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THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
COVER SHEET

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RESPONSE TO TDEC COMMENTS ON THE DRAFT BASELINE RISK ASSESSMENT FOR GOLF COURSE PONDS AT THE DEFENSE DISTRIBUTION DEPOT, MEMPHIS, TENNESSEE

Comment #1a: Figure 4-1. Proposed Sediment Sampling Locations, Golf Course, Defense Distribution Depot, Memphis on page 4-3 in the *Sampling and Analysis Plan for Fish and Sediment Sampling at the Defense Distribution Depot, Memphis, Tennessee* is left blank.

Response: Figure 4-1 (proposed sampling locations for the 1997 sampling event) is attached to this comment response. Actual sediment sampling locations for the 1997 sampling event are shown in Figure 8-1 of the draft baseline risk assessment.

Comment #1b: Figure 8-1. 1997 Sample Locations, Lake Danielson and Golf Course Pond, Defense Distribution Depot, Memphis, Tennessee shows 13 sediment sampling locations which are supported by the Analysis Request Environmental Chain of Custody form from Lancaster Laboratories. Yet on Table 10-1 Comparison of Maximum Detected Pesticide Concentrations in Golf Course Impoundments Surface Water and Sediment to EPA Region 4 Ecological Screening Values maximum concentration of DDE in water is presented. This indicates water samples have also been taken. If so, sampling locations for surface water needs to be shown, Chain of Custody needs to be in order, and sampling results have to be presented and included in the baseline risk assessment. Figure 4-1, 1990 Sediment Sampling Locations, Lake Danielson and Golf Course Pond, Defense Depot, Memphis, Tennessee does show surface water sample locations. If there are any discrepencies between 1990 and 1997 surface water sampling locations and sampling results, they need to be explained.

Response: Table 10-1 presents a comparison of the 1990 Remedial Investigation sampling results to EPA Region 4 Ecological Screening Values. Only one of the 1990 surface water samples was reported as having a detectable amount of pesticide, and that concentration (0.21 ug/L) was very low. Since DDE is insoluble in water, it is likely that

the reported concentration was a result of sediment being suspended in the water column during sampling. Due to the single, very low concentration reported for the 1990 sampling event, and due to the fact that the pesticides of concern are not water soluble, surface water samples were not collected during the 1997 sampling event.

Comment #1c: Chain of Custody Records for the September and October 1997 sampling from Radian International are not included in the Draft Baseline Risk Assessment. If included, these records will go a long way in explaining discrepencies in 1b.

Response: A completed Lancaster Laboratories chain of custody form is provided in Appendix B of the Draft Baseline Risk Assessment Report.

Comment #2: The sampling plan as shown in the *Sampling and Analysis Plan for Fish and Sediment Sampling at the Defense Distribution Depot, Memphis, Tennessee* was not carried out. The fish sampling plan calls for collection of at least five specimens of each edible species of fish from each water body. But this baseline risk assessment is based on the inedible Arkansas shiner when sunfish, smallmouth bass, largemouth bass, and catfish are proposed. In *Assessing Human Health Risks from Chemically Contaminated Fish and Shellfish* (EPA 1986), a demersal (bottom-dwelling) indicator species is recommended. The species of fish that fits the criteria best is the catfish. I have trouble understanding why the sampling event took place in September and October of 1997 but the *Sampling and Analysis Plan for Fish and Sediment Sampling at the Defense Distribution Depot, Memphis, Tennessee* was dated December 1997.

Response: A draft sampling and analysis plan and a draft health and safety plan were submitted prior to the 1997 sampling event. Those plans were reviewed and approved before sampling was commenced in fall of 1997. Radian International LLC was directed to finalize those plans and submit them with the draft baseline risk assessment report. The first paragraph of Section 4.1 on page 4-1 of the sampling and analysis plan states:

"The number and species of fish currently in the golf course impoundments is unknown. Radian will attempt to collect at least five specimens of each edible species of fish from each pond. It is anticipated that as many as four pan fish species may reside in the ponds. These include sunfish (*Lepomis* sp.), smallmouth bass (*Micropteris dolomieui*), largemouth bass (*Micropteris salmoides*), and catfish (family Ameiuridae)." Every feasible means of catching fish from the ponds was employed over a four-day period. The only species of fish captured or observed in either pond during that time was the Arkansas shiner. Baited catfish traps and trotlines were included among the sampling methods in an attempt to capture catfish in particular. There are apparently no fish other than Arkansas shiners in the ponds; therefore, no other species could be collected from the ponds.

