smelter fenced area: the CAP and EIS should take note of the fact that future development of the smelter fenced area will largely be constrained by the decisions of the current property owner, ASARCO, subject to zoning and permit approvals of the City of Everett. Thus, development of any type will only occur if ASARCO agrees to pursue or allow such development, regardless of "compatibility" analyses. Non-development of the site (with restricted community access to the property) is one option ASARCO could adopt. The CAP approach to remediation of the smelter fenced area, and the magnitude and extent of remaining contamination after remediation is completed, are appropriately recognized in the EIS (see section 4.6) as related to likely future land use decisions for the smelter fenced area. There is an apparent tradeoff between practicability issues in selecting MTCA cleanup actions and restoration of single-family residential land use that existed prior to site discovery. The CAP and EIS should discuss in more detail how this tradeoff is considered in making practicability decisions on cleanup actions. Can community restoration, as well as degree of protectiveness, be considered as a benefit in the cost-benefit analyses of practicability? If not, does this set an unfortunate precedent that purchase of contaminated property by a PLP can result in less complete site cleanup and restricted land uses, regardless of the community setting in which the property purchase occurs?

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370 4. Street abandonments: the CAP and EIS discuss modest grade increases (up to 4 feet, with no impairment of existing views from adjacent residential properties) for the final cap elevations at the smelter fenced area, after consolidation of contaminated soils from the peripheral area. There is no discussion of abandonment of the existing streets within the smelter fenced area, although it might be inferred that street abandonments would occur. The EIS should discuss this as an additional potential impact (community access issues) of the proposed cleanup actions. I understand from discussions with the City of Everett that street abandonments require action of the city council, which would be an additional ARAR. There may also be requirements for rerouting of various buried utility lines that now go through the smelter fenced areas (e.g., along Pilchuck Path).

371 5. See CAP Figures 6-1 through 6-5: these figures are used for an analysis of practicability for soil removal and replacement actions. They are derived from a database of interpolated values for individual properties and soil depth intervals, using available site characterization data as a basis for interpolation. The number of properties with interpolated values generally decreases with increasing depths, to markedly fewer than the 565 properties with interpolated surficial soils values (noted on page 84). This reflects the limitations in available site characterization data for soils contamination. A primary reason

371 cont. only areas closer to the smelter were sampled at greater depth intervals is a site conceptual model that suggests more distant properties have only limited depths of contaminated soils. The Figures all have vertical scales in units of percent of soil volume exceeding given soil arsenic concentrations. Given the conceptual model of the site, the deeper the soil interval, the fewer the number of properties to which the Figure applies. This means that criteria for disproportionality derived from examination of a single depth interval at a time have varying effects on the overall cleanup costs, since they affect fewer and fewer properties with increasing depths. Ecology might consider this effect in deriving final concentration-by-depth remediation levels; for example, the effect on total cleanup costs of a maximum soil arsenic concentration of 250 ppm rather than 500 ppm at depths below 2 feet is likely to be small. The figures should be annotated with the number of properties included in the interpolated database.

6. 372 See page 70: Ecology notes that the dangerous waste criterion of 3,000 ppm arsenic (TCLP failure criterion) is in the midpoint of the DOH-identified range of concentrations that could result in death for sensitive populations. The CAP states that leaving greater than 3,000 ppm arsenic would not be protective for possible severe acute effects in the event that containment was lost. I note that the DOH range cited is in fact a range for effects, not no effects; the no-effects concentrations are derived by DOH dividing by an uncertainty factor of 10. The DOH no-effects range is substantially lower than the 3,000 ppm criterion proposed in the CAP for removal of materials in the smelter fenced area. Thus, materials below 3,000 ppm arsenic could, if released in the future, pose some risks of severe acute health effects to sensitive individuals by the DOH analysis. The 3,000 ppm criterion does not represent a level below which there are no risks of severe acute effects.

