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STATE OF COLORADO



Colorado Department  
of Public Health  
and Environment

DUE DATE  
ACTION

Bill Owens, Governor  
Douglas H. Benevento, Acting Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S. Laboratory and Radiation Services Division  
Denver, Colorado 80246-1530 8100 Lowry Blvd.  
Phone (303) 692-2000 Denver, Colorado 80230-6928  
TDD Line (303) 691-7700 (303) 692-3090  
Located in Glendale, Colorado

<http://www.cdphe.state.co.us>

DIST.	LTR	ENC
BOGENBERGER, V.		
BOGNAR, E	X	X
DECK, C. A.	X	X
DEGENHART, K		
DIETER, T. J.		
DIETERLE, S. E.		
FERRERA, D.W.		
FERRI, M.S.		
GERMAIN, A. L.		
GIACOMINI, J. J.		
ISOM, J. H.		
LINDSAY, D. C.		
LONG, J. W.		
MARTINEZ, L.A.	X	X
NAGEL, R. E.	X	X
NORTH, K.	X	X
PARKER, A.M.		
POWERS, K.		
RODGERS, A. D.		
SHELTON, D.C.	X	X
SPEARS, M.S.		
TRICE, K.D.		
TUOR, N.R.		
VOORHEIS, G.M.		
WILLIAMS, J. L.		
Cable, J.	X	X
Emmerson, M.	X	X
Wingard, R.	X	X
Byrd, J.	X	X
Landy, D.	X	X
Brooks, b.	X	X
Leithner, R.	X	X
Rosenman, A.	X	X
Becardini, J.	X	X
Nesta, S.	X	X
Arnold, P.	X	X
Lavarato, K.	X	X
COB. CONTROL	X	X
ADMN RECORD	X	X
PATS/130		

October 9, 2002

Mr. Joe Legare  
Assistant Administrator for Environment and Infrastructure  
U.S. Department of Energy-RFFO  
10808 Highway 93, Unit A  
Golden CO 80401-8200

RE: Comments on Draft Proposed Action Memorandum for the RCRA Closure of the RFETS  
Solar Evaporation Ponds

Dear Mr. Legare:

The Colorado Department of Public Health and Environment and the Environmental Protection Agency have reviewed the above-referenced PAM and have attached comments to this correspondence. During our review, two important items were not available for our review: 1) the geostatistical spatial analysis of the data, and 2) data analyses justifying the application of the bootstrap technique for the given data sets, or comparative calculations using previous EPA guidance for developing an exposure point concentration term. The agencies therefore reserve the opportunity during the public comment period to comment further on this document.

If you have any questions please contact Carl Spreng (CDPHE) at 303-692-3358, Elizabeth Pottorff (CDPHE) at 303-692-3429, or Jean MacKenzie (EPA) at 303-312-6258.

Sincerely,

Steven H. Gunderson  
RFCA Project Coordinator  
Colorado Department of Public  
Health and Environment



Reviewed for Addressee  
Corres. Control RFP

10/15/02  
Date By

Ref. Ltr. #

DOE ORDER #

5100.1

ADMIN RECORD

1101-A-000277

cc: Scott Surovchak, DOE  
Dave Shelton, K-H  
Marla Broussard, K-H  
~~Administrative Record, T130G\*~~

Dan Miller, AGO  
Susan Chaki, CDPHE  
Steve Tarlton, CDPHE-RFOU

**Comments on the  
DRAFT PROPOSED ACTION MEMORANDUM FOR THE  
SOLAR EVAPORATION PONDS  
September 30, 2002**

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Executive Summary

The first sentence in the first paragraph seems too long, is difficult to follow and should be broken up. The second portion of this sentence beginning with "since a release" should be further explained. A second sentence containing the information defining the term "this contamination" should be included.

In the second paragraph, it would be helpful if 'cumulative hazard index' were defined and a value threshold explained in this section for individuals that are not familiar with this term.

Add the phrase, "and replacement wells installed", after the word "abandoned" in the last sentence of the fourth paragraph.

Section 1.0

The description of the regulatory process in the first 2 paragraphs might be clearer if closure of IHSS 101 under RFCA were described in the first paragraph and closure of the interim status unit were described in the second.

Changes to first 2 sentences in first paragraph: "This Proposed Action Memorandum (PAM) decision document serves to close the Solar Evaporation Ponds (SEPs), Individual Hazardous Substance Site (IHSS) 101. Accelerated actions and closures of IHSSs are approved by the Department of Energy (DOE), the Colorado Department of Public Health and Environment (CDPHE, and the Environmental Protection Agency (EPA) under the Rocky Flats Cleanup Agreement (RFCA) (DOE/CDPHE/EPA, 1996)."

New first sentence of the second paragraph: "This PAM also serves as the Resource Conservation and Recovery Act (RCRA) / Colorado Hazardous Waste Act (CHWA) closure plan."

Changes to the end of the third paragraph: "... which provides for alternative requirements that are protective of human health and the environment. DOE has proposed a modification to Attachment 10 .... However, because the proposed modifications to the other RFCA Attachments are still under development,..."

Section 1.1

The second sentence of the third paragraph states that "Results of the risk assessment were used to determine if any actions or if **additional sampling** was warranted". Determining whether or not to collect additional samples would be partially based on a

statistical spatial analysis that was not included in the risk assessment. This analysis must be made to demonstrate that sample coverage is adequate.

### Section 3.1

Lithium is a COC for groundwater from the SEPs.

It would be helpful if you included a short description of the groundwater conditions for informational purposes, such as depth to groundwater and aquifer characteristics. It is not clearly stated that you have sufficient information to conclude that remaining surface and subsurface contamination will not further contribute to groundwater contamination. This should be explained if that is indeed the case.

### Section 3.2.2

We recommend that you include summary information such as depths of samples analyzed and contamination detected at these depths to give a clearer picture of the situation in the subsurface.

### Section 5.0

It is unclear to what two exposure scenarios the second sentence of the fourth paragraph is referring.

### Section 6.0

In several instances in this section (and at the end of Section 5.0), the statement, "determined not to be contaminated with hazardous waste", is used. Such a statement can only be used if a determination has been made that a media does not contain a listed or characteristic waste. A determination that certain media are below a 1E-05 risk to a WRW is not a valid hazardous waste determination. These statements should probably be limited to explaining that these media do not contain hazardous waste above a 1E-05 risk to a WRW.

### Section 8.0

This section should state whether there are elements of the final surface and vegetation cover the SEPs that will require maintenance to be effective.

### Section 9.0

Some elements of the proposed best-management practice actions may impact the Solar Ponds Plume. The thickness of the unsaturated zone across the area needs to be provided along with an assessment of the evapotranspiration properties expected from the materials used to cover the site. A realistic assessment of recharge with the finished configuration should be provided, with and without breaching the liners. These assessments could be conducted with the UZ module of MIKE SHE or UNSAT-H.

### General Comments:

Information should be provided in the Closeout Report on type, location, depth and contaminant characterization of any pipeline left in place. Any pipelines encountered during regrading should be removed.

References to existing Tier I and Tier II action levels and proposed new WRW-based action levels is confusing. Soil below Tier I, but above new action levels needs to be identified.

CDPHE Comments on APPENDIX A – Human Health Risk Assessment, Solar Ponds:

Page 1 – Introduction and Purpose

It is stated that this document supports closure of the SEPs, however, closure is a risk management decision and is not the role of the risk assessment. It should instead be indicated that the risk assessment will be used as a tool by the risk manager in making remediation and/or closure decisions.

Page 3 – Figure 1.1

Revise title to remove “and Sampling Locations”, as the sampling locations are not shown in this figure.

Page 6 – Bottom Paragraph

Validation frequencies that are greater than 90% are not evident.

Page 10 – Section 2.2.5

The text indicates that the number of records where the RL exceeds the associated WRW PRG values is given below. This information is not evident.

Page 11 – Last Line

The correct Section (2.x.x.) should be identified.

Page 12 – Figure 2.2

There is an inconsistency with the title (0 to 6 inch depth) and Page 11 – Surface Soil (0 – 2 inches). Please clarify the depths used to assess surface soil exposures.

Page 16 – Section 2.3.1

Please provide a table showing a comparison between site concentrations and western U.S. background levels of calcium iron, magnesium, potassium and sodium.

Page 17 – Table 2.2 – Calculation of element intakes

For the majority of the elements (see ratio column in table below), a re-calculation produced values, which are 100-fold higher than those presented in the table. Overall, it should have little effect on which chemicals are carried through the risk assessment. However, the calculations should be double checked prior to finalization.

For example, using a maximum concentration of 7,650 mg/kg manganese and assuming an intake of 200 mg of soil per day, an intake value of 1.53 mg/day was calculated.

$$7650 \text{ mg/kg} * 200 \text{ mg/day} * 1\text{kg}/1\text{E}06 \text{ mg} = 1.53 \text{ mg/day}$$

Chemical	Surface Soil Conc (mg/kg)		Recalculated Daily Intake (mg/day)		Draft Final SEP RA (mg/day)		Ratio of Recalculated to SEP values*	
	Mean	Max	Mean	Max	Mean	Max	Mean	Max
Calcium	23120	248000	4.62	49.60	0.04	0.5	115.6	99.2
Chromium	20.99	120	0.004	0.024	0.00004	0.0002	104.95	120
Copper	19.89	88.6	0.004	0.018	0.00004	0.0002	99.45	88.6
Iron	12706	27900	2.54	5.58	0.02	0.06	127.06	93
Magnesium	2570.7	6500	0.51	1.30	0.005	0.01	102.828	130
Manganese	308.8	7650	0.06	1.53	0.0006	0.02	102.9333	76.5
Molybdenum	2.36	4.95	0.0005	0.0010	0.000005	0.00001	94.4	99
Nickel	15.1	176	0.003	0.035	0.00003	0.0004	100.6667	88
Selenium	0.376	0.75	0.0001	0.0002	0.007	0.02		
Silicon	3432.6	11300	0.69	2.26	0.000002	0.00001		
Vanadium	29.8	67.6	0.006	0.014	0.00006	0.0001	99.33333	135.2
Zinc	64.4	460	0.013	0.092	0.0001	0.001	128.8	92

\* With the exception of selenium and silicon (shaded), the ratios between the recalculated intakes and those presented in the risk assessment are 100-fold (with variation attributable to rounding)

Page 21 – Table 2.7

Footnote for “a” is missing. Since the liner is a manmade material, it may not be appropriate it is to compare this material to soil background levels.

Page 22 – Dibenzo(a,h)anthracene

Please provide a similar discussion for dibenzo(a,h)anthracene as was given for benzo(a)pyrene. (e.g., provide the summary statistics and compare to a PRG)

Page 22 – Arsenic – Bottom of page

The text states that there was no evidence of arsenic contamination in the surface soil or the liner materials. However, arsenic failed the preliminary PRG screen in surface soils.

Page 23 – Section 2.3.7

Please provide a list of those chemicals for which no toxicity values were available.

Page 27 – Table 3.1

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Although an upcoming comment will ask that you remove this parameter from the table and reformat the equations follow those presented in the RSALs document, this parameter should be 230/365 rather than 250/365.

Page 29 – Third bullet – gamma-exposure time factor

This parameter will be handled differently once the equations are reformatted. Rather than having a separate parameter called  $Te_d$ , the exposure time of 4 hours per 24 hour day will be used. This results in the same value, but is just presented differently.

Page 30 – Section 3.3

This section would be better situated prior to presenting the exposure parameters.

Page 32 – Section 3.4

Second paragraph – Remove the word “be” from “This method was be used....”

Third paragraph – The EPA reference is missing a number in the date.

Page 36 – Table 3.4

Please revise the external radionuclide equation to match the one in the RSALs Task 3 report. Although the two equations result in the same calculated values, the nomenclature from the RSALs report should be utilized. In other words, the  $Te_A$  and  $Te_D$  parameters are no longer needed, since  $Te_A$  is essentially the  $ED/365$  and  $Te_D$  is  $ET/24$ .

There is a parameter name EV (events per day) listed in the dermal equation which is not defined in the exposure factors table (Table 3.1 and 3.2). This parameter was apparently never used, and should therefore be removed from the equations.

The table indicates that the AWF was set to 1, when it should indicate that the AUF was set to 1.

Page 37 – Table 3.5

Attempts to recalculate the chemical intake values presented in this table were unsuccessful. With the assumption that the  $HQ = \text{intake}/RfD$ , an intake value should be equivalent to the final HQ value (presented in Table C-3) multiplied by the RfD in Table 4.1.

For example: Surface Soil Cadmium  
 $HQ$  (Table C-3) = 0.03  
 $RfD$  (Table 4-1) =  $1.00E-03$

Therefore: Intake should equal  $3E-05$

However, the intake in Table 3-5 shows a value for cadmium of  $1.1E-04$

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A forward-going calculation of intake using all of the parameters and exposure point concentrations provided in the text was also done. The resulting intake was 2.74E-05 (or essentially still 3E-05).

Please double check the source of the intake values that are presented in Tables 3.5, 3.6, C.2 and C.4. Several forward-going re-calculations resulted in the same end HQ values resulted, just not the same intakes:

Page 44 – First line

“...radionuclides are presented A.” Should this say in Appendix C?

Page 44 – Section 5.3.1

Please identify for the reader, which chemicals constitute the RCRA chemicals summarized in the risk tables. For example, out of the COCs evaluated, only uranium is not included in the Hazard Index Summary. Perhaps a quick table could be developed that summarizes which chemicals are incorporated into the final values.

Page 45 -- Third Paragraph

Remove the “is” from “The major contributors is to risk....”

EPA Comments on APPENDIX A – Human Health Risk Assessment, Solar Ponds:

1. Page 17, Table 2.2, Comparison of Element Intake

In our previous comments DOE was asked to compare the analytes they were referring to as essential nutrients to toxicity reference values to ensure that unsafe levels were not being eliminated as COCs. The first choice of a toxicity reference value should always be the IRIS or HEAST databases. Other values, such as FDA’s Recommended Daily Allowance (RDA), should be used as a last choice when no values are available from IRIS or HEAST. This hierarchy of toxicity information is described in EPA’s 1989 *Risk Assessment Guidance for Superfund*. This table should be revised to be consistent with that guidance. Reference Doses and cancer slope factors are available for chromium, copper, manganese, molybdenum, nickel, selenium, vanadium, and zinc. If an appropriate risk-based PRG was done elsewhere, then those analytes should be deleted from Table 2.2.

2. Page 24, Tables 2.8, 2.9 and 2.10, Contaminants of Concern

In our previous comments of 3 September, DOE was asked to evaluate the COC distributions for normality/ lognormality prior to calculating an exposure point concentration (EPC) term. This was not done. Instead a relatively non-conservative technique was selected without demonstrating any understanding of the distribution of the data or the applicability of the bootstrap technique for the given data sets. This is not consistent with EPA policy or sound environmental statistics. The first step is to evaluate the data for normality or lognormality. This can be done using histograms, probability

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plots or goodness of fit (GOF) tests. The *simplest* way to do this is to use the W test for data sets with  $n < \text{or} = 50$ , or D'Agostino's test when  $n$  is between 50 and 1000. Use an  $\alpha = 0.05$ . If the distribution is normal (or lognormal using the transformed data), the EPA 1992 guidance should be used to calculate the EPC. If the distribution is neither normal nor lognormal, the bootstrap-t method or a distribution specific method can be used to calculate the EPC. This process must be documented in the risk assessment. Tables must be provided showing the results of the GOF tests on both the transformed and non-transformed data and the statistical significance.

The most serious shortcoming of the bootstrap method is that the simulations are bound by the minimum and maximum detected concentrations. If sample size is small (i.e., less than 30) and there is uncertainty regarding the representativeness of the data collected, the bootstrap results could underestimate the true mean concentration at a site, resulting in erroneous decisions of "no risk". From Tables 2.8 - 2.10 it appears that the surface and subsurface data sets have an adequate number of samples, however, the liners do not. A bootstrap method should not be applied to an  $n$  of 15.

3. Page 27, Table 3.1 and Table 3.2

In our previous comments of September 3<sup>rd</sup>, we asked DOE to use the same equations for calculating radionuclide risk which were used in the Task 3 report and which are specified in EPA's *2000 Soil Screening Guidance for Radionuclides*. This still has not been done. The gamma exposure factors listed in Tables 3.1 and Tables 3.2 are variables in the older, outdated equations, not the newer ones.

A footnote should be added for the dermal adherence factor explaining what it is based on since it is not a recommended default value in the EPA guidance (e.g., 95<sup>th</sup> percentile for grounds keepers).

A footnote should be added for the surface area factor explaining what it is based on (e.g., 50<sup>th</sup> percentile for men and women for hands, forearms, and faces).

4. Page 29, 3<sup>rd</sup> bullet

See comment #4 above.

5. Table 3.4, Intake Equations

- The inhalation risk equations for radionuclides, carcinogens, and non-carcinogens have one too many Exposure Time (ET) variables. One of them has to go.
- The dermal equation for non-carcinogens is missing an exposure frequency (EF) and exposure duration (ED) variable.
- The external equation for radionuclides is outdated and inconsistent with the Task 3 report

6. Page 40, Dermal Exposure to Chemicals

The last sentence in this section states that because no adjustments were made to the toxicity values when assessing dermal exposure, this adds conservatism to the assessment. This is incorrect. The reverse is true. By using a default value of complete (i.e., 100%) oral absorption you are actually underestimating risk (Risk Assessment Guidance for Superfund, Part A (Appendix A.1) and Part E (page 4.4)). This should be noted and the section on page 40 revised accordingly. If desired, the oral toxicity factors can be adjusted based on GI absorption for assessing dermal exposure. It would make the assessment more technically accurate.

# STATE OF COLORADO

Bill Owens, Governor  
Douglas H. Benevento, Acting Executive Director

*Dedicated to protecting and improving the health and environment of the people of Colorado*

4300 Cherry Creek Dr. S.      Laboratory and Radiation Services Division  
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Colorado Department  
of Public Health  
and Environment

October 9, 2002

## NOTE TO READER:

At the time this Proposed Action Memorandum for the Solar Evaporation Ponds was released for public comment, the risk assessment in Attachment 2 was calculated according to new EPA guidance. The use of this calculation methodology is still under discussion and will be resolved as soon as possible and modifications made if necessary. The resolution is not expected to change the conclusions of the risk assessment.

11/11