Comment #3: In quantifying the pesticide exposure in fish ingestion, it is assumed that the only intakes of pesticides by fish are from the sediment and surface water (Appendix A). The pesticides in question here, DDT, DDE, DDD, chlordane, heptachlor epoxide, and dieldrin, are all highly persistent. The question of biomagnification via ingestion of other aquatic plants and animals has not been adequately addressed in this baseline risk assessment.

Response: As stated in the first sentence on page 7-1 and the first sentence of the last paragraph on page 8-5, the risk calculation spreadsheets included in Appendix A quantified the human health risks associated with dermal contact with sediment while swimming, direct ingestion of sediment in surface water while swimming, and ingestion of fish caught from the ponds. Pesticide concentrations in fish were not modeled or estimated from sediment and surface water. Pesticide concentrations in fish were directly measured by sampling fish from the ponds (in 1986 and 1997) and having the fish tissue chemically analyzed.

Comment #4: When the only fish species caught in the fish sampling event was Arkansas shiner, there was no attempt in explaining why other fish were not caught. The smallness of the database in terms of the species represented seriously undermines the result of the risk assessment. The time of sampling is vitally

important in catching fish. It was not obvious from the pictures and the text that fish sampling took place during optimum feeding time: 5 to 7 am, at dusk, or in the evenings. The fish in the impoundments have been stocked. The records for stocking can be a great source for determining the species present in the impoundments.

Response: As stated in pages 8-1 and 8-2, fish sampling methods included angling by 4 individuals using a wide variety of artificial and live baits, a baited catfish trap, and a trotline baited with several types of natural and live baits. Angling occurred from early morning until early evening. The catfish trap and trotline were kept baited and left in place in Lake Danielson for 48 hours. During that time, several dozen Arkansas shiners were caught, but no other fish species were captured or observed. One can only speculate on reasons for the absence of other fish species. There are no records regarding the specifics of fish stocking. There are, however, unofficial reports of an extensive fish kill in Lake Danielson circa 1993.

Comment #5: Table 10-1. Comparison of Maximum Detected Pesticide Concentrations in Golf Course Impoundments Surface Water and Sediment to EPA Region 4 Ecological Screening Values shows the maximum detected concentrations of DDT, DDE, and DDD. Because concentrations of these three pesticides were below the Region 4 screening values (EPA 1997) for protection of ecological receptors, it is concluded that no further ecological risk assessment is needed (page 10-1). However, chlordane and heptachlor epoxide are also detected in the sediment as shown on Table 8-1. Pesticide Concentrations Reported for the 1997 Sediment and Fish Samples Collected from the Golf Course Impoundments at the Defense Distribution Depot, Memphis, Tennessee. The maximum chlordane concentration in the sediment, 3890 ppb, is more than twice the Region 4 screening value of 1700 ppb (EPA 1996). Five out of the eight detected chlordane sediment concentrations are also above the Region 4 screening levels. Chlordane and heptachlor epoxide have been included in the human health risk assessment. So the last four steps of

the Preliminary Risk Evaluation (i.e., problem formulation, ecological effects evaluation, exposure estimate, and risk calculations) need to be completed.
Response: The initial ecological screening based on the 1990 sediment data is reflected in Table 10.1, leading to the conclusion that no further ecological risk assessment was warranted. We concur that ecological risk should be re-evaluated on the basis of the 1997 data.

RESPONSE TO EPA REGION 4 COMMENTS ON THE DRAFT BASELINE RISK ASSESSMENT FOR GOLF COURSE PONDS AT THE DEFENSE DISTRIBUTION DEPOT, MEMPHIS, TENNESSEE

Comment #1: Adolescent Trespasser and His Choice of Activities
It is assumed that this receptor swims in the lake to obtain golf balls and fishes in the lakes. It would be unlikely that an individual would perform these two activities during one excursion to the lakes. In other words, the receptor would choose to either fish or collect golf balls. The exposure frequency used for fish ingestion is 365 days/yr forced by the use of the default fish ingestion value of 6.5 g/day. Additional calculations should be performed to determine whether the adolescent trespasser would consume 6.5 g/day of fish based on an exposure frequency of 60 days/yr or less. Initially, it should be assumed that a receptor spends (1) all his time at the lakes fishing and (2) half his time at the lakes fishing and half swimming. Determination of the potential fish biomass the lakes could support (see below) should be used to inform the choice of the amount of fish consumed.
Response: The exposure assessment does not assume that the same receptor will swim and fish on every excursion to the lake. The use of the EPA-recommended default value for fish ingestion is independent of the number of days per year assumed to be engaged in fishing. It is also independent of the potential fish biomass the lakes could support. Regardless of the amount of fish biomass the lakes could support, the risk assessment assumes that the youth will be able to catch enough fish to support a fish ingestion rate of 6.5 g/day.

