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RESPONSES TO USEPA'S COMMENTS SOUTH PLUME REMOVAL ACTION EE/CA

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DOE-FMPC/USEPA
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REPORT
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RESPONSE TO USEPA's COMMENTS
SOUTH PLUME REMOVAL ACTION
EE/CA

General Comments

1. Comment:

The risk assessment considers uranium as the only contaminant of concern. Current U.S. EPA policy is to address all chemicals found within the area of concern.

Response:

We agree with the comment. All chemicals found within the area of concern are addressed in the risk assessment. Section C2.0 of the assessment was prepared in accordance with U.S. EPA guidance, Risk Assessment Guidance for Superfund - Human Health Evaluation Manual Part A (1989), (HHEM). The determination of uranium as the only chemical of potential concern was made after a careful review of the environmental data for this area, and application of the selection methodology of Chapter 5 of the HHEM. Hazardous substances, other than uranium, were not indicated to be present in the South Plume area which has been specifically defined in the EE/CA.

Action

No change to the EE/CA is necessary.

2. Comment:

The risk assessment only quantifies the increased risk above background concentrations resulting from direct discharge of contaminated ground water to the Great Miami River. Risk assessments are required to quantify the total risk.

Response:

Risk assessments which are performed for actual or potential releases of hazardous substances from a site consider the total risk as a consequence of those actual or potential releases. Numerous primordial radionuclides, including uranium isotopes, are ubiquitous in the environment. The presence of these naturally-occurring radionuclides contributes to the overall natural background radiation dose which each person receives.

The annual average effective radiation dose equivalent from natural background sources has been reported to be approximately 300 mrem (National Council on Radiation Protection and Measurements, Report No. 94). Assuming that the cancer risk factor is 1.25 x 10^{-7} per mrem (International Commission on Radiological Protection, Publication 26), the cancer risk from 70 years of exposure to natural background radiation is 3E-03. When assessing the risk as a consequence of actual or potential releases of radioactive materials from a site, it is not appropriate to include risks due to natural background radiation exposures. Inclusion of the risks from natural background radiation exposures (such as exposures to naturally-occurring uranium in the Great Miami River) to give a "total risk" is equally as wrong as including any other risks which are unrelated to the release of the hazardous substance from the site.

The Risk Assessment for the South Plume EE/CA correctly evaluates the risks as a consequence of calculated releases from the area.

Action

No change to the EE/CA is necessary.

3. Comment:

The risk assessment does not take into account the possibility of discharging from the waste pit area (proposed operable unit 1 removal action), or other yet to be identified sources.

Response:

It is not the intent of the South Plume EE/CA to address the total hypothetical risks from the FMPC. The purpose of the risk assessment for the South Plume EE/CA is to assess the human health risks for the "no action" alternative as well as for each removal action alternative. The results of the risk assessment are used as part of the evaluation of proposed removal actions. However, since Alternative 4 (Pump & Discharge) in the EE/CA has been modified to Pump and Treat it will address the Waste Pit Area Run-off Control Removal Action. The contribution of uranium from this removal has been identified and risks associated have been evaluated.

Action

The EE/CA has been modified to address the pump and treat alternative and its associated risks.

4. Comment:

Even after addressing the concerns raised in the specific comments on the risk assessment, it is unlikely that direct discharge (without treatment) to the Great Miami River will result in a risk greater than 1E-06 because contaminated ground water will be diluted by a comparably large surface water body. This method of lowering risk is not consistent with CERCLA.

Response:

As stated in the EE/CA, the DOE is designing an Advanced Wastewater Treatment (AWWT) facility for the FMPC. The AWWT will treat existing FMPC wastewater discharges to remove radionuclides. The AWWT is projected to begin operation in December 1993. DOE has proposed to install a 150 gpm "Interim" Advanced Waste Water Treatment (IAWWT) unit as part of the South Groundwater Containment Plume Removal Action. This unit would remove uranium from a portion of the FMPC wastewater currently being discharged to the Great Miami River (GMR). The IAWWT unit would operate until the AWWT becomes operational. The mass of uranium that will be removed from the FMPC waste water will exceed the amount that the various removal actions will be contributing to the GMR. Attached is a Figure 1 demonstrating this concept and how the implementation of the various removal actions & AWWT will occur. This figure quantifies the amounts of uranium that each removal action will contribute to the GMR and how the 150 gpm unit will remove a greater amount of uranium from the process waste water that is discharged to the GMR. This figure clearly demonstrates that the addition of the 150 gpm unit would prevent any increased risk to human health and/or the environment.

