UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 HANFORD PROJECT OFFICE
712 Swift Boulevard, Suite 5
Richland, Washington 99352

0061854

June 1, 2004

Administrative Record, 100-KR-2
c/o Debbi Isom
Mailstop H6-08

Subject: PCB Risk-Based Disposal Approval, K Basins Sludge

The U.S. Department of Energy (DOE), the Washington State Department of Ecology, and the U.S. Environmental Protection Agency anticipate approval of a Time-Critical Removal Action, in accord with the *Comprehensive Environmental Response, Compensation, and Liability Act,* as amended for a portion of the sludge from the 100-K Area's K-East spent nuclear fuel storage basin. As part of the removal action, DOE is requesting a risk-based disposal approval for polychlorinated biphenyls as per 40CFR761.61(c). The enclosed information is provided to the administrative record in support of making that risk-based disposal approval.

Sincerely,

Laurence E. Gadbois

Laurence E. Gadbois
K Basins Project Manager

Cc: Jim Todd, DOE

Gadbois, Laurence E

From: Watson, David J (Dave)
Sent: Wednesday, March 03, 2004 5:14 PM
To: Todd, James W; Gadbois, Laurence E; Hebdon, Joel B
Cc: McKarns, Anthony C (Tony); Perry, Jon K; Hyatt, Jeannette E; Sax, Scott M
Subject: KE Basin Time Critical Removal Action Memo. Append. B PCB RBDA

Jim,

As a follow up to our discussions this morning on the TCRA in which I explained that we were evaluating EPA's comments on the PCB Risk Based Disposal Approval that is Appendix B of the TCRA and would provide you an updated Appendix B if that was determined necessary. No changes are necessary. The emails below contain our evaluation and conclusions. I understand a commitment was made to Larry Gadbois to get back with him on this matter. This email satisfies that commitment. Please advise if you have any questions or comments.

Dave Watson
373-3250

-----Original Message-----
From: Hyatt, Jeannette E
Sent: Wednesday, March 03, 2004 4:33 PM
To: Perry, Jon K; Winward, Robert T (Terry); Watson, David J (Dave)
Cc: Gurske, Richard H; Williams, John D; Johnson, Russell E; Franz, Gary R; Prignano, Andrea L
Subject: RE: K Basin PCB RBDA

(I deleted David Hyatt from distribution)
Inserted in blue is the recommended response to EPA. Should EPA desire to discuss this further, it will be important to make sure we either address the technical issues or the policy issues, as the supporting information and personnel will differ. Technical discussions are provided below in green following each of the responses to aid in discussions with technical reviewers in Region 10.

The conclusion is:
The cumulative worst case scenario cannot cause the risk to exceed the EPA acceptable risk range.

The combined maximum risk by considering all of these other factors identified in items 1 to 4 [a male Native American that lives to age 70, that lives in the nearest residence, that is born at the start of the project, that eats dirt during his first 6 years and eats fish that he caught from the Columbia River directly across from the 300 Area for the 30-year period after the start of the project (exposure duration for the fish is one year), and with consideration of coplanar congeners in the cumulative TEF for Arochlor 1254] is 6.6 E-7. Although this value is a factor of 30 higher than the previous risk evaluation, it is still below the EPA lower threshold of acceptable risk (1 E-6).

I recommend that we do not engage in modifying the RBDA portion of TCRA document.

J'nette
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Excerpted from Larry Gadbois email dated 2/26/04 to Jim Todd and Dave Watson:

There are a number of analyses that EPA Region 10 expects in these documents that we need to include or explain why they are not included.

In order to perform the risk assessment, a hypothetical situation that assumes all the PCBs are released was used and annualized , while in reality, controls would prevent almost all of the release and the project duration is short- this portrays **worst case** and does not represent the real situation.

1) Exposure to an adult was included but not a child analysis. We need to add the child to the residential and river scenarios. The original evaluation was sufficiently conservative to bound risk, based on the project duration of approximately a year rather than the 30 years duration used in the risk evaluation. The assumptions for activity and and exposure frequency for adults sufficiently bound the risk to children. The child scenario can be developed but given the small increase in risk and the two orders of magnitude difference in the acceptable risk and the current calculation of 2.11 E-8, the activity doesn't seem warranted.

The risk calculations for the air pathway were redone for the river and residential scenarios, breaking the risk down for men and women ages 0-70 on a per year basis according to age, body weight, ventilation rate, and gender, using data from the EPA Exposure Factors Handbook (Tables 5.1 and 5.2). The original evaluation used a reference man with a ventilation rate of 20 cubic meters/day, a body weight of 70 kg, a life expectancy of 70 years, and an exposure duration of 30 years. Cumulative risks for a thirty-year exposure period, with the initial exposure starting at birth and ranging up to 40 years, were calculated. A male with exposure starting at birth, living at the nearest residence 1.4km, had the highest cumulative risk; however the risk was less than 12% higher than the general reference man risk calculations.The new risk calculation is 2.11 E-8 rather than the previous calculation of 1.89 E-8. The cumulative risk for all categories of starting age groups was lower than the previous reference man calculation in all cases where exposure started after the age of two.

2) EPA Region 10 has begun to ask for co-planer data. Let me know if I'm wrong, but I don't believe we have this data. What we can and should do is make an assumption that some very small percent of the total PCBs are co-planer and run the risk model. The tanks have begun to measure co-planer PCBs and are finding they contain a fraction of the fraction of a percent co-planers. Just make a reasonable assumption about the basin sludge co-planers and run the model.

Although a quick review of the relative risk attributable to Dixon-like coplanar PCB was performed, this request from Region 10 seems to go beyond what is currently required for risk calculations. The EPA does not yet have a promulgated method for analyzing congeners, recognizing proposed method 1668 has been in the works for several years in the Office of Water, the relevance of requesting coplanar data for the North Load Out Pit (NLOP) sludge is unclear.

The River Protection Project (the Tank Farms) have not analyzed for coplanar PCB's in the traditional "analytical" sense. They have performed scientific evaluations and concluded that the presence of Dixon-like coplanar PCB's is negligible. Based on the scientific evaluations performed, the highest cumulative Toxic Equivalency Factor (TEF) for all congeners present was 1.84 E-5 for Arochlor 1254, where Dioxin is assigned a value of 1, a relative risk factor can be determined and subsequently applied to the risk calculations.

To evaluate the relative risks of the Dixon-like co-planar PCB's resulting from the NLOP an evaluation was performed by comparing the Acceptable Source Impact Levels (ASILs) for Dioxin and PCBs listed in WAC 173-460 (3 E-8 and 4.5 E-3 ug per cubic meter, respectively). The ASILS can be used to estimate that the cancer risk for Dioxin is 150,000 times higher than the cancer risk for PCBs. With a TEF of 1.84 E-5 for Aroclor 1254, the relative risk is, at most, a factor of 2.76 higher than the previous calculations. The highest risk scenario (nearest residence) was 1.89 E-8. Multiplying that number by 2.76 gives a risk of 5.22 E-8, still well below acceptable levels of 1.0 E-6.

3) EPA Region 10 expects a Native American scenario. I'll leave it up to you to either run this scenario, or explain why it isn't necessary.

Although the scenario can be calculated, based on the short duration of exposure, calculating this specific risk is not necessary.
For the air pathway, no significant difference is expected between the reference man and the Native American scenario. Based on the parameters for the Native American scenario, a shorter lifespan and a smaller average body weight could result in an increase on the order of 10-20% with a 30 year exposure duration. Based on the short duration of the project (approximately one year) no significant change is likely in the results of the risk calculations.

4) EPA Region 10 expects to see an analysis of indirect effects (not just air pathway). I.e. deposition to the soil or river, and subsequent uptake via plants and animals (an eco risk assessment) and uptake to humans via consumption. I think in your risk model, you can just turn on these pathways and get the result. If not, provide an explanation for why these are not

significant.

In order to perform the requested risk evaluation a combination of existing work (DST Risk Assessment) and results from other modeling (Screen 3 Model) was used to determine the risk posed by indirect effects is also acceptable. Ingestion pathways (soil ingestion by child, transfer and plant uptake, bioaccumulation is fish) were evaluated and all found to be with the EPA acceptable range of 1.0 E-4 to 1.0 E-6. The following technical discussion explains how the NLOP risk compares to the DST risk assessment. The performance of a stand alone risk assessment for NLOP will take a significant amount of time to complete and based on the comparison would not result in provides no new information attributable to the indirect effects.

Technical Comparison to the DST Risk Assessment:

The ingestion pathway was considered in terms of the DST Risk Assessment. The DST Modeling resulted in a maximum air PCB concentration of 1.71 E-2 ug/cubic meter, a soil PCB concentration of 4.3 E-2 mg/kg, and a very conservative river water concentration of 7.8 E-4 ug/L. The Screen 3 Model results for the NLOP sludge were 3.7% of the DST results at the highest concentration (6.29 E-4 ug/cubic meter at the river). Ecological risk was considered acceptable for the DST evaluation. The NLOP risk is 3.7% of the DST risk; therefore, the ecological risk from the NLOP sludge project is acceptable as well.

Soil ingestion by children was also considered a valid pathway. Using data from the EPA Child-Specific Exposures Handbook, risk was modeled for children ages 0-6, using 100 mg/day soil ingestion for the general population and 10 g/day for Pica children (repeated episodes of eating nonnutritive substances, e.g. dirt), and the cumulative risk for the six-year period of risk is 3 E-10 for Pica children. This pathway is less than 2% of the residential air pathway already evaluated, so it is negligible.

The simple model for soil deposition for the DST risk assessment assumed a PCB release rate of 1.71 E-3 g/s for a period of 20 years, evenly distributed through the top 2 cm of soil. The NLOP scenario has a residence 1.4 km from the 325 Bldg. Using the same parameters for soil density and using a radius of 2 km (instead of 20 km) to conservatively bound the soil concentration at the nearest residence, and further assuming the entire inventory of available PCBs (593 g) is evenly distributed through the top 2 cm of soil, the soil concentration of PCBs at the nearest residence is 5.5% (2.36 E-3 mg/kg) of the DST scenario. By using the same transfer factors for air and soil to plants, soil to invertebrates, plants to herbivores, plants and animals to birds, and tissue to tissue (prey to predator) and applying a 5.5% ratio, all species specific and EPA toxicity reference values were less than one, indicating that no adverse impacts are anticipated.

The DST risk assessment for fish bioaccumulation was very conservative. The model assumed that the volume of air in the plume above the river deposited all of the PCBs present in the air into the river during a period of low flow to calculate the maximum instantaneous concentration of PCBs in the water (7.8 E-4 ug/L) and further assumed that the concentration persisted at that level for a period of 30 years. Using the 3.7% ratio for NLOP to DST air concentration and the water to fish transfer factor of 2.3 E+5 (mg/kg wet weight)/(mg/L) resulted in a fish concentration of 6.6 E-3 mg/kg. Modeling risk for the general population (ingestion of 20 g/day and comparing risk to Native American population (ingestion of 59 g/day) resulted in cancer risks of 1.6 E-6 and 4.8 E-6, respectively. These values are above the EPA lower threshold of acceptable risk (one in one million), but still lower than the upper threshold (one in ten thousand). By considering the exposure duration of one year for the NLOP sludge project instead of 30 years (especially since the model had such extremely conservative assumptions to estimate maximum concentration), the risk drops to 5.4 E-8 for the general population and 1.6 E-7 for Native Americans. Although this pathway has a higher impact than the air pathway, it is still within acceptable risk levels.

-----Original Message-----
From: Gadbois.Larry@epamail.epa.gov [mailto:Gadbois.Larry@epamail.epa.gov]
Sent: Thursday, February 26, 2004 8:48 AM
To: James_W_Todd@RL.gov
Cc: David_J_Dave_Watson@RL.gov
Subject: PCBs

In consultation with my PCB support people within EPA Region 10, we have reviewed what is contained in the Risk-Based Disposal Approval attachment to the time critical removal action. There are a number of analyses that EPA Region 10 expects in these documents that we need to include or explain why they are not included.
1) Exposure to an adult was included but not a child analysis. We need to add the child to the residential and river scenarios.
2) EPA Region 10 has begun to ask for co-planer data. Let me know if I'm wrong, but I don't believe we have this data. What we can and should do is make an assumption that some very small percent of the total PCBs are co-planer and run the risk model. The tanks have begun to measure co-planer PCBs and are finding they contain a fraction of the fraction of a

percent co-planers. Just make a reasonable assumption about the basin sludge co-planers and run the model.
3) EPA Region 10 expects a Native American scenario. I'll leave it up to you to either run this scenario, or explain why it isn't necessary.
4) EPA Region 10 expects to see an analysis of indirect effects (not just air pathway). I.e. deposition to the soil or river, and subsequent uptake via plants and animals (an eco risk assessment) and uptake to humans via consumption. I think in your risk model, you can just turn on these pathways and get the result. If not, provide an explanation for why these are not significant.

Let me know if you have any questions.
--Larry--