Comment #2: Behavior Patterns of the Adolescent Trespasser

On page 5-2, the second paragraph details the choice of the age, gender, and behavior of this receptor based on the professional judgement of the risk assessor. The text says: "on the basis of the risk assessor's personal observation of behavior patterns." How many youths has the risk assessor observed? In general, data is needed to support choices such as these. In the absence of data, the choices should be heavily qualified at the start of this paragraph.

Response: Access to the golf course is currently restricted, and the golf course impoundments are posted against fishing and swimming. Therefore, there are no known, current receptors. In the absence of site specific data regarding known, current receptors, it is standard practice to make reasonable assumptions regarding potential, future receptors and exposures. The assumptions regarding potential, future receptors and exposures used for this risk assessment are conservative yet realistic. If EPA would like to recommend alternative receptors and exposure scenarios, we will consider re-evaluating risk on the basis of those recommended alternatives.

Comment #3: Exposure to Sediment

The risk assessment considers both dermal exposure to sediment and incidental ingestion of sediment suspended in the surface water during swimming. Region 4 risk assessment guidance states: "*In most cases, it is unnecessary to evaluate human exposure to sediments covered by surface water.*" For these lakes, it is unnecessary to consider either dermal contact with sediment. When the Region 4 guidance was written, it was assumed that sediment covered by surface water would be rinsed from exposed skin very quickly by the surface water and that exposures would occur during wading.

A youth diving for golf balls, however, would ingest sediment resuspended in the water column by his own activities, and it is appropriate to consider sediment ingestion.

Additionally, it would be helpful to provide the basis for assuming that 10 mg/L of sediment would be suspended by underwater golf ball collection. How does this measure of turbidity compare with the standard Nephelometric turbidity unit (NTU)?

Response: If EPA can recommend and justify an alternative assumption regarding suspended sediment concentrations in the water column while swimming, we will consider re-evaluating risk on the basis of that alternative assumption. Even if the water were assumed to contain 100,000 mg/L suspended sediment (i.e., 10% sediment), the risk as otherwise modeled using EPA default assumptions would be below EPA range of concern for human health.

Comment #4: Fish Collection Methods

A number of fish collection methods were used, including trot lines, rod and reel, and catfish traps. Apparently, electroshocking is not appropriate in these lakes. The facts that largemouth bass, bluegill, and catfish were stocked in the lakes in the past and the only fish species obtained were Arkansas shiners indicates that either these previously stocked fish were absent or the fishing methods were inadequate. What biomass of fish could these lakes support? Was past angling pressure sufficiently intense to have "fished out" these lakes? Additional analysis to answer these questions would help alleviate the consequences of the uncertainty surrounding this data gap. Please see previous comment on the Adolescent Trespasser and his Choice of Activities.

Response: Subsequent to the fish and sediment sampling activities in September and October 1997, DDMT personnel have stated that at least one extensive fish kill occurred in Lake Danielson in the early 1990s, perhaps in 1993. This is the likely reason for the failure to collect edible fish species from the impoundments.

Comment #5: Inadequacy of the Ecological Risk Assessment

Table 10-1 reports the screening levels incorrectly – 3 orders of magnitude too high. The relevant Region 4 sediment screening values are:

DDT	**3.3 ug/kg**
DDE	**3.3 ug/kg**
DDD	**3.3 ug/kg**
Chlordane	**0.5 ug/kg**
Heptachlor epoxide	**not available**

All sediment samples exceed at least one of these screening levels. Hence, the ecological risk assessment should include a Preliminary Risk Evaluation (PRE) as detailed in the Region 4 guidance.

Response: The Region 4 ecological screening values shown on EPA's web site are indicated as mg/kg. Nonetheless, we concur that a PRE should be conducted using the new data from the 1997 sampling event.

