



Docket No. 70-36
License No. SNM-33

Director, Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: **Response to Request for Additional Information on Hydrogeologic Investigation (TAC NO. L31022)**

Dear Dr. Soong:

Attached is Combustion Engineering's (CE) response regarding your February 19 request for additional information on the Hydrogeologic Investigation and Groundwater/Surface Water Monitoring Work Plan submitted on October 21, 1997. CE has also received comments from the Missouri Department of Natural Resources (MDNR). NRC and MDNR comments will be incorporated in the revised work plan as appropriate. The revised plan is scheduled for submittal by April 28, 1998.

If there are questions regarding this matter, please feel free to contact me at (314) 937-4691 Ext. 461.

Sincerely,

COMBUSTION ENGINEERING, INC.

Robert W. Sharkey
Director, Regulatory Affairs

3-20-98
Date

cc: Sean Soong

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RA98/703

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**Enclosure to
RA98/703**

**Response to Request for Additional
Information to Hydrogeologic Investigation**

Question 1) Add the following subsection to Section .0

A) History of Activities at the Site- This subsection is needed to support logical placement of sampling locations. Include summaries of the following items: (1) NUREG/CR-3387 (Radiological Survey of the Combustion Engineering Burial Site, Hematite, Missouri, July 1983); (2) Regional and Local Geologic Summary at the combustion Engineering, Hematite, Missouri Plant, May 30, 1997, Gateway Environmental Associates, Inc.; and (3) other prior surface and subsurface physical and analytical data.

Highlight any data quality concerns.

Response: The purpose of this investigation is to provide data necessary to support future decisions on actions for the burial area. The above mentioned documents were considered as part of this planning effort. Subsequent reports which present preferred options for the burial area will discuss data application and quality.

B) Sources of Contamination - Include in this subsection the expected physical/chemical properties of the radioactive and hazardous materials involved (i.e., contaminants of concern) from the burial area, evaporation ponds, and former ring storage area.

Response: The expected physical/chemical properties of radioactive and hazardous materials involved in the burial area will be added. The pond and the ring storage are not within the scope of this investigation.

C) Regulatory Requirements of Site Characterization - Describe in this subsection the governing regulations(s) of this site characterization and dose assessment.

Response: Burials were made pursuant to 10 CFR 20.304 and, the area will be released under 10 CFR 20 Subpart E. In Missouri, hazardous wastes are regulated under 10 CSR 25 and solid wastes are regulated under 10 CSR 80.

D) Conceptual Model of the Site - Section 1.0, 2nd paragraph states the "...purpose of this Ground Water Monitoring Plan (GWMP) is to...obtain site specific data necessary for computer modeling of the site." Discuss the model utilized and list the site-specific input parameters required for the model. This will provide the basis for data collection activities. Describe in the GWMP why groundwater is the only exposure pathway of concern because the regulations require all credible pathways be evaluated.

Response: The exact code or codes which will be used to model the site have not been selected. The model will be used to determine Total Effective Dose Equivalent (TEDE) to an average member of the group of individuals reasonably expected to receive the greatest exposure to residual radioactivity for any applicable set of circumstances (critical group). Therefore, we will collect the information outlined in the plan which we believe will allow for modeling of the burial area. Groundwater is considered the only credible pathway because it is the limiting pathway. Direct exposure by any other pathway is precluded while there is cover material on the burial. When one assumes an intruder scenario that opens other pathways, a mixing of the burial and cover material would lower concentrations will be considered when calculating potential exposure. In addition, uranium is an internal rather than external hazard with the most likely pathway being ingestion via ground water.

Question 2) Section 3.0 page 5; Commit to using the results of the geophysical investigation to locate monitoring wells in positions near the burial sites to detect leachate immediately downgradient. Commit to describing in the hydrogeologic report the limitations of geophysics, standard operating procedures employed, survey design, quality assurance, data reduction/interpretation, and presentation of results (e.g., traverse sections, fixed positions, labeled interpretations, surface landmarks, areas of poor data quality, etc.)

Response: In the plan, CE has committed to place monitoring wells near the burial area on all four sides. Currently WS-14 is placed in a burial pit and has not demonstrated consistently detectable concentrations of uranium. CE will note in the final report for the above mentioned items, areas that in the opinion of the registered geologist have substantial uncertainty.

Questions 3) Section 4.0, page 6; Add a "background" subsection to discuss the statistical approach regarding the estimation of soil, groundwater, and surface water background radioactivity at the site. Determine background concentrations from measurements in soil samples taken at several nearby off-site locations where contamination is not likely.