Action

Alternative 4 of the EE/CA is being revised to include the 150 gpm "Interim" Advanced Waste Water Treatment unit. All sections of the EE/CA which evaluate Alternative #4 will be changed accordingly.

5. Comment:

The EE/CA states that organic chemicals have been observed in a few samples, but not on a persistent basis. However, data is not presented to support this statement. This may be a significant factor in evaluating whether treatment is needed or the type of treatment needed. This is of particular concern given the lack of data from near the Paddys Run Road site.

Response:

A summary table of data representing organic chemicals found in 2000 series wells within the South Plume area has been developed.

Action:

Table 2-8 has been generated and will be inserted into the EE/CA.

6. Comment:

The EE/CA does not present any data to substantiate the background concentration of uranium (or other potential contaminants). Surface water data provided in the RI/FS analytical database indicated that only one sample had a total uranium concentration above 1 ug/L (apparent method detection limit). Sample 01102 had a concentration of 2 ug/L. None of the reported specific uranium isotopes had activity concentrations greater than 1.0 pCi/L (apparent method detection limit). The establishment of background concentrations is key to the direct discharge alternative because the risk assessment focusses, on increased risk above background and the determination not to treat the contaminated ground water is based on the comparatively small mass of uranium being added to the Great Miami River.

Response:

Analytical results for 52 surface water samples collected each week during 1987 from the Great Miami River (sampling location W-1) upstream from the FMPC effluent line where used as the background concentrations. The average concentration of uranium in surface water at this location was 1.2 pCi/l as reported in the FMPC Environmental Monitoring Annual Report for 1987 (April 30, 1988). This concentration of total uranium was used as the background concentration in the Great Miami River for the purposes of the risk assessment in the EE/CA.

Action

Section C3.3.6 of the risk assessment will be revised to include the value of, and reference for, the background concentration of uranium in water in the Great Miami River.

7. Comment:

The reasons listed in the responsiveness summary for why treatment of the contaminated ground water is not viable are not sufficient to justify a non-treatment alternative. Although the Advanced Wastewater Treatment Plant (AWWTP) will be operational in 1994, the responsiveness summary also states that the AWWTP will not treat any of the contaminated water from environmental media (either ground water or surface water). Second, the discussion on the background concentration of uranium in the Great Miami River is not supported. Third, the estimates of $50 million and 3 years to implement a treatment system appear to be excessive. Estimates from vendors experienced in uranium removal range from $1 to $8 million in capital costs and 0.5 to 1.5 years to implement.

Response:

A. The AWWT will be installed in a phased approach. At the present time it is planned to construct Phase I & II of the AWWT at the same time. Phase I of the AWWT is being designed to treat approximately 700 gpm of contaminated storm water run-off from the Storm Water Retention Basin (SWRB) and the Storm Sewer Lift Station (SSLS). The 700 gpm rate is needed to stop the overflow of the SWRB caused by successive storm events. Historical weather data indicates that at the 700 gpm treatment rate, the system will only operate approximately half of the time (i.e. the average discharge flow is approximately 350 gpm). Therefore, the AWWT will be available to treat approximately 700 gpm of the South Groundwater Contaminated Plume the other half of the time. Phase II of the AWWT will treat 400 gpm of the other FMPC waste water.

As presently envisioned, an expansion to the AWWT (Phase III) as part of Operable Unit #5 will be installed to specifically address the water generated from the South Groundwater Contamination Plume and other future groundwater remedial action flows.

B. See response to Question #6.

C. A Conceptual Design Report (CDR) was prepared for the AWWT and the cost for the proposed 1100 gpm system was estimated at between 20-30 million dollars. This system included ion exchange and reverse osmosis (RO) along with supporting pretreatment equipment to protect these systems and ion regeneration facilities. The system needed to specifically address the South Groundwater Contamination Plume Removal Action would treat approximately 2000 gpm. Based on a flow ratio markup, the 2000 gpm system was estimated to cost approximately 50 million dollars.