RESPONSE TO TDEC/DSF COMMENTS ON THE DRAFT BASELINE RISK ASSESSMENT FOR GOLF COURSE PONDS AT THE DEFENSE DISTRIBUTION DEPOT, MEMPHIS, TENNESSEE

General Comment: TDEC/DSF is not completely satisfied as to whether the fish species that are likely to be eaten by humans and were previously reported as being stocked or observed in Lake Danielson (bluegill, bass, and catfish) have been accounted for. Although none of these species were caught during recent sampling, these species' complete absence is not proved. It is stated that the calculated risk (which is acceptable) assumes "that there are edible fish in the impoundments." Page 8-5 states that "humans are unlikely to eat Arkansas shiners, but the sample data were used as surrogates for edible fish species, since the shiners were the only fish obtained from the ponds." Our concern is that if there are actually bluegill, bass, or catfish in the lake then sample results from those species might change the risk numbers. TDEC/DSF acknowledges that no species other than Arkansas shiners were caught or observed at this time, but uncertainty regarding the presense of other, more likely to be eaten species remains.

Response: There are unofficial reports of a massive fish kill in Lake Danielson circa 1993, which is the likely reason that edible fish species were not obtained during the 1997 sampling event. We propose to use EPA-approved modeling from the *North Carolina Protocol for Performing Indirect Exposure Risk Assessments for Hazardous Waste Combustion Units* (Research Triangle Institute 1997) to conservatively estimate the pesticide concentrations that would likely occur in fish exposed to contaminated sediment. We propose to use the pesticide concentrations that were reported for the 1997 sediment samples as the basis for this analysis. This approach will also address concerns regarding potential, future fish populations in the ponds in the absence of remediation of contaminated sediment.

Comment #1: Section 1.0, page 1-1, second paragraph, second sentence.
Should "The Depot's mission is to receive..." be changed to "...mission was to receive..."?
Response: This change will be made.

Comment #2: Figure 1-1, page 1-2.
There is an east-west segment of highway north of DDMT shown as an interstate highway, which is actually a surface street. Please correct.
Response: This change will be made.

Comment #3: Section 2.0, page 2-1, first paragraph.
Should "at a" be inserted between "released" and "site" in the second sentence?
Response: This change will be made.

Comment #4: Section 2.0, page 2-1, second paragraph.
Should the word "pathway" in the fifth sentence be "pathways"?
Response: This change will be made.

Comment #5: Section 2.0, page 2-2, third paragraph, last sentence.

The sentence should be corrected as shown. "The actual risk posed...but areis usually believed..."

Response: This change will be made.

Comment #6: Section 2.0, page 2-2, last paragraph.

The acronym ERA should be preceded by "an."

Response: This change will be made.

Comment #7: Section 5.0, page 5-4, first paragraph.

Isn't the 95 UCL often higher than the maximum detected concentration?

Response: Yes.

Comment #8: Section 6.3, page 6-2, first paragraph.

The NOAEL is stated to be 42 mg/kg/day, but liver tumors are cited from an exposure of 19 mg/kg/day. Please clarify.

Response: The data cited were from two different studies.

Comment #9: Section 6.7, page 6-8, second paragraph.

Should "NOEL" actually be "NOAEL"?

Response: The research cited did not report a NOEL (No Observed Effects Level), which accounts for both adverse (i.e. No Observed Adverse Effects Level---NOAEL) and beneficial effects.

Comment #10: Section 8.0, pages 8-1 ff.:

It is unclear whether any angling was attempted in the golf course pond.

Response: Angling was attempted in the golf course pond. No fish were captured or observed in the golf course pond, which is quite small and shallow and, therefore, unlikely to support edible fish species.

Comment #11: Section 11.0, page 11-1, first paragraph.

It is somewhat unclear whether the cancer probability of 7 in a million is a result of past or current fish tissue samples. It is also unclear whether the assumption that the Arkansas shiner samples "are representative of the muscle tissue of edible fish that might occupy the ponds in the future" is justified.

Response: The cancer risk estimate is based on the pesticide concentrations measured in the muscle tissue of Arkansas shiners captured from Lake Danielson in October 1997. We propose to use EPA-approved modeling from the *North Carolina Protocol for Performing Indirect Exposure Risk Assessments for Hazardous Waste Combustion Units* (Research Triangle Institute 1997) to conservatively estimate the pesticide concentrations that would likely occur in fish exposed to contaminated sediment. We propose to use the pesticide concentrations that were reported for the 1997 sediment samples as the basis for this analysis. This approach will also address concerns regarding potential, future fish populations in the ponds in the absence of remediation of contaminated sediment.

Comment #12: Figure 4-1 in the Sampling and Analysis Plan and Figure 1-2 in the Safety and Health Plan.

These figures are blank.

Response: These figures were inadvertently omitted. They will be included in the final report.

Comment #13: Section 2.1.3, page 2-3 in the Safety and Health Plan.

Should "water Micatin" actually be "water moccasin"?

Response: Yes. This change will be made.

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE