MEMORANDUM

TO: Barbara Hoditschek, Program Manager
Teri Davis, Kim Hill, Susan Hoines, Stephanie Kruse, Steve Zappe, Michael Chacon
FROM: Robert S. (Stu) Dinwiddie
DATE: July 31, 1996
RE: LANL Meeting on Eco-Risk August 6, 1996

Attached are the copies of the Jeff Yurk letters to LANL in regard to their Eco-Risk Project. These items may come up at the meeting on the 6th.

6/3/96

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From: Roger W. Ferenbaugh <rwf@Lanl.GOV>
To: R6DAL02.R6HAZRD2(yurk-jeffrey)
Date: Friday, July 5, 1996 10:08 am
Subject: Ecorisk questions

Hi Jeff,

We're having a difference of opinion here about how EPA wants screening TRVs to be calculated. The basic question is what intake pathways should be included. The two viewpoints are as follows.

1. TRVs should be calculated based on ingestion using the assumption of 50% soil intake. These TRVs would then be compared to the soil concentrations found during the site characterization.

2. TRVs should include an inhalation pathway, and ingestion exposure should be based on some estimate of contaminant transport up the food chain. (The argument against this is that it requires a lot of effort for a screening assessment.)

The draft guidance that you sent us contains the following statement. "Chemicals will be screened without consideration of specific receptor populations or organisms at a particular trophic level within a food chain." We're not entirely sure what that means and how it relates to the above question. Can you provide some clarification?

There is also another question, not related to screening. LANL has active firing sites that continue to input contaminants into the environment within the dispersal zone of the site. Some of the PRSs that we are supposed to evaluate lie within these dispersal zones.
How should we address a situation when the source term is not static?
We can do an assessment for a given point in time, but the results could change in the future. The human health risk assessment approach appears to be to indefinitely defer action at these PRSs. What is your view on this?

Roger F

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Roger: Both options you presented are somewhat correct. The guidance which you are citing is for selection of chemicals of concern. In this guidance, it is suggested to keep all chemicals which have a Log Kow greater than 3. All the rest of the assumptions put forth in this guidance are conservative assumptions for evaluating chemicals which don't bioaccumulate or biomagnify. Therefore, for sites which do not have contaminants with log Kows greater than 3, option 1 is correct.

The second option you presented is the correct one to follow for chemicals which bioaccumulate and biomagnify up the food chain. There are, however, a number of things that can be done to minimize the number of pathways, receptors, and chemicals you need to do this for. First, eliminate following chemicals up the food chain which have a Log Kow less than 3. Second, assess the toxic mechanisms of the chemical to determine if any exposure pathways can be eliminated that way (Example 1 below). Third, examine the fate and transport properties of a chemical and assess whether a complete exposure pathway exists (Example 2 below). Professional judgement will need to be incorporated into this whole process in order to keep the scope of work within reasonable bounds.

When assessing the appropriate food chain pathways, conservative assumptions should be made because the TRVs generated are to be used for screening purposes. This is the rationale behind conservative assumptions such as a 50% soil ingestion rate by soil invertebrates are made. Also, somewhere in the screening procedure it should be noted that TRVs are not clean-up levels, but only to be used as a screening tool.

As to the second question about how to evaluate sites receiving dispersion of contaminants from active firing ranges, I will need more information to get you an answer back on that. I'm not familiar with the scope of the dispersion, frequency of firing or the contaminants involved. The whole issue may be a risk management call. I will talk it over with Barbara Driscoll and get back to you on it.

Example 1 - Toxic Mechanism Assessment at PCB site

Understanding the toxic mechanism of a contaminant can help to evaluate the importance of potential exposure pathways. For example, some contaminants affect primarily vertebrate animals by interfering with organ systems not found in invertebrates or plants. For substances that affect, for example, reproduction of mammals at much lower environmental exposure levels than they affect other groups of organisms, the screening values can focus on exposure pathways and risks to mammals. Some PCBs are reproductive toxins in mammals and fall into the above situation.

Example 2 - Complete Exposure Pathways for Mammal at PCB Site

This example illustrates how to narrow down the number of receptors and exposure pathways which need to be assessed to generate the TRV. Three exposure pathways are assessed at this site: inhalation, ingestion through the food chain, and incidental soil ingestion.

Inhalation - PCBs are not highly volatile, so the inhalation of PCBs by mammals would be an essentially incomplete exposure pathway.

Ingestion through the food chain - PCBs tend to bioaccumulate and biomagnify in food chains. PCBs in soils generally are not taken up by most plants, but are accumulated by soil macroinvertebrates. Thus, mammalian herbivores would not be exposed to PCBs in most of their diet. In contrast, mammalian insectivores, such as shrews, could be exposed to PCBs in most of their diet. For PCBs, the ingestion route for mammals would be a complete exposure pathway for insectivores, but not for herbivores. For the PCB site, therefore, the ingestion exposure route for a mammalian insectivore (e.g. shrew) would be a complete exposure pathway that should be evaluated.

Incidental soil ingestion - Mammals can ingest some quantity of soils incidentally as they groom themselves or consume plants or animals from the soil. Burrowing mammals would tend to ingest more than non-burrowing and plant root or soil macroinvertebrate eaters would tend to ingest more than mammals without these characteristics. The intake of PCBs from incidental ingestion of soil is difficult to estimate, but for mammalian insectivores, it is far less than the intake of PCBs

in the diet. For herbivores, the incidental intake of PCBs in soils might be higher than the intake of PCBs in their diet, but still less than the intake of PCBs by mammals feeding on soil macroinvertebrates. Thus, the exposure pathway for mammalian insectivore remains the exposure pathway that should be evaluated.

Question 1: When calculating TRVs, should we consider only NOAELS and LOAELs from studies where survival and/or reproduction are the specific endpoints used in the study? Toxicological databases include NOAELs and LOAELs from studies where the occurrence of various biomarkers (e.g.: protein concentrations, blood pressure, organ lesions) is the basis for the NOAEL or LOAEL. While these biomarkers might indicate a condition that could lead to death or reproductive failure under the appropriate circumstances, the NOAEL or LOAEL is not for death or reproductive failure specifically. What is your position on the use of these data?

Reply: I would just use NOAELs and LOAELs based on mortality, reproduction, and growth from chronic studies. Biomarker studies may be used to predict these other endpoints (e.g. regression relationship) if the data exists to do so, however, I do not believe most biomarker data has been studied enough to show a cause and effect relationship. I'm not against using biomarker data, but I would not require it.

Question 2: Should inhalation pathways be considered in calculating TRVs for preliminary screening purposes? (I asked this question before, but I didn't see an answer to it in your previous response.)

Reply: TRVs for inhalation pathways could be generated for small mammals using the iris database and removing the correction factor from the RfC. There is not enough data out there to evaluate the inhalation pathway for other species. I would use the TRVs for mammals to justify a qualitative risk screen for the inhalation pathway.

Question 3: When you were here in May, we all agreed that the preliminary eco-screen would be applied to PRSs only in the context of the Ecological Exposure Unit in which the PRSs are located, and not on a PRS by PRS basis. The question has to do with how the results of the preliminary screen are reported. For those PRSs for which the preliminary screen indicates that there is no ecological risk associated with the site, Bob Simeone wants to report this result in the RFI report for the site so that the site can be completely NFAed for both human health and ecorisk at the same time. This makes

sense to me, and I have no objection to doing that. However, I thought that you indicated in your conversation with us that you also wanted the results of the preliminary screen presented in an Ecological Exposure Unit context. Did I misunderstand you? If not, do you object if we report the results of the preliminary screen in both the RFI reports and in an Ecological Exposure Unit context? Can you clarify this situation for us?

Reply: Once the screening TRUs are finalized, any PRS below these TRUs, may be proposed for NFA. The only reason to not close one PRS until all PRS's in an EEU are closed would be if we did not account for cumulative risk. We have chosen a Hazard Quotient of 0.3 to account for cumulative risk in the screening assessment TRU, therefore, I have no problem with NFAing a PRS for ecological risk when contaminants are below the TRUs.

Question 4: One topic that we did not discuss is how to deal with potential cumulative effects of transport from more than one Ecological Exposure Unit into a common sink, such as our onsite canyons. Is it acceptable for us to conclude that there is no ecological risk associated with the Exposure Unit itself and simply note that potential transport from the Unit will be considered further in conjunction with potential transport from other Units as part of the assessment of the Unit that acts as the sink?

Reply: Extent of contamination needs to be determined for each PRS. If contamination from one PRS is transported across two EEUs, you could not NFA that particular PRS until maximum concentrations in each EEU were evaluated using the appropriate TRUs from each EEU. Again, cumulative effects are being dealt with by using a hazard quotient of 0.3 to generate TRUs.