Data obtained from recently completed bench scale testing has indicated that the 2000 gpm Phase III could be simplified to eliminate RO and its supporting pretreatment equipment. Therefore, it is expected that the above cost will be reduced. The above estimates were for a system to treat an effluent of 250 - 500 ppb with a maximum effluent of 20 ppb.

With regard to the estimated time to implement, DOE agrees it may be possible to obtain vendor supplied equipment in 1 to 1.5 years. However, the three year estimate is based on our estimate for the design, construction, and start of the system at the FMPC. This time includes government procurement, safety analysis, NEPA documentation, permitting, etc. It is our intent to expedite the process, but the three year estimate is considered reasonable.

8. Comment:

Because the AWWTP will not be used to treat contaminated ground water, the EE/CA should project the estimated loading of contaminants into the Great Miami River beyond the 5-year anticipated removal action time frame.

Response:

Reference response to Comment 4.

Action:

No change to the EE/CA is necessary.

9. Comment:

As stated on page 7 of the Responsiveness Summary, "The intent of any removal action . . . is to abate, minimize, stabilize, mitigate, or eliminate a release or threat prior to a final action if there is a threat to public health or the environment." However, the issue of ecological assessment, as required under the NCP (40 CFR 300.415) and the intent and scope of removal actions described therein, was not addressed in the risk assessment.

Response:

Alternative 4 (Pump & Discharge) has been changes to "Pump & Treat" (see response to comment 4).

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Action:

No change to the EE/CA is necessary.

10. Comment:

Models used for exposure assessment and their accompanying parameters and assumptions are not adequately described or properly referenced. Individual parameters should be defined (e.g., transfer coefficient), and their relevance to the model discussed. It is difficult to ascertain the suitability of a model without this information. In addition, it is not known whether the parameter values used in the exposure assessment represent local or regional conditions.

Response:

As noted in Section C3.3 of the risk assessment, standard mathematical models were used to calculate potential intake of uranium. The formulae, definition, of parameters and parameter valued are listed in Section C3.3, with the exception of typographical omissions on page C3-8. References for specific formulae and values for the parameters are not listed in the risk assessment. Site-specific values of parameters were selected whenever possible, but many parameter values are standard values for general applications.

Action

Page C3-8 will be revised to include the omitted parameter valued. Section C3.3 will be revised to include specific references for formulae and parameter values.

11. Comment:

The uranium isotopes present in the ground water should be stated. If more than one isotope is present, then radiation dose calculations will be needed for each isotope, using specific dose conversion factors. If only Uranium-238 is being considered, then this should be made clear. Alternatively, a second dose calculation should be made if more than one uranium isotope is present in the water. Natural uranium is composed of equal activities of U-238 and U-234. These doses would be additive.

Response:

Analysis of groundwater from the South Plume clearly indicate that uranium isotopes occur in natural isotopic ratios. The dose conversion factor (DCF) for ingestion of uranium (2.5E-04 mrem/Pci) was calculated from the DCFs for the

most soluble from of uranium-234, uranium-235, and uranium-238 given in the U.S. DOE Publication, Internal Dose Conversion Factors for Calculation of Dose to the Public (July 1988). The DCF for total uranium is the weighted sum of the DCFs for uranium isotopes in natural isotopic proportions. Use of EPA's Federal Guidance Report No. 11 gives a DCF approximately 7% higher than the DOE value for total uranium having natural isotopic ratios.

Action

The source of the value for the DCF will be referenced in the revision of the EE/CA.

12. Comment:

Responsiveness Summary, Page 73: The response to comment 112 is no adequate. U.S. DOE's assumptions and calculated doses from all pathways, including direct exposure resulting from the watering of lawns and gardens. The accumulation of uranium in surface soils in close proximity to homes may result in excessive direct exposure and inhalation hazards. Watering of lawns with water with up to 20 pCi/l of uranium may result in soil concentrations in the 10 to 50 pCi/g range.

Response:

As stated in Section C3.2 of the EE/CA and in the Responsiveness Summary, p. 73, numerous potential exposure pathways were considered in addition to the four pathways presented in the report. The potential exposure pathways listed in the Responsiveness Summary were excluded from the quantitative exposure assessment since one or more of the transport and dose assessment parameters caused the radiation dose contribution to be so small as to be insignificant with respect to the four pathways for which the quantitative exposure assessment was performed.

Exposure pathways were identified in accordance with the procedures given in Chapter 6 of EPA's Human Health Evaluation Manual (1989). Exclusion if the numerous pathways, including exposure from watering of lawns, was based on considerations given in that report. In accordance with EPA guidance, it is not a requirement that a quantitative assessment of all pathways be presented in a risk assessment.

No basis is given for U.S. EPA's comment that "watering of lawns with water of up to 20 pCi/l of uranium may result in soil concentrations in the 10 to 50 pCi/g range". In the absence of the specific parameters used by U.S. EPA to calculate

these soil concentrations, we have performed a quantitative evaluation of the potential future soil concentration. Assuming that the soil is irrigated for 70 years at a rate of 30 cm per year, with water having a concentration of 20 pCi/l, the added concentration of uranium is less than 2 pCi/g averaged over the top 15 cm of soil (using this PATHRAE.EPA assumption) having a mass density of 1.6 g/cm^3. Regular applications of lawn fertilizer (including the normal phosphoric acid component) over 70 years are expected to increase the concentration of uranium in soil by a greater amount than that contributed from irrigation.

Action

No change to the EE/CA is necessary.

13. Comment:

Responsiveness Summary, Page 36: The responses to Comments 30, 34, and 119 contains irrelevant information on a limit for uranium in drinking water. The response cites U.S. EPA's ground water protection portion of the proposed standards for the control of residual radioactive materials from inactive uranium processing sites, which sets a limit of 30 pCi/l. The response says that based on discussions between U.S. EPA and U.S. DOE that there was agreement to use 30 pCi/l as an allowable limit for drinking water. This statement is not true and there is no current MCL for this contaminant. U.S. EPA has not agreed to this since there is no current promulgated MCL. This entire paragraph should therefore be stricken from the Responsiveness Summary.

The last two paragraphs of this response seem to imply that the concentration of uranium in drinking water has been decided upon by U.S. DOE and U.S. EPA to be 22 pCi/l (33*ug*/l). This is not true. Based on dose conversion factors from Federal Guidance Report No. 11, it was agreed to set the action level for cleanup of groundwater at 20 Pci/l (30*ug*/l). The response to these comments should be revised to reflect this. The EE/CA has been revised to reflect this decision.

Response

The first three paragraphs of the Response to Comments 30, 34 and 119 on page 36 of the Responsiveness Summary will remain unchanged. The remainder of the response (4 paragraphs at the top of page 37 of the Responsiveness Summary) will be replaced by the following:

Based on discussions between U.S. EPA and U.S. DOE on July 13, 1990, U.S. DOE proposed an action level for cleanup of uranium in groundwater at the FMPC in a letter to U.S. EPA on September 25, 1990. This proposed concentration for

uranium (in natural isotopic proportions) is twenty picouries per liter (20pCi/l), and corresponds to a mass concentration of 30 micrograms of uranium per liter of water (30 ug/l). Remedial actions at the FMPC will be based on compliance with the concentration limit and will be reviewed, as necessary, when an MCL for uranium is approved by EPA.

In the absence of definitive chemical solubility information for uranium in groundwater at the FMPC, it is assumed that uranium in drinking water is relatively soluble with five percent of ingested uranium passing into the blood (i.e. fl=0.05). The radiation dose conversion factor corresponding to this solubility is given in Federal Guidance report No. 11, (EPA-5201-88-020, September, 1988). The radiation dose (50-yr committed effective dose equivalent) per unit ingested quantity of uranium (natural isotopic proportions) is 2.69 x 10^{-4} mrem/pCi. The allowable concentration is calculated by dividing the annual radiation dose limit (a4 mrem) by the annual intake (730 liters) and the radiation dose conversion factor (2.69 x 10^{-4} mrem/pCi). The resultant calculated concentration of uranium in drinking water 20.4 pCi/l, which is rounded to 20 pCi/l.

The use of this concentration limit will be applied under a "sum" rule in conjunction with other radionuclides not specifically listed in 40 CFR 141. This rule requires that the sum of the radiation dose from all radionuclides (excluding radium-226, radium-228, and radon) via the drinking water pathway cannot exceed 4 mrem per year.

Activities conducted as part of the RI/FS at the FMPC which are impacted by the choice of this allowable concentration of uranium in water will be reviewed when the final MCL for uranium is approved by the EPA.

Action:

Page 37 of the Responsiveness Summary will be modified as described above. Copies of these changes will be incorporated in the Responsive Summary and will be located at the two Administrative Record locations.

Effect of Removal Actions and AWWT On Uranium Discharges to the Great Miami River

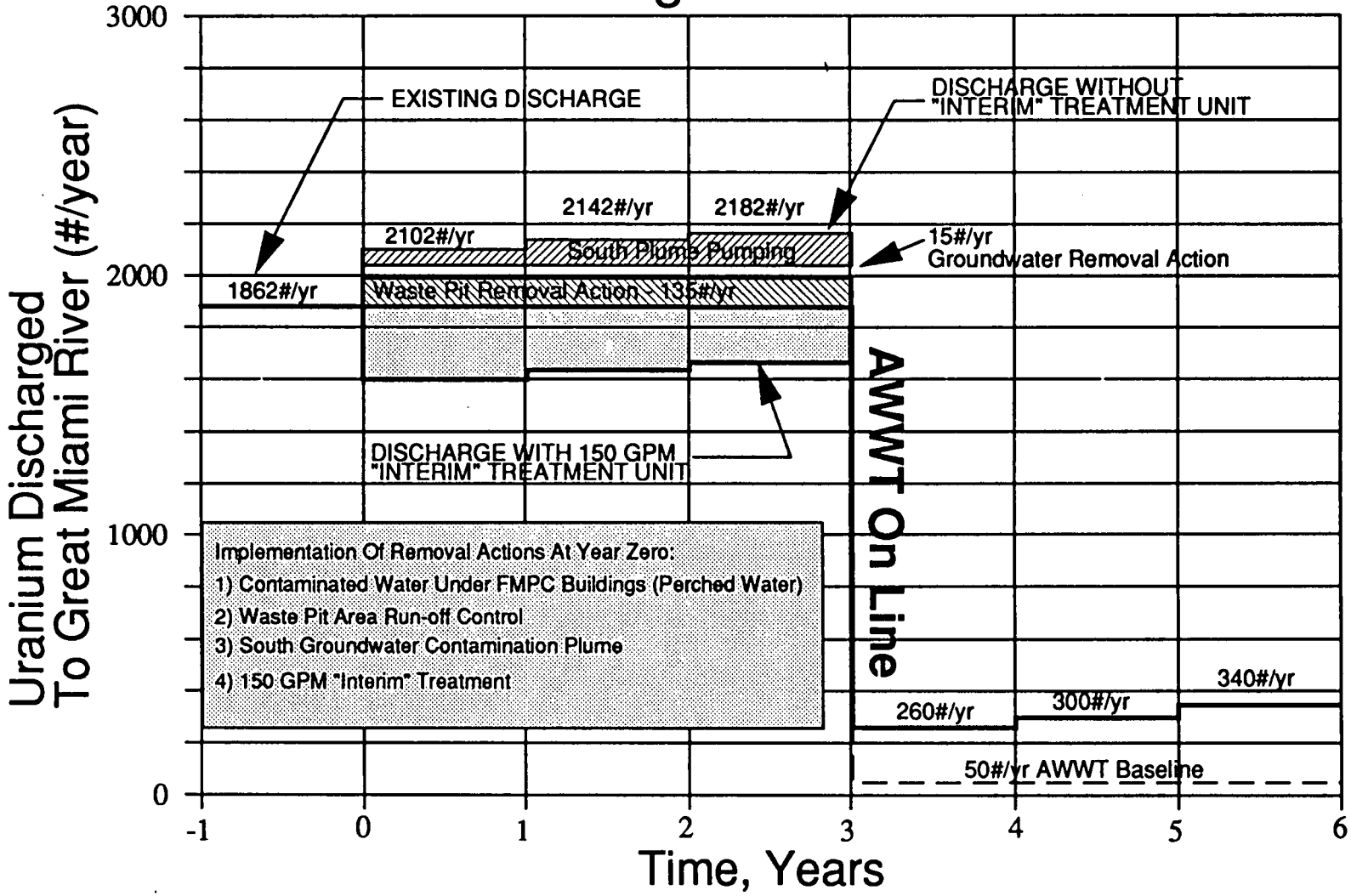

FIGURE 1