373 Other discussions in the CAP (see EIS page A3-14) suggest that the 3,000 ppm arsenic criterion for removal of materials from the smelter fenced area is not a firm value, but rather is a default value that could be changed if further TCLP (designation) testing was performed. ASARCO has noted earlier, with respect to its TCLP criterion evaluations, that further testing of specific materials may be performed (see letter of July 12, 1996 to D. Nazy from T. Aldrich, Appendix F in Smelter Area Investigation report). Ecology should clarify in the CAP whether the 3,000 ppm arsenic criterion is based solely on TCLP failure and hazardous waste designation, and is therefore subject to modification based on additional testing, or whether it is also based on protectiveness for acute health effects and is a firm value. If materials above 3,000 ppm arsenic can be tested and left at the smelter fenced area as long as they do not fail the TCLP test, then the analysis of potential long-term acute health threats should be modified to reflect greater long-term risks if containment is lost.

7. 374 See pages 77 and 83: the CAP discusses the remediation levels for average arsenic concentrations for the 12-24 inch and >24 inch depth intervals in relation to acute health effects evaluations by DOH. Since the acute analyses by DOH are based on short-term (one-day or less) exposure scenarios, the assumption that contact occurs over an area as

374 cont. large as a complete decision unit (4,000 square feet or more), as reflected in an average concentration criterion, is inappropriate. Short-term exposures to considerably higher concentrations at specific locations within a decision unit could occur even if the DU average concentration criterion was met. Acute criteria are reasonably compared against maximum concentrations, not area-averaged concentrations. This is correctly stated on page 76.

Potential recontamination of surficial soils, where frequent contact could occur and chronic exposures are of concern, may be one alternate basis for evaluating average concentration criteria for deeper soil depth intervals.

375 8. See page 84: the references to Figures 6-6 and 6-7 appear to be reversed in the text.

9. 376 See CAP Figure 6-6, page 85: as noted in the text, these soil volume estimates are only for those residential properties in the peripheral area for which interpolated values are included in the database. They are understood to be imperfect estimates. The comparison of soil volumes reflected in the two columns is nevertheless meaningful. The EIS includes an estimate of total soil removal volumes for the selected remediation levels in the peripheral area, including both residential and non-residential properties (see EIS Tables 3-4 and 4-3). The total volume estimated in the EIS is 162,000 cubic yards, with perhaps an additional minor increment of 4,000 CY of >3,000 ppm arsenic soils for disposal at Arlington, OR (see page A4-42). The CAP states in section 4.1.2 that cleanup standards for commercial and recreational land use areas within the site will be identical to those for residential areas. Apparently the same remediation levels also will apply to all peripheral area properties, regardless of current land use. Given the extent and locations of non-residential areas in the peripheral area, it is likely that more than 21,000 cubic yards of accessible soil (the difference between the EIS total estimate of 166,000 CY and the 145,000 CY shown for residential properties in Figure 6-6) will exceed the stated remediation levels. The two volume estimates thus appear to be incommensurate.

Ecology should consider additional discussion in the CAP regarding non-residential property cleanup actions in the peripheral area. The practicability analyses for applying the same cleanup levels and remediation levels at non-residential properties should be further developed and presented. I understand that soil arsenic criteria for non-residential land uses are being developed at another MTCA site (Former DuPont Works), which may provide some comparison analyses. With respect to sampling at non-residential properties, would it not be reasonable to modify the size of decision units to something greater than 4,000 square feet?

10. 377 See EIS section 4.10, Transportation: the CAP does not provide a firm implementation schedule for cleanup actions. ASARCO's willingness to perform cleanup actions, the status of litigation, and alternative funding available to Ecology to pursue cleanup actions itself are all understood to affect potential cleanup action schedules. The EIS makes an

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377 cont. assumption that peripheral properties are remediated in three years, at a rate of about 200 properties per year, as a basis for assessing and comparing traffic impacts. (The summary on page 67 of the CAP, however, comments on a three to five year schedule, with a May to October construction period annually). I note that this rate of about 200 properties remediated per year is substantially higher than at Ruston/ North Tacoma. Alternative rates for performing cleanup actions will affect some anticipated traffic impacts (magnitude and duration). Ecology may want to contact community residents for comments on the number of properties to be remediated per year; this may be a parameter for which a range of durations would be acceptable. I understand that the EIS assumption supports the analyses in the EIS but does not reflect a decision within the CAP on the schedule for property remediation.

Transportation impacts are also addressed as part of Ecology's response to ASARCO's "new science" submittal. Additional factors relevant to the analysis of transportation impacts and risks, beyond those discussed in the EIS in section 4.10, are identified and discussed there. Ecology should consider incorporating such additional assessments into the EIS.

11. 378 See EIS section 4.9, Parks and Recreation, page A4-39: the EIS proposes that remediation of parks and recreation area soils in winter would mitigate impacts on public use of those facilities. Does Ecology consider soil remediation in winter, a period of unfavorable wet weather, to be realistic, practical, and cost-effective? Are there precedents for similar soil excavation and removal cleanup actions in winter in western Washington?

12. 381 Permanent remedies for soil contamination with arsenic and other metals, as that term is defined in MTCA, are very difficult if not impossible to achieve. From the point of view of community residents, however, excavation and replacement of contaminated soils with transport of contaminated soils out of the community for ultimate disposal achieves permanence as a practical matter for their properties (see page 72 et seq.). The proposed cleanup actions, considering practicability and protectiveness, combine soil excavation and removal with on-property containment actions. An extensive set of institutional controls is proposed for long-term community protection from residual site contamination. Those institutional controls are an essential component of the overall protectiveness of the selected remedy for the site (given its "impermanence"); they need to be effectively implemented and funded. A decision not to remove contaminated soils as part of this cleanup action is not really a permanent no action decision; it is more appropriately viewed as a deferred action or an active, long-term management decision. Institutional control programs will not be perfect; some "error rate" will be associated with them, representing errors and potential exposures that would not occur if contaminated soils had been removed from the community (the more "permanent" solution). Considering how long arsenic will remain in community soils, it is also worth considering how long institutional controls can be made effective at a large number of properties including hundreds of

381 cont. residential parcels. If they weaken or disappear over time, then a long-term management and deferral of action decision could be changed into a *de facto* no action decision.

379 I support Ecology's proposal to have a Citizen's Advisory Committee review overall site cleanup actions, including institutional controls, on a continuing basis and make recommendations to Ecology for changes to improve effectiveness. I also support the
380 periodic monitoring of the long-term effectiveness of on-property containment of residual soil contamination, through repeated sampling of "selected" surficial soils for possible recontamination. Ecology should provide some minimum specifications for the resampling
381 cont. program within the CAP, lest de minimis sampling programs be considered which would not be useful in monitoring long-term community protectiveness. During the MTCA PAC process, the point was raised and emphasized (by Rod Brown, among others) that if institutional controls are to be used as an element of cleanup actions, they should be subject to the same standards for demonstrating long-term effectiveness as any engineering measures would be. Periodic resampling of surficial soils, to document that they remain below applicable cleanup standards, should be part of that demonstration for the Everett Smelter site, especially given the large number of activities that potentially disturb residential property soils.

13. 382 See CAP section 7.2.2, Site Boundary Study: the CAP states that a boundary study will be performed based on transects as discussed in the mediation Technical Work Group workbook on alternatives. A detailed study protocol is to be developed as part of a compliance monitoring plan. The principle for any boundary study should be the collection of adequate confirmatory negative evidence that significant contamination does not occur beyond the site boundary. Recent results from soil sampling on Maury Island and at University Place, some 5 to 7 miles from the former Tacoma Smelter site, are instructive with respect to boundary issues. Soil arsenic concentrations at both locations exceed the 230 ppm cleanup action level for the Ruston/North Tacoma Superfund site, despite their distance from the current site boundary. The spatial coverage of any boundary study should extend well beyond one or two properties past the current boundary to provide adequate information. Spatial heterogeneity in soil arsenic concentrations, especially given property-specific histories of soil disturbing activities, needs to be recognized. One or two properties that are below cleanup standards is an insufficient basis to define a boundary.

14. 383 The CAP notes that lead is identified as a probable human carcinogen (see page 111 and elsewhere), as EPA has noted based on results from animal studies. No cancer potency factors have been developed by EPA for lead. EPA notes substantial uncertainties regarding lead carcinogenicity data; if lead is in fact a carcinogen, it appears to be a weak one (low potency). The CAP should state that lead cleanup standards are evaluated based on non-cancer health effects (e.g., neurobehavioral toxicity), using blood lead levels as a biomonitoring indicator for those non-cancer effects.

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15. 384 The CAP and EIS discuss Arlington, OR and the Roosevelt landfill in eastern Washington as the disposal sites for hazardous waste and problem waste, respectively, to be removed from the Everett Smelter site. I understand these to be representative and acceptable disposal sites which can be used as a basis for comparative costs of cleanup alternatives. Other options for disposal sites that offer lower costs, but still meet objectives for protectiveness and compliance with ARARs, could be supported by the community.

Hazardous wastes sent to a permitted RCRA TSD facility such as the Arlington, OR landfill require stabilization (e.g., with cement kiln dust, fly ash, or cement, plus additive compounds) prior to disposal (under EPA's RCRA "land ban" rules). I do not know if samples have been sent to the Arlington, OR TSD landfill operators for testing to determine whether or not successful stabilization can be achieved. Such tests might be required for several different types of materials from the smelter fenced area. It is possible that some "high end" materials (arsenic product or arsenic flue dusts) may be impossible to successfully stabilize. In that case, they are not allowed to be disposed of in the TSD landfill but must be sent elsewhere for metals recovery or other processing. The unit costs for materials sent to Arlington, OR depend on whether or not those materials can be stabilized and disposed of at the landfill. Thus, the costs in the CAP for cleanup actions related to hazardous wastes (mostly from the smelter fenced area) may be too low if they do not account for materials that cannot be successfully stabilized.

16. 385 See CAP section 2.4.1, Soil Contamination, and Exhibits 2 and 3 (concentration contour maps): Exhibits 2 and 3 are, as stated, useful for presenting a general overview of the pattern of soil arsenic contaminant distribution across the site. To avoid any potential misinterpretation of those contour maps, the CAP should also state that the contour maps are based on very limited data (in comparison to the property-by-property sampling that will be performed as part of site cleanup actions); that they should not be assumed to provide good estimates for soil arsenic concentrations at individual properties; that the average concentration over the 0-18 inch depth interval may not reflect variability in smaller depth intervals; and that they probably do not reflect the true local heterogeneity in soil contamination levels. I believe the database from which these maps were prepared, although extensive, may also be missing some relevant site data (e.g., information from interim action sampling). The detailed property-by-property sampling in Ruston/North Tacoma in comparison to the RI-level sampling data summaries for that site demonstrate the limitations of figures such as Exhibits 2 and 3.

17. 386 The smelter demolition debris, residual arsenic product, and elevated contamination in soils in the smelter fenced area constitute a threat to ground water quality. Leaching tests confirm that arsenic in these materials has a high potential mobility. Infiltrating precipitation contacts these materials under present site conditions, and probably flows laterally when it encounters competent till. Recent investigations of the smelter fenced area and the lowlands area to the east suggest that materials at the smelter fenced area are one potential source for observed ground water contamination. Cleanup actions at the

386 cont. smelter fenced area are designed, among other things, to address this threat to ground water quality. The containment actions for the consolidation area include a low permeability cap and an upgradient interceptor trench to isolate residually contaminated materials from ongoing contact with ground water. It is assumed that the existing till layer will serve as a low permeability barrier to downward movement of contaminants. It will take time for ground water quality to improve after remedial actions are completed at the smelter fenced area. An enhanced ground water monitoring system is needed as part of the CAP.

387 The water quality data for monitoring well EV-4B, one of only a few wells screened in the lower aquifer, are mentioned in the CAP. Well EV-4B is located just east of East Marine View Drive near the northeast corner of the smelter fenced area. According to the RI Report well log, there is a 6-foot thick till layer above the screened interval at well EV-4B. Elevated arsenic concentrations are nonetheless reported for this monitoring well. This deserves more discussion than is currently presented in the CAP. It is possible that there are installation problems (e.g., poor surface seals or well casing problems) affecting data quality at this well. It is also possible that the monitoring results for this lower aquifer well are indicating some lack of effectiveness of the till layer as a barrier to downward contaminant migration. Since contamination will remain at the consolidation area for a very long time (the arsenic and metals will not significantly degrade or diminish over time), some degradation in the performance of the cap and interceptor trench over time may occur. The potential long-term pathways for contaminant movement - downward through the till, or laterally along the top of the till - should be considered as part of long-term design for the consolidation area.

The CAP notes that evaluations of lowlands ground water quality issues will continue as part of future site investigations, separate from uplands cleanup actions. Once remedial actions at the proposed consolidation area are completed, it seems unlikely that they would be disrupted and then reinstalled to provide for further removal actions. Initial excavation and removal decisions for the smelter fenced area may thus become final decisions, regardless of the results of further investigations. A degree of conservatism in those initial decisions is therefore warranted, given uncertainties that apparently exist with respect to ground water transport issues.

18. 336 Ecology states that soil excavation would be limited to depths not requiring shoring. A need for shoring near structures would not preclude excavating and removing soils over substantial parts of residential yards without shoring in many cases. The greater the residual contamination at a property, the more long-term issues will devolve to the property owner. Deeper excavations are likely to be indicated at only a small number of properties close to the former smelter facilities. Although unit costs for remediation at those properties would be comparatively higher, the effect on overall site cleanup costs should be minor. Ecology should target removal of high concentration materials, including those at deeper soil intervals, considering how much excavation could be

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386 cont. achieved (in partial yard areas) without shoring.

19. 388 See Section 7.2.1.2. The discussion of sampling at the smelter fenced area appears to indicate that performance monitoring will be conducted only through borings and soil sampling at the limits of excavation areas. Based on the smelter area investigations, ASARCO has concluded that materials exceeding 3,000 ppm arsenic only occur in areas close to the footprint of the former smelter facilities; that is, demolition of the smelter was essentially "in-place" demolition, with no movement of materials to fill in swales or for other reasons, and no greater area of residual contamination above 3,000 ppm as a result of smelter operations. (Detailed records of demolition are not available). The extent of available sampling data summarized in the smelter area investigation for areas beyond identified excavation areas is inadequate to support such a conclusion. The soil arsenic concentrations > 3,000 ppm in the Medora Way area are not proximate to former smelter structures. Data from an interim action sampling site (IA-1; see RI report, Table 1-13, page 1-30) near SAIC-S26 show increasing concentrations with depth, to a maximum of 3,100 ppm arsenic at 23-25 inches; that location also appears to be beyond the intended excavation area.

A systematic sampling program should be performed to determine whether additional areas require excavation and to document the levels and amounts of contaminants to be contained onsite (see WAC 173-340-360(8)(c)). This can be accomplished for a moderate and reasonable cost. For example, assuming approximately 2 of the almost 6 acres of the smelter fenced area are not excavated, a sampling density of one boring per 1,600 square feet (40-foot spacing) would require about 60 borings. Samples should be collected down to till. Assuming an average of 10 feet to till, and samples composited vertically in two-foot intervals, a total of 300 samples would be analyzed. All samples should be analyzed for arsenic; a subset should be analyzed for other site-related contaminants.

Similar sampling beneath excavated areas should be conducted down to till. Field screening using a portable XRF could provide detailed information with greater spatial resolution about contaminant levels near the limits of excavation.

20. 389 "Clean" backfill soils should be available at well below 20 ppm with no cost penalty. The CAP should specify a lower acceptable limit than 20 ppm unless a significant cost penalty can be demonstrated. Based on Ecology's natural background study, where the maximum surficial soil arsenic concentration was only 11.3 ppm (eliminating Point Defiance Park samples near the Tacoma Smelter) and the median value was less than 4 ppm, soils at no more than 7 to 10 ppm maximum should be readily available. This will avoid problems of having replacement backfill soils almost equal to excavated soils (e.g., removing 22 ppm and replacing with 20 ppm) in contaminant concentrations. Ecology should require documentation of the metals content of any topsoils that include biosolids (e.g., "three-in-one" soils mixing soil, sawdust, and biosolids). Homeowners should have an option not to accept biosolids if that is their choice.

21. 390 The decision rules for soil excavation and replacement at residential properties indicate that decisions will be made for each decision unit based on data for that decision unit only. Thus, the property-wide averaging rule used at Ruston/North Tacoma will not apply. To the extent possible, the boundaries for defining decision units should incorporate available information on the history of soil disturbance at a property (such information as can be reasonably obtained from owner/occupants as site-specific sampling and remediation plans are developed). Matching DU boundaries to site history can reduce errors in which portions of contaminated areas are left onsite as a result of simpler decision rules (DU-based, all-or-none excavations).

391 The CAP should incorporate the idea of allowing property owners to designate a few high-use, high potential exposure areas (e.g., gardens, play areas) for separate sampling and remediation actions.

392 Soil sampling at residential properties should incorporate the idea of variable sampling densities for demonstrating compliance with cleanup levels and remediation levels. At properties closer to the former smelter, where contamination levels may be much higher than at more distant properties, the consequences of missing contamination are greater; for example, acute threats are much more of concern. This approach could save substantially on sampling and analysis costs compared to a "one size fits all" approach. For some properties accessible soil areas may be quite limited. A minimum number of samples, plus maximum density of sampling, could be used at such properties to avoid excessive sampling (i.e., to adjust from a fixed sample count). It may also be reasonable to define only a single DU (plus any owner-option targeted areas) for such properties, rather than force division of a small area into two separate DUs.

393 To avoid artifacts, soil samples should not be collected within a few feet of CCA treated wood, painted buildings, or gravel alleys or driveways. The effects of such extraneous possible sources for contaminants such as arsenic appear to be limited spatially; use of exclusion zones will minimize their potential confounding effects.

22. 394 If the analytical detection limit (or quantification limit) for soil arsenic samples is as high as <18 ppm, the calculation of an average concentration given some not-detected results will become an issue. Use of a simple one-half the detection limit approach is likely to bias the results low for many cases (consider the simple conceptual model of a steady decrease in contaminant levels with increasing distance). Note that MTCA statistical guidance does not favor use of half the detection limit for estimating an average. The number of samples will likely be too small for more sophisticated censored data evaluation approaches such as maximum likelihood estimates or regression-based approaches. A lower detection limit should be used if practicable; alternatively, the initial statistical calculation should be based on using the high detection limit, not one-half the detection limit, with an option for better analyses (lower LLD) of archived sample materials and recalculation of an average in case of initial failure.

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403 The Draft CAP notes that use of a simple arithmetic average rather than a UCL for the average will reduce false positive error rates, avoiding cleanup actions at properties that are already clean (see page 111). It is equally true, of course, that this will increase false negative error rates (there is no free lunch in statistics!), in which contaminated properties will not be remediated. The consequences may be considered acceptable by Ecology and the community as long as the degree of missed contamination is minor and the consequences of a false negative outcome are limited. But the decrease in one type of error should be recognized as leading to an increase in the other type of error. It should be recognized that the extent of missed contamination and the consequences of false negative errors will increase as soil sampling is decreased; this should be considered by Ecology in developing sampling plans.

23. 395 See page 74, MTCA equation for cancer risks and soil cleanup levels: Refer to the new science review document (M. Blum, January 26, 1999) response to comments on arsenic as a late-stage carcinogen (promoter rather than initiator) and an alternate calculation for adult exposure scenario and cancer risks. The resulting soil arsenic concentration at a calculated 1:1,000,000 cancer risk is still less than 20 ppm for an adult exposure scenario. The selected 20 ppm soil arsenic cleanup level should be clearly identified as being based on background rather than calculated cancer risk. The calculation in WAC 173-340 based on childhood exposures will also be protective for adults, but both are below the selected background-based concentration of 20 ppm soil arsenic.

24. 396 The initial soil sampling and analysis study at 20 residential properties included evaluation of the potential differences in soil contamination levels for 0-2 inch versus 0-6 inch sampling intervals. Those differences appeared to be relatively small. Ecology should not generalize this result to non-residential properties, especially relatively undisturbed properties, without further confirmational sampling. Residential properties have probably had substantial soil disturbance that has affected the vertical depth profile for smelter-related contaminants. Studies of smelter-related metals in undisturbed soils (e.g., research studies on Maury Island) have often shown a pronounced decrease in contaminant concentrations below the top few inches (e.g., below 0-2 inches). Sampling too deep an initial soil depth interval in those circumstances would dilute the reported concentration to below true surficial soil levels. Since potential human exposures and contaminant mobility are most affected by near-surface soils, this is an issue for appropriate sampling protocols and cleanup decisions.

25. 397 Assuming that the cost per ton to transport and dispose of problem waste contaminated soils offsite (e.g., at the Roosevelt regional landfill) is unaffected by the contaminant concentrations, being determined by transport costs per ton and landfill tipping fees only, there is no cost penalty to requiring that excavated peripheral area soils being consolidated at the smelter fenced area be relatively low-concentration soils. This will reduce the total amount of contamination being left onsite under a long-term containment approach. It will avoid circumstances where soils marginally above 3,000 ppm arsenic are removed only to

397 cont. be replaced with peripheral soils at several thousand ppm arsenic. Additional timing and sequencing issues may need to be considered to integrate the smelter fenced area and peripheral areas components of the CAP. Delaying backfill of excavation pits at the smelter fenced area, and deferring cleanup of highly-contaminated residential properties so that modestly-contaminated properties are addressed to provide consolidation soils, both have some obvious drawbacks. The principle of using least-contaminated peripheral soils as consolidation materials, however, should be met to the maximum extent practicable.

26. 398 See CAP Table 4-1, page 44: the listed, risk-based soil arsenic standard of 1.67 ppm includes use of a special default 40 percent bioavailability factor for ingested arsenic. The risk-based soil cleanup level would change if a different bioavailability factor was used. There are no site-specific studies for the Everett Smelter site of soil arsenic bioavailability in the various types of materials present. The basis for a 40 percent bioavailability factor for arsenic has been challenged, in both directions. See the recent DOH paper on acute health threats from arsenic and Ecology's new science review paper (M. Blum, January 26, 1999). Changing the bioavailability factor alone is unlikely to result in a risk-based soil arsenic standard exceeding 20 ppm, the default background (MTCA Method A) value.

399 27. See EIS page A4-51: delete reference to California.

28. 400 The background levels of arsenic in area ground water may well be greater than the current arsenic criteria and cleanup standards for surface water. If background-based cleanup standards are to be developed for ground water (or surface water), Ecology should take care in developing or reviewing proposed background study protocols.

29. 401 Some areas of high activity and comparatively deeper and more frequent soil disturbance, such as gardens, would justifiably require more than 12 inch clean cap thicknesses to maintain protectiveness. I agree with this principle as it is included in the Draft CAP and encourage Ecology to retain it. This would be a good fit with the concept that homeowners could identify one or two special DUs; the remediation levels down to 18 or 24 inches at those limited areas could be maintained at the cleanup standards (average and maximum concentrations).

30. 402 ASARCO now owns a number of residential properties south of the smelter fenced area. Has Ecology considered the possibility that ASARCO, as property owner, would refuse access for sampling and/or refuse soil cleanup actions? Would Ecology use deed restrictions in that event to prevent continued rental of those properties?

Sincerely,

Gregory L. Glass

Gregory L. Glass