Response: A section describing the calculation of background for surface and ground water will be added to the plan. The backgrounds for surface and ground water will be calculated using the arithmetic mean of samples collected from each source. Since the burial contains fill as well as native soil, substantial background variations may exist. However, these variations may not be significant relative to release levels. Therefore, background in soils will be addressed at a later date if modeling indicates that remediation to levels near background is necessary.

Question 4) Section 4.1.1, page 6: Present a summary table of concentrations of volatile organic compounds detected by Missouri Department of Natural Resources and radionuclides detected by others in the groundwater to support monitoring locations and sampling parameters.

Response: A summary of data from the MDNR as well as radiological data from License SNM-33 will be added.

Questions 5) Section 4.2, page 8: Include a general hydrostratigraphic cross section (or sections) of the site from existing subsurface data to support the proposed monitoring well locations.

Response: The schematic generalized geologic cross section from the summary document will be added to the work plan. However, sufficient specific geologic information from borings located at or near the burial area which would allow for the creation of a detailed hydrostratigraphic cross section capable of guiding the choice of exact monitoring well construction does not exist. Therefore, exact well depths and screening intervals will be determined in the field as outlined in Sections 4.2 and 4.3 of the work plan.

Question 6) Section 4.3, 1st paragraph: Commit to geologically logging all monitoring wells because of potential horizontal and vertical heterogeneities. Include in the text a description of the analysis to be performed on the Jefferson City Dolomite borehole and the core.

Response: CE has committed to logging the deepest well of the pair. This is sufficient because the small distance (approximately 10 feet) between wells in a pair. Because it is in the saturated zone, no chemical analysis is planned for the Jefferson City Dolomite borehole.

Question 7) Table 1, Section 4.3, page 9: Revise Figure 2 to contain a north arrow, labeled site features, and estimated groundwater flow directions to reconcile the direction of each monitoring well relative to the burial area. Without such a figure, it is very difficult to understand the proposed monitoring well rational. Based on Figure 12 (regional and Local Geologic Summary, Gateway, May 30, 1997). WS-22 & WS-23 are not upgradient of the burial area.

Response: The figure will be revised to add true north arrow, plant north arrow, hill to the plant north, and drop off to the creek located plant east of the burial area. The map in the summary document was from an investigation of the ring storage area. The groundwater flow in the northern portion of the burial area should be dominated by flow away from the hill located to the northwest. Therefore, the WS-22 and WS-23 should be upgradient. However, there are wells located on four sides of the burial area. Therefore, one of the sets of wells will be upgradient of the burial area. Ground water flows will be described in the report generated from this work plan.

Question 8) Table 1, Section 4.3, page 9: Use the operational history and construction summary of the "evaporation ponds" and "former ring storage area" to evaluate those areas as potential sources of surface and/or subsurface contamination because monitoring wells are proposed near these areas.

Response: No new wells are proposed near the evaporation ponds. A decommissioning plan for the ponds has been accepted by the NRC. The elevated levels of ⁹⁹Tc in the vicinity of the former ring storage area have been previously evaluated and accepted by the NRC.

Question 9) Section 4.4., page 11: Commit to collecting discrete samples from a short interval to provide a vertical contaminant profile to be used in RESRAD.

Response: When modeling the site, the best information available (burial records) will be used. The concentration will be determined by averaging the contents over the volume of the burial area. This averaging will most accurately reflect the actual situation as it exists.

Question 10) Section 4.4.4, page 11 and Section 7.1.1: If any radioactive screenings are elevated (i.e., above background), commit to conducting specific isotopic analysis on the sample(s). RESRAD requires, as input parameters, initial concentrations of principal radionuclides in order to have valid dose calculations.

Response: Isotopic analysis for uranium lacks precision at low concentrations (the uncertainty of the ^{238}U and ^{235}U values are relatively large rendering a large uncertainty for their ratio, enrichment). Therefore, it would be inappropriate to perform isotopic analysis on low activity samples. The initial conditions for the burial pits occurred between 25-40 years ago and would be appropriate starting point for a RESRAD type model.

Question 11) Add a section that discusses how the "Source Term" will be calculated. RESRAD requires a source analysis to determine the rate at which residual radioactivity is released into the environment. The rate is determined by the geometry of the contaminated zone, the concentrations of the radionuclides present, the ingrowth and decay rates of the radionuclides, and the removal rate by erosion.

Response: Hydrologic conditions coupled with residency scenarios provide dose conversion factors. After dose conversion factors and limits (15 mrem/year, 25 mrem/year or for restricted release up to 100 mrem/year) are determined, a contaminate characterization plan is developed to support release or remediation. The hydrogeologic work plan will provide the source geometry and transport factors necessary to model the burial area. A decision will then be made based on a source term calculated by the burial records, as confirmed by NUREG/CR-3387, to select a path to obtain closure for the burial area.