002054

United States Department of Energy

Savannah River Site

Interim Action Record of Decision

Remedial Alternative Selection

for

F-Area Groundwater Operable Unit (U)

Prepared by:

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Aiken, SC 29802

Prepared for the U.S. Department of Energy Under

Contract DE-AC09-89SR18035

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Declaration for the Interim Action Record of Decision

Site Name and Location

F-Area Groundwater Operable Unit
Savannah River Site
Aiken County, South Carolina

The F-Area Groundwater Operable Unit is the groundwater associated with the F-Area Hazardous Waste Management Facility (HWMF). Both the F-Area Groundwater Operable Unit and the F-Area HWMF are part of the F-Area Fundamental Study Area. The F-Area HWMF (Building Numbers 904-41G, 904-42G, and 904-43G) is listed as a Resource Conservation and Recovery Act (RCRA) regulated unit in Appendix H of the Federal Facility Agreement (FFA) for the Savannah River Site (SRS). These terms have been defined in the Interim Action Proposal Plan for the F-Area Groundwater operable Unit. That document is part of the administrative record for this unit and is the document on which this declaration and the accompanying Record of Decision are based.

Statement of Basis and Purpose

The purpose of this Interim Action Record of Decision (IROD) is to address the potential concerns at the F-Area Groundwater Operable Unit under a program that comprehensively and responsively meets the needs of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and supports the SRS RCRA Permit as the primary decision-nuddng authority. If the remedy appearing in the permit is significantly revised. a review of this interim action will be performed to determine whether requirements for continued protection of human health ● nd the environment are being met.

This document presents the selected interim corrective action for the F-Area Groundwater Operable Unit at the SRS. which was developed in accordance with the FFA. This decision is based on the Administrative Record File for this specific unit. The selected interim action under CERCLA is no further action beyond that required by the corrective action as identified in the SRS RCRA Permit.

Assessment Of the Site

The F-Arcs HWMF is a source specific operable unit within the F-Area Fundamental Study Area. The F-Area HWMF is located in the center of SRS, Southwest of Road E and North of head 4 approximately 16 miles from the nearest plant boundary. The F-Area HWMF consisted of three unlined earthen basinsthat had a combined maximum operating capacity of 20.5 million gallons of wast.. water during operation. The groundwater contamination plume associated with these basins is called the F-Area Groundwater Operable Unit and is observed in a zone which extends from the water table surface to approximately 150 feet Mow tand surface and covers an area of approximately 200 acres. The primary contaminants arc tritium, alpha. and beta emitting radionuclides, and hazardous metals. The potential pathway for contamination from the F-Area Groundwater Operable Unit is through discharge of contamination into an onsite stream.

Remedial alternatives were developed for corrective action of the F-Area Groundwater Operable Unit as part of the SRS RCRA Permit process. Monitoring and investigation of the groundwater operable unit is being conducted. DOE is scoping a phased approach 10 identify the optimal sequence of activities for corrective action.

Description of the Selected Remedy

Closure of the F-Area HWMF was conducted under a RCRA closure plan approved by the South Carolina Department of Health and Environmental Control (SCDHEC). The corrective action of the groundwater operable unit associated with these basins is being addressed under the SRS RCRA Permit.

The CERCLA selected alternative for the F-Area Groundwater Operable Unit is no further action beyond that required by the SRS RCRA Permit. The remedy described in the 1992 SRS RCRA Permit provides for recovery of contaminated groundwater via extraction wells and treatment of hazardous constituents and radionuclides (except tritium and nitrates). The treated water under conditions of current permit will be injected into the shallow aquifer at the upgradient extent of the plume. DOE has been proceeding to implement this action. On March 1, 1995, the renewal of the SRS RCRA Permit was issued as a draft for public/permittee review and comment.

Declaration Statement

Corrective action for the F-Area Groundwater Operable Unit is specified by the SRS RCRA Permit issued by State of South Carolina. Pursuant to the FFA, the permit addresses all identified constituents capable of harming human health and the environment. This action has been determined to be protective of human health and the environment under CERCLA. Therefore, no further remedial action beyond or in addition to that established under the SRS RCRA Permit is necessary under CERCLA.

4/7/95
Date

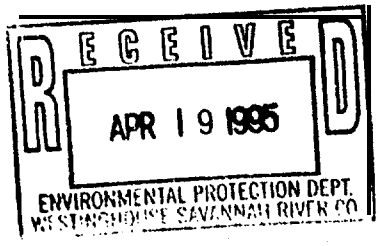
Thomas F. Heenan
Assistant Manager for
Environmental Restoration and Solid Waste
U.S. Department of Energy

4-13-95
Date

for John H. Hankinson, Jr.
Regional Administrator
U.S. Environmental Protection Agency
Region IV

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street. Columbia, SC 29201

April 13, 1995



CERTIFIED MAIL

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Mr. John H. Hankinson, Jr.
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RE: Savannah River Site
SC1 890008989
Aiken County

F-Area Seepage Basin Groundwater Operable Unit
H-Area Seepage Basin Groundwater Operable Unit

Gentlemen:

The South Carolina Department of Health and Environmental Cent rol (SC DHEC) has reviewed the Interim Records of Decision (RODS) for the remedial alternative selection on the F-Area and I-l-Area Seepage Basin Groundwater Operable Units at the Savannah River Silt. SCDHEC concurs with these interim RODs. In concurring with the se interim RODS, SCDHEC does not waive any right or authority it may have under federal or state law. SCDHEC reserves any right and authority it may have to require corrective action in accordance with the Section X)04(u) and (v) of RCRA, South Carolina Hazardous Waste Management Act, and the South Carolina Pollution Control Act. These rights include, but are not limited 10, the right 10 ensure all necessary permits are obtained, all clean-up goals and criteria are met , and 10 take a separate action in the event clean-up goals are not met. Nothing in the concurrence shall preclude SCDHEC from exorcising any administrative, legal and equitable remedies available to require additional response actions in the event that: (1) (a) previously unknown or undetected conditions arise at the site, or (b) SCDHEC receives additional information not previously available concerning the premises upon which SCDHEC relied in concurring with the selected remedial alternative; and (2) the implementation of the remedial alternative selected in the final ROD is no longer protective of public health and the environment.

Furthermore, DOE is not released from any liability it may have pursuant to any

provisions of State and Federal Law including any claim for damages for liability to the destruction of, or loss of, natural resources.

Should you have any concerns regarding the matter, please contact Keith Collinsworth at 896-4055.

Sincerely;

R. Lewis Shaw

R. Lewis Shaw, PE
Deputy Commissioner
Environmental Quality Control

RLS/kac

cc: Thomas M. Treger, DOE
Cynthia V. Anderson, DOE
John Cook, WSRC (signed original)
Jon D. Johnston, EPA
Camilla Warren, EPA
Myra Reece, DHEC-Lower Savannah
Keith Lindler, DHEC-BSHWM
Randy Thompson, DHEC-BSHWM
Ken Taylor, DHEC-BSHWM

L Site and Operable Unit Names, Locations, ● nd Descriptions

The Savannah River Site (SRS) occupies approximately 300 square miles (800 square km) adjacent to the Savannah River, principally in Aiken and Barnwell Counties of South Carolina (Figure 1). SRS is a :ecured facility with no permanent residents. The site is approximately 25 miks (40 km) southeast of Augusta, Georgia, and 20 miles (32 km) south of Aiken, South Carolina. SRS is owned by the United States Department of Energy (DOE). Westinghouse Savannah River Company (WSRC) is the managing and operating contractor for DOE.

The original mission of the site was to produce nuclear materials for nationat defense. Recycling and reloading of tritium to keep the nation's supply of nuclear weapons ready is a continuing site mission. Today the separations Facilities, of which F Area is a part, are processing existing inventories of materials for ● variety of purposes, including supplying Plutonium-238 for deep space probes and processing inventoried liquid radioactive materials into solid form for storage and testing. This activity i? expected to continue for several years.

The F-Area HWMF is a RCRA-regulated unit (Figure 2). As an operable unit, the basins comprising the F-Area HWMF were stabilized and closed in 1991. The F-Area Groundwater Operable Unit is the groundwater associated with the F-Area HWMF. Contaminant plumes arc shown on Figure 3.

IL Operable Unit History and Compliance History

Operable Unit History

The F-Arcs HWMF (basins F-1, F-2, and F-3) was operated from 1955 until November 7, 1988. During that time, the facility received waste effluents from F-Area chemical separations facilities such as the nitric acid recovery unit, waste storage system evaporator overheads, and general purpose evaporator overheads. Significant amounts of nitrate and caustic were received. Tritium was the primary radionuclide released to the basins.

The basins were closed by dewatering, physically and chemically stabilizing the remaining sludge on the bottom of the basins and placing a muhi-layer clay/soil cover over them. The cover system reduces rainwater contact with the stabilized sludge and further contamination of the groundwater.

Compliance History

The entire SRS was placed on the National Priorities List (NPL) in December 1989. Following that date, RCRA preventive activities at the F-Area HWMF have also been required to meet CERCLA regulations. The Federal Facilities Agreement, which became effective in 1993, formalized the integration of RCRA and CERCLA in remediations on the SRS. Remediation of environmental contamination on the SRS is directed by a Federal Facility Agreement (FFA), which was signed by EPA Region IV. DOE, and SCDHEC and became effective August t6. 1993. The FFA identifies all sites that may require remediat ion and establishes an administrative process to set priorities and guide response actions. The FFA requires CERCLA Records of Decision for all RCRA decisions

Preventive actions at the F-Area HWMF were conducted pursuant to the requirements of RCRA per Settlement Agreement 87 27-SW between SCDHEC and DOE. In 19S8. a RCRA Closure Plan was submitted to SCDHEC. The closure plan underwent revisions to address SCDHLC comments prior to approval in 1989. Closure of the F-Area HWMF was begun in 1989. completed in January 1991. and the unit was certified closed in February 1991. In April 1991, the closure certification was accepted by SCDHEC as bcmg in compliance with RCRA requirements. Following a review of the SCDHEC RCRA action, EPA determined that it was protective of human health and the environment and that no additional

actions were necessary. The three parties to the FFA then embodied this decision in a CERCLA Record of Decision on the dosed basins which was signed on September 10, 1993, *A* RCRA Permit Application for Postclosure Care of the cover and to address groundwater contamination was submitted in December 1990 and revised in 1992. SCDHEC addressed the F-Area HWMF in the SRS RCRA Permit effective November 1992. This permit required submittal of a corrective action plan for the groundwater associated with the F-Arcs HWMF. The Corrective Action Plan was included in the RCRA Permit Renewal Application (submitted in October 1993). On March 1,1995, as part of renewal of the permit, a draft SRS RCRA Permit was issued for public/permittee review and comment. Issuance of the renewed SRS RCRA Permit is anticipated in the near term.

III. Highlights of Community Participation

The public comment period for the F-Area Groundwater Operable Unit Interim Action Proposed Plan was from December 14, 1994 to February IS, 199S. The comments received on the Interim Action Proposed Plan arc addressed in the Responsiveness Summary found in Appendix B.

IV. Scope ● nd Role of Operable Unit Within the Site Strategy

T&description of the remedy addressing groundwater contamination at the F-Area Groundwater Operable Unit, summarized below, is from the SRS RCRA Permit.

As described in the SRS RCRA Permit the goat of remediation of the F-Area Groundwater Operable Unit is to lower contaminant concentrations in the groundwater associated with the F-Area HWMF to levels specified in the RCRA permit and to minimize the discharge of contaminants to the adjacent stream. In accordance with the current 1992 SRS RCRA Permit. the remediation program includes groundwater extraction, treatment, and injection at the upgradient extent of the contamination. The remediation follows the closure of the F-Area HWMF, and precedes the investigation of smaller source-specific units in the F-Area Fundamental Study Area. The smaller source-specific sites will require investigation and possibly remediation in accordance with the FFA. The groundwater remediation is an interim measure pending an evaluation of its effectiveness in actual practice. The 1992 RCRA Permit specifies that the overall corrective action will be implemented in phases and will be periodically reevaluated. The scope of the Phase I action coupled with possible future actions (i.e., Phase It, Phase 111) will serve to provide protection to human health ● nd the environment.

v. Summary of Operable Unit Characteristics and Contaminants

Waste effluents from F-Area chemical separations facilities including the nitric acid recovery unit, waste storage system evaporator overheads, and general purpose evaporator overheads were discharged to the F-Area HWMF. Significant amounts of nitrate and caustic were discharged to the basins. Tritium was the primary radioactive constituent (99%) released to the basins. According to the RCRA Permit the following constituents have been detected at concentrations above the Groundwater Protection Standards (GWPS) established in the 1992 SRS RCRA Permit:

Hazardous Constituents (South Carolina Hazardous Waste Management Regulations 264.94 Table 1)

Arsenic	Barium
Cadmium	Chromium
Lead	Mercury
Selenium	Silver

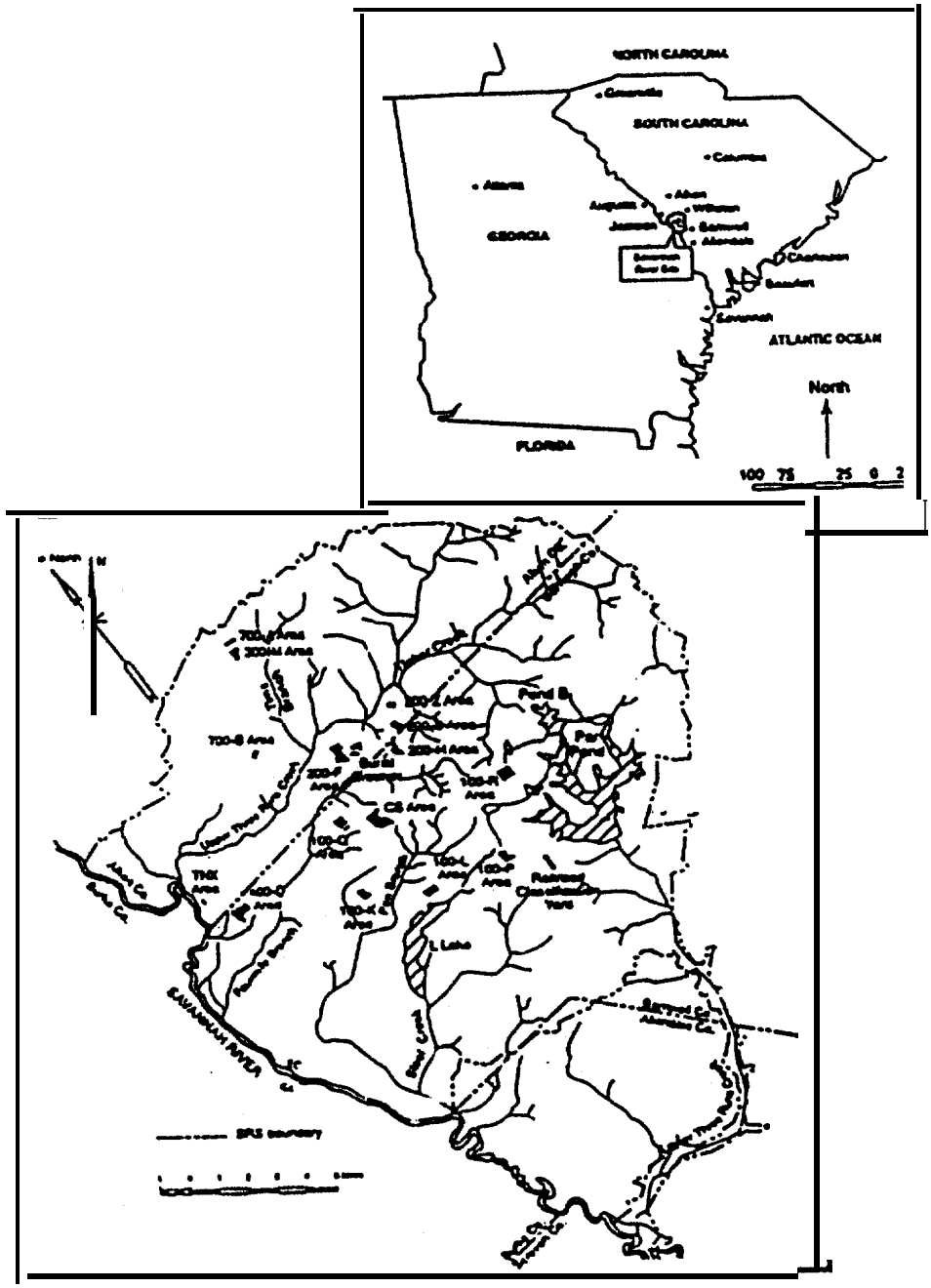

Figure 1. Site Area Map

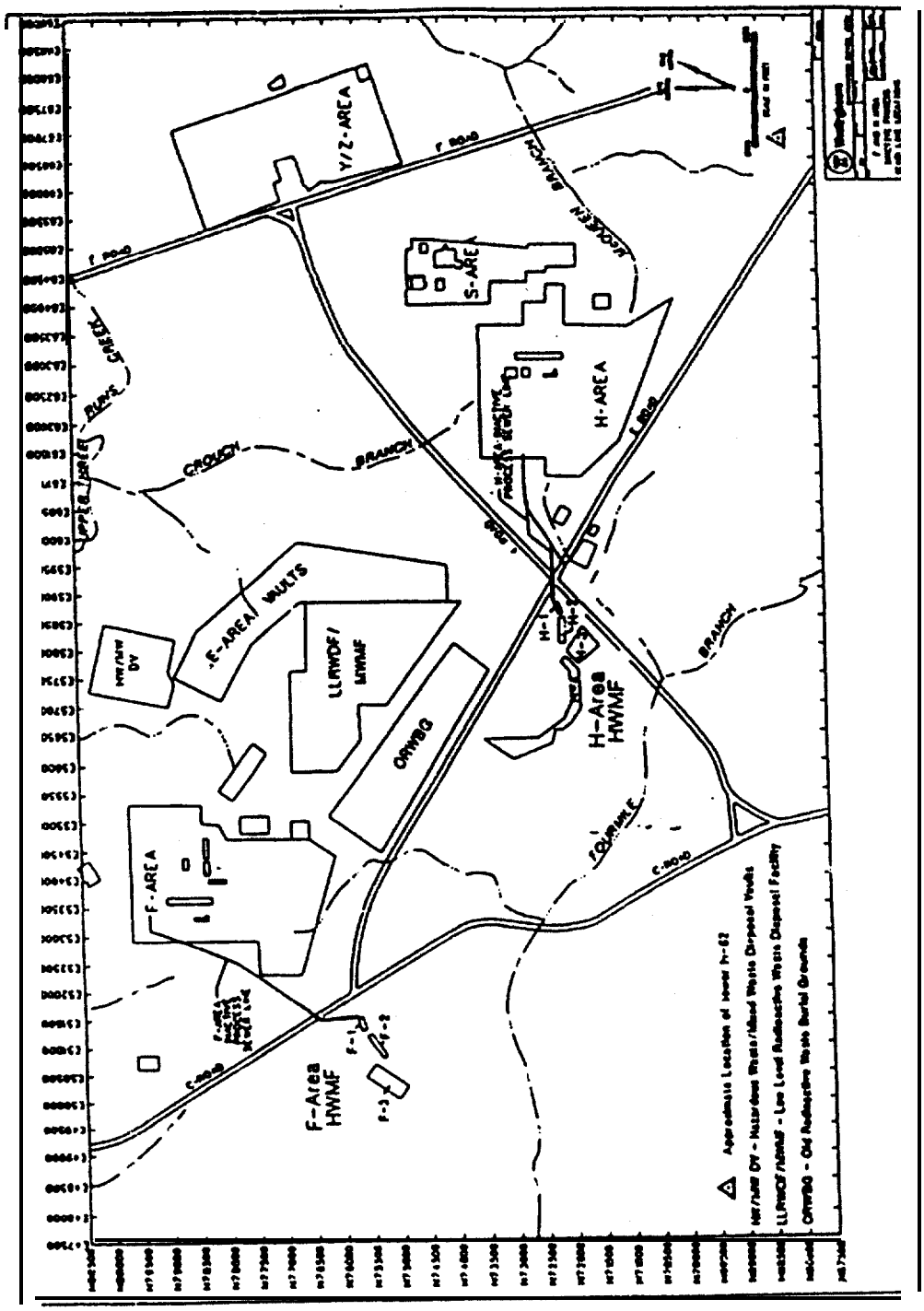

Figure 2. F-Area Hazardous Waste Management Facility Map

Hazardous Constituents (SCHWMR 261 Appendix VIII/264 Appendix IX)

Antimony	Benzene
Bis(2-ethylhexyl) phthalate	Cobalt
Copper	cyanide
Nickel	Phenols
Tetrachloroethylene	Thallium
Trichloroethylene	Trichlorofluoromethane
vanadium	zinc

Non-Hazardous Constituent

Nitrate

Specific Radionuclides + Indicators

Gross Alpha	Gross Beta (i.e., Nonvolatile Beta)
Total Radium (226 + 228)	Tritium
Americium-241	Cesium-137
Curium-242	Curium-243/244
Curium-246	Cobalt-60
Iodine-129	Plutonium-238
Plutonium-239/240	Radium-226
Radium-228	Strontium-90
Technetium-99	Thorium-228
Thorium-230	Uranium-233/234
Uranium-234	Uranium-235
Uranium-238	

Statistically Derived Constituent

Uranium

VI. summary of Operable Unit Risks and Basis for Remedial Action

The maximum detected level of several contaminants (e.g., tritium, cadmium, and lead) in the F-Area groundwater currently exceed the National Primary Drinking Water Standards, and applicable state standards. However, potential exposures to the general public are minimized by the distance from the operable unit to the site boundary, by natural attenuation and radionuclide decay, by institutional controls,

and by dilution in receiving streams. In addition, all off-site contaminant concentrations arc well below drinking water and other applicable standards. This corrective action will address the potential ecological impacts at the seeplines along Fourmile Branch, and will also serve to address the ambient water quality standards in Fourmile Branch by remediating this operable unit. The remediation of the F-Area Groundwater Operable Unit will be designed to meet, as far as practicable, the Phase I groundwater protection standards outlined in the RCRA permit.

VII. Description of Alternatives

Three alternatives were evaluated for remediation of contamination at the F-Area Groundwater Operable Unit. Each alternative is described below.

1. No Remedial Action.

2. Groundwater Recovery and Hydraulic Control with treatment of mobile hazardous constituents and radionuclides (except tritium and nitrates) and discharge of treated water to a surface stream.

3. Remedy as provided in tho SRS RCRA Permit, i.e., groundwater recovery and hydraulic control with treatment of mobile hazardous constituents and radionuclides (except tritium and nitrates) by treatment and injection of treated water into the shallow aquifer at the upgradient extent of the plume.

All three of the alternatives include groundwater monitoring. engineering and administrative controls to guard against inadvertent human and ecological exposure to contaminated water.

Alternative 1. No Remedial Action

Under Alternative 1, no groundwater extraction would be conducted. Concentrations and activity levels of the constituents of concern would gradually be reduced with time through natural attenuation processes such as dispersion and radioactive decay. Groundwater would continue to discharge low levels of contaminants into surface waters. Institutional controls and long term monitoring of groundwater, surface water, and ecological conditions would be components of the no remedial action alternative. These activities are already being implemented and associated costs arc substantially lower than the other alternatives. The lower cost is duc to the lack of capital expenditures, such as the procurement of a treatment system and the installation of walls. Potential risks to ofl-site receptors would be identified through monitoring and minimized by inst itutional controls.

Alternative 2. Groundwater Recovery, Treatment, and Discharge to a Surface Stream.

This alternative would consist of recovery of contaminated groundwater via extraction wells and treatment to remove hazardous constituents and radionuclides (except tritium and nitrates). The treated water would be discharged through an NPDES permitted outfall into a surface stream at SRS. A practical technology to remove tritium from the groundwater does not exist. Therefore, tritium would be released to the surface water. Hazardous constituents and radionuclides removed from the groundwatcr would be immobilized and disposed in permanent disposal vaults at SRS

Discharge of the treated water would shorten the flow path of tritium-contaminated groundwater to surface streams. This strategy would allow less lime for tritium decoy before water discharges to surface waters. in the short term this system could increase specific activities of tritium in the onsite receiving streams. However, the impact to the Savannah River would be negligible due to dispersion and dilution. (The specific activity of a radionuclide is equivalent to the concentration of a chemical),

Institutional and engineering controls, plus long-term monitoring of groundwater and surface water conditions would be part of Alternative 2, and anticipated to be lower in cost than Alternative 3.

Alternative 3. Groundwater Recovery, Treatment, and Injection

Alternative 3 is the remedy provided in the 1992 RCRA permit. It provides three phases for the recovery of contaminated groundwater via extraction wells and treatment of hazardous constituents and radionuclides (except tritium and nitrates). The extraction wells would capture the plume as defined by the 10,000 picoCuries per milliliter (pCi/mL) tritium contour (Figure 3) Groundwater modeling was used to determine optimal well locations and pumping rates. Unlike Alternative 2, the treated water would be injected into the shallow aquifer at tho upgradient extent of the plume. Meeting treatment standards provided in the RCRA permit in the injected water is the remedial goal of Phase 1.

Although tritium will not be removed from the groundwater, injection of the treated water will partially control the movement of tritium-contaminated water. Upgradient injection will lengthen the tritium flow path to the seep lines, allowing more time for tritium decay before the plume water discharges to the receiving stream. This will reduce tritium discharges to the onsite receiving surface stream.

Institutional and engineering controls, plus Iottg-term monitoring of groundwater, surface water, and ecological conditions would be part of Alternative 3. This alternative could be operational in accordance with the schedules in the SRS RCRA Permit, and it would have the highest costs of the three alternatives.


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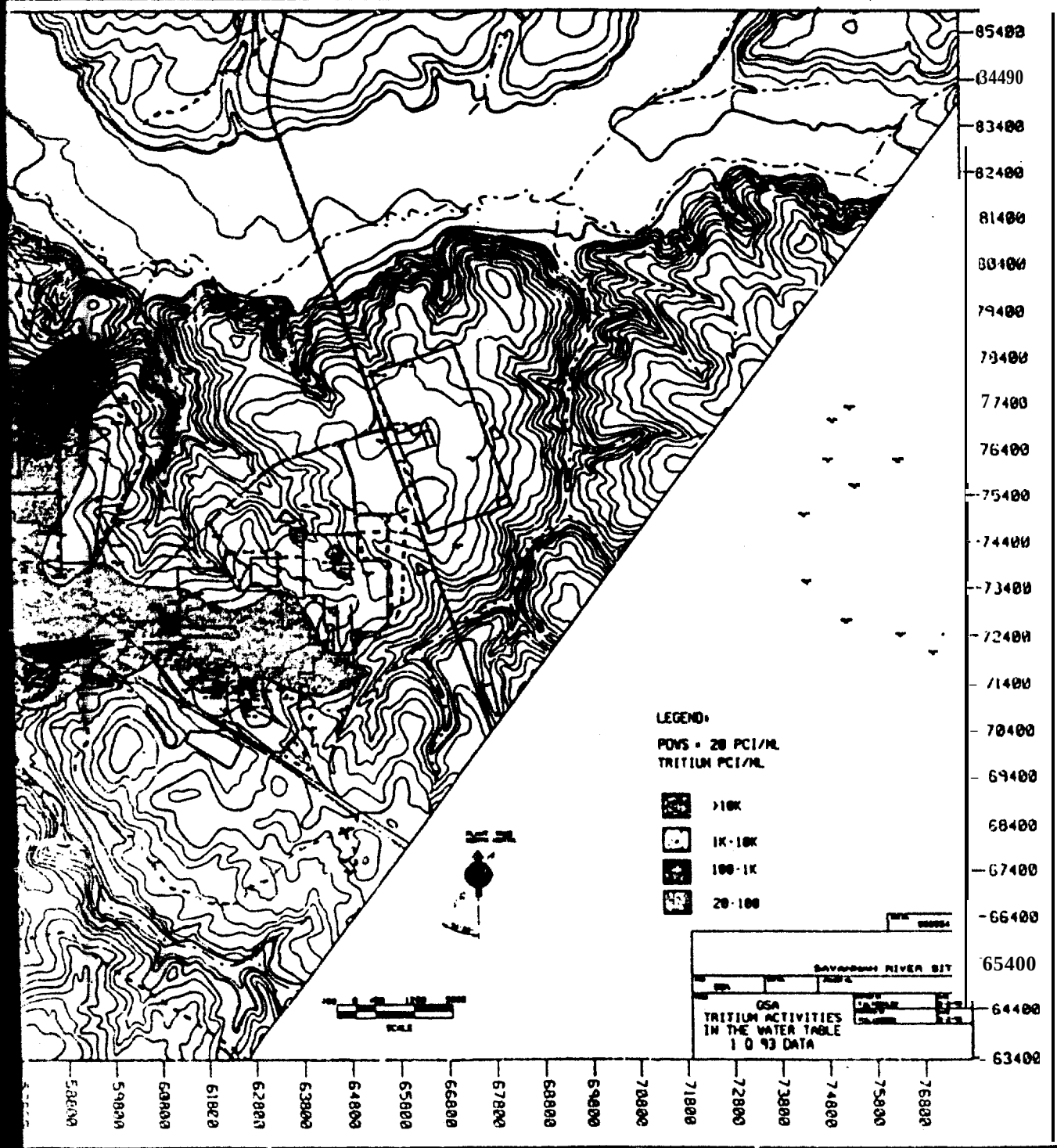

Fig. 3. Contaminant Plumes in Water Table Aquifer, F- and H-Area Groundwater Operable Units

Table 1. Applicable or Relevant and Appropriate Requirements (ARARs) and Guidance

Actions	Requirements	Prerequisites	Federal Citation	South Carolina Code of Laws
LOCATION - SPECIFIC				
Groundwater Remediation	Establish a *h.active* action rogram	Measurement of hazardous constituents in the groundwater which exceed established concentration limits. - Substantive requirements applicable	40 CFR 270.14 40 CFR 264.92-100	SC - R.61-79.270.14 Sc - R.61-79.264.92 -100 (Implemented by the SRS RCRA Permit)
CHEMICAL - SPECIFIC				
Protection of the general public 'mm all sources of radiation	The general public must not receive an effective dose equivalent dose equivalent greater than 100 mrem/year	Dose received by the general public from all sources of radiation exposure t a DOE facility - TBc guidance	DOE Order S400.5	
worker Protection	Maintain wo·ker exposures to "as low as reasonably achievable" (ALARA)	Internal and external sources of continuous exposure to occupational workers at a DOE facility - TBC Guidance	DOE Order 5480.1 I	
	Maximum exposure to occupational workers: 5 rem/year (stochastic); SO rem/year (nonstochastic) effective dose equivalent	Internal and external sources of continuous exposure to occupational workers at a DOE facility - TBC guidance	DOE Order 5480. I I	

Table L Applicable or Relevant and Appropriate Requirements (ARARs) and Guidance (Cont'd)

Actions	Requirements	Prerequisites	Federal Citation	South Carolina Code of Laws
ACTION- SPECIFIC				
Water Treatment	Discharge limits will be established in the permit	Discharge of regulated constituents in water - Substantive requirements applicable		SC - R.61-9
Stormwater discharge	Prepare a Notice of Intent in accordance with NPDES SC 1000000	Land Disturbance activities over 5 acres - Applicable		SC Pollution Control Act Title 48-1-10
Erosion Control	Develop a plan for erosion sediment cont.	Land disturbing activities - Applicable		SC 72-300
Well Construction	Construction by a certified driller is required	Drilling water wells - Applicable		SC R.61-71
	standards for construction, maintenance, and operation of all wells	Drilling Water wells - Applicable	40 CFR 144-147	SC R.61-71
	Standards for construction of injection wells	Construction injection well - Applicable		SC R.61-87.4
Discharge of treated water to groundwater	Injection of any waters to groundwaters of the State by means of an injection well is prohibited except as authorized by a Department permit or rule	Discharge to injection wells - Substantive requirements applicable		
Wastewater Treatment	state of S.C. requires a permit to build and a wastewater facility	Construction and operation of industrial wastewater treatment facility - Substantive requirements Applicable		S.C. Pollution Control Act Title 48-1-110

Table L Applicable or Relevant and Appropriate Requirements (ARARs) and Guidance (tint'd)

Actions	Requirements	Prerequisites	Federal Citation	South Carolina Code of Laws
Wastewater Treatment (cont'd)	A NESHAP evaluation to determine if source of radionuclide emission requires EPA approval	Radionuclides other than radon from DOE facilities (Air discharge may or may not be a part of the selected treatment process) - TBC Substantive requirements may be applicable	40 CFR 61.%	
Secondary Waste Disposal	Disposal in a low level waste disposal facility	Generation of Low Level radioactive secondary waste - TBC guidance	DOE Order 5820.2A	

Acronyms used in Table

TBC = to be considered
CFR = Code of Federal Regulations
DOE = Department of Energy
EPA = Environmental Protection Agency
NPDES = National Pollutant Discharge Elimination System
NESHAP = National Emissions Standards for Hazardous Air Pollutants
UIC = Underground Injection Control

VIII. Summary of Comparative Analysis of Alternatives

Each of the remedial alternatives was evaluated using nine criteria established by the National Contingency Plan. The criteria were derived from the statutory requirements of CERCLA, Section 121. The results of the evaluation are presented in Table 2.

Description of Nine Evaluation Criteria

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) - addresses whether a remedy will meet all of the ARARs of other federal and state environment statutes.

Overall Protection of Human Health and the Environment- addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.

Long-term Effectiveness and Permanence - refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Short-term Effectiveness - refers to the speed with which the remedy achieves protection, as well as&c potential for a remedy to create adverse effects on human health and the environment that may result during the construction *and* implementation period.

Reduction of Toxicity, Mobility or Volume Through Treatment - assesses reduction of toxicity, mobility, or volume through treatment, including how treatment is used to address the principal threats posed by a media-specific operable unit.

Implementability - assesses the technical and administrative feasibility of a remedy, including th.. availability of materials and services that maybe used to implement the chosen solution.

Cost - includes capital and operation and maintenance costs.

State Acceptance - indicates whether the state concurs with. opposes, or has no comment on the preferred alternative based cn its review of the proposed action.

Community Acceptance - will be assessed in the Record of Decision following a review of the public comments received on the proposed interim actions.

IX. Selected Remedy

The SRS RCRA permit is viewed as the pri:..., decision.mlcing ● rthority, Alternative 3 (groundwater recovery, treatment ● nd injection) is the corrective action described in the *1992* RCRA permit. This action has been determined to be protective of human health and the environment under CERCLA, and therefore, no additional corrective action under Phase 1 is necessary at this time.

Table 2. Evaluation of Alternative Actions Considered for Remediation of Groundwater Contamination.

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Pump-treat-discharge to stream	Alternative 3 Pump-treat-inject (RCRA permit)
Overall Protection of Human Health and the Environment	This alternative is the least protective of human health and the environment. If groundwater above the GWPS continues to seep along Fourmile Branch uncontrolled, then some measure of human and ecological impact may occur.	In the short term, this alternative will increase tritium flux to the Savannah River (levels will remain below DWS).	This alternative will minimize tritium discharge to the wetlands, streams, and ultimately to the Savannah River. This alternative is protective of human health and environment.
Compliance with ARARs	This alternative will not be in compliance with the Groundwater Protection Standards as contaminant concentrations in the groundwater and local onile surface water exceed primary drinking water standards.	This water treatment unit will be constructed in full compliance with wastewater treatment regulations. Treated groundwater will meet NPDES requirements and off-gas from the treatment unit will meet Clean Air Act regulations. Clean up goals for this alternative will be based on drinking water standards (with the exception of tritium).	The water treatment unit will be constructed in full compliance with wastewater treatment regulations. Treated groundwater will meet Underground Injection Control (UIC) permit requirements and off-gas from the treatment unit will meet Clean Air Act regulations. Clean up goats for this alternative will meet RCRA permit levels.
Long-term effectiveness and permanence	Adequacy of this alternative will be assessed by monitoring.	Contaminants (except tritium and nitrates) will be removed from the groundwater and disposed of in low level radioactive waste vaults at SRS. Residual risk is expected to be minimal. Adequacy of this remediation will be assessed by monitoring	Contaminants (except tritium and nitrates) will be removed from the groundwater and disposed of in low level radioactive waste vaults at SRS. Tritium discharge to surface water will be minimized. Residual risk is expected to be minimal. Adequacy of this remediation will be assessed by monitoring

Table 2. Evaluation of Alternative Actions Considered for Remediation of Groundwater Contamination. (coot%')

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Pump-treat-discharge to stream	Alternative 3 Pump-treat-inject (RCRA permit)
Reduction Of toxicity, mobility, a volume through treatment	None	Wata treatment process will remove contaminants (except tritium and nitrates) from the groundwater, reducing toxicity. Tritium release to surface water may be increased; however, tritium levels in the Savannah River will remain well below drinking water standards.	Water treatment process will remove contaminants (except tritium and nitrates) from the groundwater, reducing toxicity. Tritium release to surface water will be reduced by allowing a longer time fix radioactive decay of tritium before it discharges to surface water.
short-tam effectiveness	This alternative does not provide a short-term remedy for preventing discha ges of contaminated groundwater to wetlands, surface streams and ultimately the Savannah River.	Groundwater recovery and treatment will immediately reduce the amount Of contaminants (except tritium and nitrates) from discharging to wet'ands and streams. Tritium release to surface water will be increased; however, tritium levels *in the* Savannah River will remain well below drinking water standards. Since risks to the offsite population are minimal, no measures to protect the community will be required during remediation ● *nd* during the time period before remedial goats are met. Protection of workers will be required 10 eliminate risks associated with handling ● nd treatment of radioactive materials.	Groundwater recovery and treatment will immediately reduce the amount of contaminants from discharging to wetlands and streams. Tritium release to surface water will immediately be reduced by allowing a longer tires for radioactive decay of tritium before it discharges to surface water. Since risks to the offsite Population are minimal, no measures to protect the community will be required during remediation and during the time period before remedial goals arc met. Protection of workers will be required to eliminate risks associated with handling and treatment of radioactive materials.

Table 2 Evaluation of Alternative Actions Considered for Remediation of Groundwater Contamination. (cont'd)

Evaluation criteria	Alternative 1 No Action	Alternative 2 Pump-treat-discharge to stream	Alternative 3 Pump-treat-inject (RCRA permit)
Implementability	This alternative is already in place.	Water treatment processes to remove contaminants of concern (except tritium *and* nitrates) *arc* commercially available.	Water treat processes to remove contaminants of concern (except tritium and nitrates) arc commercially available. Technology to inject treated water into an aquifer exists; however, there may be operational problems with such a system. some development maybe required before the injection system design can be finalized.
(	Capital Cost = None Maintenance & Operation = Groundwater Monitoring and Repotting Costs	Capital Cost = approximately $16 million. Maintenance & Operation arc probably less than the preferred alternative because surface discharge is less expensive 10 operate than an injection field.	Capital cost= approximately S 16 million. Maintenance & Operation = estimated to be between S? and S3 million per year.
State Acceptance	During negotiations with regulators, it was indicated that this alternative would not be acceptable to SCDHEC.	During negotiations with regulators, it was indicated that this alternative would not be acceptable to SCDHEC because it would not minimize tritium discharge to surface waters.	This alternative has been accepted by SCDHEC. A RCRA permit requiring a corrective action plan for pump-treat-inject to remediate groundwater contamination has been issued.
Community Acceptance:	*This* criterion will be completed following public review.	This criterion will be completed following public review.	This criterion will be completed following public review.

X. Statutory Determination

The National Contingency Plan (40 CFR 300.430(0(9)) sets forth nine evaluation criteria that provide the basis for evaluating alternatives and subsequent selection of a remedy. The selected alternative, Alternative 3, was evaluated with respect to the five statutory findings, as required for interim actions under CERCLA. The results of the evaluation are as follows:

Protection of Human Health and the Environment. Alternative 3 will mitigate risks of exposure to contaminated surface water by minimizing discharge of contaminated groundwater to the adjacent wetlands and stream. In addition, removal of hazardous constituents and radionuclides (except tritium and nitrates) will reduce the future risk of exposure to contaminated groundwater by ingestion.

Attainment of ARARs. All ARARs, as identified in Table 1, pertaining to the treatment and disposal of contaminated groundwater and injection of treated water will be met by the proposed alternative.

Cosi *Effectiveness.* Alternative 3 has significantly higher operating and maintenance *costs* than the other alternatives, because the injection system is expected to be a long-term and high maintenance operation. However, operation *Of any* treatment facility which will handle radioactive materials will be costly.

Use of Treatment Technologies and Permanent Solutions to the Maximum Extent Practicable. The chemical *water* treatment, .ess represents utilization of treatment technologies to the maximum extent practicable. No practical treatment is ● vaildds for tritium.

Reduction of Mobility, Toxicity, and Volume. The *selected* alternative *utilizes* extraction and treatment of contaminated groundwater in a way that minimizes migration of conta.ninants to sunk waters and reduces the mass of contaminants in the plume. Hazardous constituents *and* radionuclides *removed* from the groundwater will be immobilized and deposed in permanent disp' sal vaults at SRS. The system will be designed to ensure that the secondary waste sludge will not be a hazardous waste.

XI. Explanation of Significant Changes

There were no significant changes.

APPENDIX A

References for Development of ROD Format

EPA, 1991. "Guide to Developing Superfund No Action, Interim Action, and Contingency Remedy RODs," OSWER Publication *9355.3* -02FS-3, U.S. Environmental Protection Agency, Washington, D.C., April 1991.

Weeks, Victor, 1993. "Regarding Records of Decision, F-Area and H-Area, Savannah River Site. Aiken, South Carolina", Letter to Goidell (DOE), Savannah River Site, Aiken, SC, April 14, 1993.

WSRC, 1992. "Draft RCRA Facility Investigation/Remedial Investigation Program Plan," WSRC-RP-89-994, Rev. 1, Chapter 15, Westinghouse Savannah River Company, Aiken, South Carolina, May 1992.

APPENDIX B

RESPONSIVENESS SUMMARY

During the 34 day public comment period, a request for a public meeting was received. The public meeting was held on January 9, 1995, in the North Augusta Community Center, North Augusta, South Carolina. The public comment period was extended an additional 30 days so that comments could be submitted.

DOE has received comments regarding the F&H Areas Groundwater Operable Units and they have been addressed in this Responsiveness Summary. These comments are available for review in the Administrative Record.

During the public comment period, several letters were submitted from individuals and groups regarding the proposed interim action. This Responsiveness Summary addresses the general comments and concerns from the public meeting and specifically addresses the written comments received. The summary is divided into three sections: 1) general responses to specific comments and questions raised during the public meeting, 2) responses to written comments received on questionnaires at the public meeting, and 3) specific responses to written comments received during the public comment period. Please note that some of the specific comments arc addressed in the general response section due to common questions and concerns.

Many of the comments that DOE has received relating to this type of project question the soundness of the planned remediation. DOE is required to continue the groundwater remediation project under the terms of the Resource Conservation and Recovery Act (RCRA) Hazardous Waste Permit that is issued by the State of South Carolina in conjunction with the United States Environmental Protection Agency (EPA). This permit sets forth all the requirements with which DOE is obligated to comply. Prior to issuance of the permit, the South Carolina Department of Health and Environmental Control (SCDHEC) issues a draft permit that is made available to the public and the DOE for *a 45 day* comment period. Any interested party can request a public hearing to discuss concerns regarding the conditions set forth in the draft permit. SCDHEC will evaluate these concerns prior to issuing a final hazardous waste permit. Many of the comments received arc in regards to the appropriateness of this corrective action. These comments will be addressed through the SCDHEC RCRA renewal permitting process during the *45 day* public comment period.

The following questions were extracted from the public meeting transcript and arc numbered sequentially for case of reference as they appeared in the transcript.

1. How does the cost effectiveness of this program relate to Grumbly's six gods?

   Response: Grumbly's six goals arc:

   - Eliminate and manage the urgent risks in our system
   - Emphasize health and safety for our workers and the public
   - Establish a system that is managerially *and* financially in control
   - Demonstrate tangible results "
   - Focus technology development efforts on identifying and overcoming obstacles to progress
   - Establish *a* stronger partnership between the DOE and its stakeholders

   These six Grumbly goals arc Department of Energy programmatic goals. In terms of these goals the F- and H-Area projects do not rate highly in terms of managing urgent risks. However, SRS

must work within the framework of existing laws and regulations in making decisions regarding the cleanup of F- and H-Area Groundwater Operable Units.

2. Provide scientific justification?

Response: As part of the development of the Corrective Action Program contained in the RCRA Part B HWMF Permit, 12/3/90, SRS evaluated several potential ground water remediation technologies for implementation at the F&H Seepage Basks. Based on a thorough evaluation of various treatment alternatives, which included evaluation of Treatment Effectiveness, Constituents Treated, Treatment of Seep Area, Regulatory Requirements, Implementation Schedule, Capital Cost, etc., SRS selected the ground water removal with the * treatment remediation alternative. Further studies were performed to evaluate the potential surface treatment technologies, and potential treated effluent discharge alternatives. A request for proposal has been sent out for bid 12/28/94. A commercially available water treatment unit will be selected based on technical evaluation of the vendor bids, cost, and the ability of the unit to meet or exceed the clean up levels.

Alternate remedial technologies have been evaluated as part of technology selection for the RCRA corrective action plan. Evaluation criteria included treatment effectiveness, feasibility, ability to satisfy regulatory requirements, and capital cost. Pump and treat was chosen largely because it is a developed technology for groundwater remediation. A demonstrated technology can be implemented more quickly (and usually mom inexpensively) than an innovative technology which would require extensive laboratory and fieldtesting prior to implementation.

Potentially applicable technologies which have been considered include immobilization techniques such as dap soil mixing and in-situ vitrification. Other potentially applicable technologies arc those which remove or immobilize contaminants in-situ (such as electrokinetic migration and magnetic separation.) Introduction of chemicals into the subsurface which would cause precipitation of contaminants or mobilize them for faster removal have also ban considered. All of these were eliminated from consideration because of the expense involved in development and testing of these technologies, and because of the uncertainty of their effectiveness.

3. How long will the process take?

Response: The duration of the entire remedial process has not yet been determined. The RCRA Part B permit application calls for remediation to be accomplished in phases. Phase 1 is expected to operate for five years. The effectiveness of the corrective action will be evaluated at the conclusion of Phase 1. At that time. a decision will be made whether to discontinue operation of the remedial system, to continue operation without modification, or to modify the system to enhance its performance in the next phase.

4. What kind of a standard arc you cleaning up 10? Residential or Industrial? Arc you cleaning up 10 a residential standard? If this is being cleaned up to an industrial standard, would this even have to be done? So the reason to do this is to reduce the levels in the GW and at the seepline to get it to a residential standard? And if wc were taking about ● n Industrial standard, it would strictly be for the tritium contamination. is that right? Discussion on land usc including if industrial use, a different standard should be applied Is that land use policy More you go in and spend money?

Response: The clean up levels, Groundwater Protection Standards (GWPS) arc based on drinking water standards and background levels. These values arc mandated by the RCRA permit and do not reflect either an industrial or residential standard as defined by EPA Risk Assessment Guidance for Superfund sites (RAG's). Residential standards *arc* considerably more stringent than the GWPS for some constituents and less restrictive for others. Industrial standards as defined by EPA guidance arc more restrictive than the GWPS for some constituents and less restrictive for others.

RCRA does not recognize any difference between residential and industrial scenarios. RCRA is a regulation that was developed to address mainly active, industrial sites--so there was not a need to make distinctions between residential and industrial for the regulated units under the RCRA permit.

5. Ability to Capture Contaminants? (referring to which COC's, ie. metals and radionuclides, will be cleaned up)

Response: The remedial system is being designed to extract contaminated water from the ground, treat it to remove hazardous constituents and radionuclides (except tritium and nitrates), and inject the treated water back into the shallow aquifers. In order to achieve ckan up goats, the contaminants must be captured bv the extraction well network Anv contaminants which :re in the water and are mobile are expected to be captured and treated by the pump and treat system.

Radionuclides and hazardous metals generally adsorb onto soil particles, which can inhibit their capture by ● pump and treat system. However, during operation, solutions with very low pH were placed in the basins. The low pH facilitated the movement of hazardous metals and radionuclides into the groundwater. Hazardous metals and radionuclides arc present in the groundwater downgradient of the basins, and in surface water at the seepline (wetlands), indicating that these constituents are in the water and arc mobile. Therefore, these constituents arc expected to be captured ● nd treated by the proposed corrective action whik the pH remains low in portions of the plume, However, the pH is expected to rise as the system begins to operate which will reduce the mobility of many of the m:tals and radionuclides

Evaluation of the corrective action will take place at the conclusic.n of Phase 1. Modification of the system to enhance capture of any contaminants which remain in the groundwater will bc considered at that time.

6. There is essentially no difference in the metals between the Four Mile Creek and the Savannah River?

Response: The levels of hazardous metals arc below primary drinking water standards in the Savannah River. Cadmium has ban measured above the primary drinking water standard in Four Mile Creek. Lead, cadmium and zinc exceed ambient water quality standards in Four Mile Creek.

7, When tritiated water is injected upgradient, how tong will it take to reach the surface water and at what rate will it be decaying? To what degree will the tritiated water reinjected upgradient decay") Dow have a model as to what degree the tritium will decay by the time it gels to the surface water'1 Can you supply how much tritium witt ultimately go into the creek?

Response: The pump-treat-injectsystem takes advantage of the short half life of tritium to minimize the migration of tritium from the F ● nd H Area seepage basin plumes to surface water and ultimately the Savannah River. Tne nstf life of tritium is 12.3 years. This means that every 12.3 years half of the tritium has decayed. Groundwater extracted ● t the downgradient edge of the plum will be treated to remove hazardous constituents and radionuclides except tritium and nitrates. The treated water wilt be injected into the shallow aquifer upgradient of the plume. Based on groundwater modeling contained in the 1992 Part B Permit Application, It is estimated that it will take 3-S years for injected water to travel back to the extraction network and bc recaptured and reinjected for another *3-5* year cycle.

This system will provide a measure of hydraulic control which wilt minimizetritium discharge to sdjacent wetlands. steams. and ultimately the Savannah River. The total estimated reduction in tritium discharged to surface water due to implementation of the proposed Phase I corrective action based on groundwater modeling is approximately *3000* curies. The total estimated tritium release

from F&H-to Fourmile Creek between the years of 1997 to 2027 is estimated to be 16,690 curies.

8. Describe the treatment system that takes place at the surface? Have you specified a particular treatment technology?

Response: The actual treatment process has not been determined. A commercially available water treatment unit will be used. A particular treatment technology has not been specified. Selection of the actual unit will be based on a technical evaluation of vendor bids and cost considerations. Technical evaluation will bc based on the ability of the unit to meet or exceed clean up levels. Performance specifications will require that any secondary waste generated will be nonhazardous. However, it will ultimately be up:0 the supplier to provide ● commercial treatment technology that will meet the water cleanup standards and the requirements of the specification. SRS has performed an evaluation of various treatment technologies, which included evaporation, reverse osmosis, ion exchange, chelation, and chemical precipitation.

9. Has the RFP gone out forbid?

Response: The RFP went out forbid on December 28,1994.

10. "Found tritium 1S00 feet down in wells in Georgia."

Response: The results of the tritium underflow study indicate that there is not any tritium migrating from the SRS to Georgia under the Savannah River. The tritium in the wells in Georgia was found to come from rainwater. The rainwater contained small amounts of tritium from atmospheric releases of tritium.

11. Will the drawdown and reinjection increase the migration? If so, how much? What effect will drawdown and migration have on migration of radionuclides and other chemicals in the soil? Will drawdown (and reinjection) increase the flow of nuclides mom so than if you had left it the way it is? Wilt drawdown increase rate of migration? soil effects? radionuclides?

Response: The extraction / injection system is designed to change the flow path and increase the migration rate of contaminated plume water. Flow towards the extraction wells wilt be increased by pumping and drawdown. This will enhance delivery of the contaminants to the treatment unit. It is not expected to increase migration of contamination towards surface waler or any environmental receptors.

The effect of pumping and drawdown on migration of radionuclides and chemicals in the soils is expected to bc minimal. In the saturated zone, the greatest fraction of contamination is thought to exist in the groundwater and is not expected to bc adsorbed onto saturated sediments. Any contamination which is bound to sludge and soils in the unsaturated zone at the waste sites has been isolated from the groundwater by source control measures. Low permeability caps provide source control by deflecting rainwater from infiltrating into the closed waste site and thus protecting against transportation of contaminants into the groundwater. Pumping and drawdown will have no direct effect on the unsaturated zone.

12. "...this IAPP position is very negative and very technically oriented and very difficult for the common person who does not work on the site to understand." "Why was Rev 1 (IAPP) so negative and difficult to read when Rev 0 was much easier?"

Response: SRS will attempt to make these type of documents easier 10 read in the future. It can be a difficult balance to insert the appropriate ● mount of technical discussion for the regulators and reviewers, and at the same time summarize the proposed action in clear and concise manner. The Rev 1 document incorporated DOE-HQ, EPA and SCDHEC comment,. Some of the comments requested incorporation of more technical discussion.

13. "...Public can influence the decision-making process.."

Response: EPA, SCDHEC and DOE encourage and support public participation in the environmental restoration process. Both RCRA and CERCLA require public review of the remediation decisions. These Proposed Plans document that the RCRA remedy chosen to remediate contaminated groundwater at F&H-Areas is protective of human health and the environment and meets the requirements of CERCLA. The RCRA decision had already been subject to the public review process and had been deemed acceptable. The public will be allowed another opportunity to provide comment in the RCRA process in the near future when the draft permit renewal is issued for public comment.

14. 'Why does the Bulletin indicate that our minds are made up for the selected alternative when the IAPP says 'he public will be given the opportunity to participate in the selection of the remedial action."

Response: The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) are the regulations implementing CERCLA. The NCP gives specific requirements for Acting a remedy for a site. After identifying the ● krnativc that&al reacts the requirements, the lead agency presents the alternative to the public. The proposed plan describes the remedial alternatives analyzed by the lead agency, presents a preferred remedial action alternative and summarizes the information relied upon to select the preferred alternative. The proposed plan is then made available to the pub. for review.

After review by the public the proposed plans arc then re-evaluated to see if the preferred alternative provides the best balance of trade-offs, factoring in any new information or public perspective The Bulletin identified the preferred remedy in the Proposed Plan and gave information about the public comment period.

15. "...thc only action is the onc done under RCRA 2 years ago or do wc have a right to say which alternative wc wish to have brought up before you folks.."

*...What makes me think that my opinion in the selection of the alternatives counts? Has anyone listened to what DOE is saying.?"

Response: The Proposed Plans for the F&H Groundwater Operable Unit state that no additional actions am necessary under CERCLA to address the contaminated groundwater. The R(XA actions arc independent and required by other permits. There were no additional remedial actions proposed for the F&H-Area Groundwater Operable Unit at the public meeting.

16. How was SRS scored for placement on the National Priority List?

Response: The SRS was placed otr the NPL December 21, 1989. SRS commented on the proposed listing to EPA during the allowable comment period. Specific comments regarding how the site was ranked arc not specifically relevant to these Proposed Plans. However, this information can be obtained from Region IV EPA.

17. The H-3 Basin does not fail under RCRA and it is atso the primary sours for the release of mercury, and this has not been addressed?

Response: Basin H-3 was not considered ● regulated unit under RCRA. However. the NCP gave EPA broad ● uthority to determine how best to use its ● uthorities under CERCLA, RCRA, or both to accomplish appropriate cleanup action ● t ● site, even where the site is listed *on* the NPL. When the site is an active. RCRA-permitted facility, EPA may consider whether the usc of RCRA or CERCLA authorities (or both) is most appropriate for the accomplishment of cleanup at the site. The cleanup plan would be discussed in the Inter Agency Agreement, or the Federal Facility

Agreement (FFA) at the SRS. The DOE, EPA and SCDHEC agreed that cleanup would be best accomplished by integrating it into the existing RCRA action. This not only accomplished it faster and cheaper, but allowed the entire complex to be closed and monitored as one unit.

18. The National Academy of Sciences finds pump and treat an incomplete remedial activity? What would it recommend 8s an alternative?

Response: The National Academy of Sciences (NAS) performed art extensive review of alternatives for groundwater cleanup, which included ● review of pump and treat systems, The NAS stated that based on a review of these systems, that the effectiveness of the pump and treat technology to restore contaminated aquifers seems quite limited and subsequently, this has kd to a widely held view that pump and treat systems should not be used for groundwater remediation. The conclusions of this report am based on a review by the NAS of only 77 sites utilizing the pump and treat technology. The NAS has indicated that there are greater than 3000 pump and treat units currently in operation. Based on a review of the 77 listed sites and their associated hazardous wastes, only 3 sites were identified to contain metals, and the remainder all contained primarily organic hazardous Wastes. consequently, the results reported certainly do not represent the overall effectiveness of the pump and treat technology for all hazardous waste streams. Although the pump and treat technology appears to be limited, the NAS identifies several factors to be considered in utilizing pump and treat as ● possible remediation method. The kcy technical masons for the difficulty of cleanup include the following

- Physical heterogencity: The subsurface environment is highly variable in its composition and contaminant migration 'pathways arc often extremely difficult to predict.
- Presence of nor 3qucoua-phase liquids (NAPL's): This includes many common contaminants like oil% gasoline% etc., that do not dissolve readily in waler.
- Migration of contamination to inaccessible regions: Contaminants migrate to inaccessible areas of the flowing groundwater.
- Sorption of contaminants to subsurface materials: Contaminants adhere to solid materials in the Subsurface.
- Difficulties in characterizing the subsurface: The subsurface cannot be viewed in its entirety *and* is usually onty viewed through a small number of drilled holes.

Based on a review of the above technical difficulties and the 77 sites reviewed by the NAS, which all contained primarily organic waste streams. it is apparent that the effectiveness of the pump and treat technology is very site specific. The difficulties noted above are not of major concern at the F&H Groundwater Operable Units, it., the subsurface environmental contaminated pathways have been extensively characterized, groundwater monitoring indicates no presence of NAPLs, the plumes exist in shallow easily accessible aquifer units. and studies indicate that sorption of contaminants to subsurface materials in minimal. Finally, the NAS provides several alternative technologies or "enhanced pump and treat systems", i.e. soil vapor extraction, bioremediation, air sparging, etc., and states that these methods. show promise, but they are in the development stage, and their long term effectiveness has nor yet been determined. These techniques are applicable to remediation of volatile organics (it. TCE. PCE), but arc not effective for cleaning up metals and radionuclides such as those that exist at F&H seepage basins.

19. How much will the proposed remediation cost? S270 million? Have any alternatives to reduce the operating cost by reducing the life cycle primarily been investigated as part of this? What technologies for reducing operating rests were looked at, if any, and at what point in the future operating scheme or phases is that expected to be dons?

Response: Tabk 2 in each of the interim Action Proposed Plans for F&H Areas addresses the estimated costs for each of the ● ltcnutit=. Alternative 3 (pump and treat system) capital costs are estimated at S16 million per area (S32 million combined) and the annual operating costs arc estimated at S2 million to S3 million pcr area ($4 million 10 S6 million combined), Phase 1 will

operate for 5 years. Capital costs and operation of Phase I are estimated at approximately *45 million* dollars. Future phases may incur additional coats. Total life cycle costs are dependent upon further evaluation of subsurface conditions and evaluations of the effects of pump and treat once the system is operational. Studies are underway across the DOE complex to identify and develop technologies which will enhance remediation and reduce life cycle costs.

20. "Did you purposely plan the public comment period over Christmas? Why was this meeting so hurriedly called?"

Response: The public comment period is always scheduled as soon as possible after concurrence of the Proposed Plans by the three agencies. The comment period is usually only 30 days and it was extended because of the holidays.

21. 'Now that we've had the request for 90 days, I'm sure the comment period will be extended."

Response: The public comment period was extended through February 15, 1995.

22. What ● mounts of heavy metals& nuclides arc reaching the surface waters and how much, what sort of level?

Response: In the report titled "Semi-Annual Sampling of Fourmile Branch and Its Seeplines in the F and H Areas of SRS: February 1993, July 1993, and April 1994," results from these sampling events suggest that the seeplines in both F and H Areas and FMB continue to be influenced by contaminants migrating from the F and H Area seepage Basins. The analytes exceeding groundwater protection standards or maximum concentration limits as indicated in this report arc shown below;

Analyte	FMB	F-Seep	H-Seep	Standard	Units
Gross Alpha	3	20	16	15	pci/l
Non-Vol. Beta	28	614	426	50	pci/l
Tritium	1070	2030	4470	20	pci/ml
Sr-90	10	227	80	8	pci/l
Ra-226	5	14	32	20	pci/l
1-129	2	2	9	1	pci/l
Cadmium	6	15	16	5	µg/l
Lead	3	3	3	15	µg/l
Iron	668	28.300	7570	300	µg/l
Aluminum	109	5650	90,000	50	µg/l
Manganese	41	2760	891	50	µg/l
Nitrate	2000	50,000	31,000	10000	µg/l
Zinc	21	12?	222	5000	µg/l

23. What contaminants exceed the ambient water quality standards that effect ecological issues?

Response: All analytes listed in the response to question #22 ● rc also listed as ecological chemicals of *concern. The metals that* have *exceeded the* Ambient Water Quality Criteria (AWQC) for there locations are Cadmium, Lead, and Zinc. The radionuclides listed do not have a corresponding AWQC standard.

24 Does water in the wetlands (seepline) exceed drinking water standards?

Response: See response to question #34.
Levels of radionuclides and hazardous metals have ban measured above primary drinking water standards at the seepline in both F and H Areas.

25. Explain gross alpha and gross beta measurements? p.70.

Response: The gross alpha measurement is representative of alpha emitting radionuclides (ie. Uranium, Plutonium), and the nonvolatile beta measurement is representative of the beta emitting radionuclides (ii. Strontium, Cesium). The EPA has set drinking water standards for these measurements, which are 15PM for gross alpha and 4 mrem (approximately SO pCi/l) for nonvolatile beta.

26. "Considering that treatment for this site has already progressed to the point where there's procurement underway, under the RCRA decision, what in reality does this process under CERCLA have to do with the ultimate treatment of the site?"

Response: To fulfill the requirements under the CERCLA process, the proposed plans state that no further action under CERCLA is required to protect the human health and the environment.

27. How come the six treatment alternatives weren't presented to the regulators? How come they are not in the public document?

Response: The six treatment alternatives were presented to EPA and SCDHEC in the Proposed Plans for F&H Areas Groundwater Operable Units, Revision O. During comment review and negotiations with the Regulators, it was determined that the alternatives that had been previously rejected should be removed.

28. "Are you familiar with the 11/8/94 Federal Register? Is it true that EPA is proposing to remove the current requirement for postclosure permits?"

Response: The proposed provisions actually expands the authority of EPA to mandate post-closure care requirements. The proposal would allow EPA or an authorized State to use any other available legal authority as an alternative to the post-closure permit, as long as that authority provides the same level of protection and public participation as does the post-closure permit. The EPA and States had found that for closed or closing facilities they had very little incentive to submit the post-closure care permit applications. They did not want or need a permit to operate. The proposed rule would allow EPA and authorized states to bring an uncooperative facility into compliance through an enforcement action. Facilities that need an operating permit such as SRS, would still have to obtain post-closure care permits for their closed RCRA facilities. This proposal does not change the requirements for corrective action.

29. Haven't you heard lately that everybody's budgets are being cut? Haven't you heard that DOE'S budget and that Secretary O'Leary as well as Mr. Grumbly are saying we want prioritization? What is the worst risk?

Response: We acknowledge budgets across the DOE complex will be reduced in the near term. SRS is no exception to the mandate from the Ministration and Congress to use fiscal responsibility in planning its work. As such, SRS is evaluating its programs from a total risk standpoint, rather than risk posed to human health and the environment as a sole consideration. The parameters being used to determine total risk include: 1) public health and safety. 2) environmental protection, 3) worker health and safety. 4) compliance with standards, 5) clean-up mission and business efficiency, 6) safeguards and security, 7) public and community relations, and 8) cost efficiency.

m. What about the GAO report (which criticized the progress of the DOE's cleanup programs and calls for consideration of alternatives such as creating a separate government cleanup commission)?

Response" The GAO Report, entitled Superfund, Stares. Cost. and Timeliness of Hazardous Waste Cleanups and dated September 1994 was a general report evaluating the Superfund program across the nation (including federal and private cleanups). This report noted that expenditures for the

Superfund program are higher than expected and that the actual number of sites deleted from the NPL remains small. Additionally, federal facility cleanup is slower than nonfederal facility cleanup. No reference could be found regarding creation/formation of a separate cleanup commission.

Another GAO report (GAO/RCED-95-66, Coordinating Activities Under RCRA and CERCLA, December 12, 1994), examined how DOE coordinated cleanup activities under RCRA and CERCLA and outlines some problems encountered to date with those coordination efforts. The report notes that DOE intends to issue guidance in the spring of 1995 to facilitate this coordination and develop, with EPA and state involvement, model interagency agreement language. Again, no reference regarding the creation/formation of a separate government cleanup commission was found in this report.

31. SCDHEC and EPA, are you aware of any time that you granted SRS authority to pump tritium into the streams at levels that exceed 10,000 pCi? How about ETF? Isn't that (32K Ci) significantly higher than the 10,000 we are supposedly treating? Tritium is the primary radionuclide in the effluent at the ETF and can not be separated and is currently being discharged to surface streams. what's the difference?

Response: In its implementing regulations (40 CFR 122 in particular), EFA refined the definition of "pollutant" to exclude radioactive materials regulated under the Atomic Energy Act of 19[illegible] (AEA). Currently all discharges of tritium into sitewide SRS stares are regulated by the Department of Energy in accordance with the ALARA program. This information is provided to EPA and SCDHEC in ar annual Environmental Report as well as in National Pollutant Discharge Elimination System (IIF#ES) permit applications. The levels of tritium discharged from the F/H Effluent Treatment Facility into Upper Three Runs Creek are 1-3% of the maximum allowable levels (it. 20 pci/ml), well within the safe levels for maintaining all applicable stream uses.

32. 'Arc we going to have another one of these meetings after you respond to the comments."

Response: Another meeting on the IAPP's is not currently planned.

Written comment received on questionnaire from the F&H Groundwater Public Meeting.

"There must be a better way to get public involvement than this kind of meeting."

Response: As part of the CERCLA process it is required to involve the public in selection, review, and comment of a proposed remedial action. This type of public meeting allows the public the opportunity to openly communicate their concerns, comments, and to go on record with any specific questions. Additionally, the public is given the opportunity to review and provide written comments on a proposed remedial action such as that contained in the F&H Groundwater Interim Action Proposed Plan documents. SRS would welcome suggestions from the public on how to possibly improve the Public Involvement - - - submit any suggestions to:

Mrs. Mary A. Flora
WSRC
1995 Centennial Avenue
, Aiken, SC 29$03

Written comment received on questionnaire rom the F&H Groundwater Public Meeting.

"What Is the impact off site if no action is taken? Quantify impacts if any against federal criteria *and actual risk to public compared to other* industries *along* river. Does *the risk justify cost?"*

Response: Environmental monitoring and n* assessment work indicate that there is minimal risk to the public if no corrective action is taken.

Letter #1 from Mr. Philip Brandt to the EPA

3325 Berkshire Circle
Johnson city, TN 37604
January 16, 1995

U. S. EPA Region IV
Attn: Jeff Crane
345 Courtland Street
Atlanta, Georgia 30365

Dear Mr. Crane:

A public meeting was held at North Augusta, South Carolina on January 9, 1995 On the Savannah River Site F&H Groundwater Proposed Plans. At that time I submitted written comments, however, due to time constraints those comments were incomplete. Attached please find a complete set of comments. Please disregard the original comments.

I am in the process of obtaining additional technical information relevant to the proposed alternative and request an extension of public comments for 90 days due to the time required to obtain information through the Freedom of Information process. In addition, I am requesting that a second public meeting be held after a formal response to all commentors have been completed.

If you need to speak with me directly you can call me at work (615), 734-9141 ext 1316 or home (615) 282-5239.

Sincerely,

Philip Brandt

COMMENTS
ON
F&H GROUNDWATER
PROPOSED **PLANS**

My name is Philip Brandt. X have ●BS in Wildlife and Fisheries Science ● nt three years of graduate study training in zoology and terrestrial ● colOgy. I have over 15 years experience in the regulatory and ● vironmantal field including six years at the SRS. Three of those years was spent working for ● consultant under contract to the DOE. During that time x provided expert ● nvironmental *regulatory* support to the DOE. My last three years at SRS, I was employed by the DOE as *Senior* Waste Management Specialist ● nd as Acting Branch Chief, Environmental *Restoration.* During my tenure there I was responsible *for* the RCRA Interim Status closure of the F and H Area Seepage basins and *S8* acres of the mixed waste burial ground. Since leaving DOE and the SRS I have continued my ● vironmntal career in the commercial sector and have continued to work with both hazardous and radioactive . contaminants. Most recently, I managed ● removal ● ction involving radioactive ● nd ! :ardous waste which resulted in a release *of* the property with *no* restrictions by the regulating agency. My areas of expertise include both RCRA and CERCLA.

Over the Christmas holidays I became ● ware of this public meeting and have driven over five hours to be here to present my comments. The direction the regulatory process has taken ● *rul* how the public is kept informed and involved, or more importantly not informed, is of ● great concern to me.

First I want to provide *c o m m e n t s on* the environmental facts *concerning* the Savannah River Site, the F and H area ● @@page Lasins and the proposed ● nvironmental remedy, facts which have not been properly identified or communicated to the public by the DOE or the regulatory agencies. At . issue is whether the *contaminated* groundwater from the seepage basins pose a threat to human health and the ● nvironment. This threat is ● xamined from the perspective of (1) impact on the Savannah River which is a recreation source in the area and a drinking water source for Beaufort, South Carolina and Savannah, Georgia, (2) impact to Four Mile Creek on the SRS reservation *into* which contaminated groundwater from the basins seep, (3) impact on wildlife ● nd vegetation along the area between Four Mile Creek and where contaminated water seeps onto the land, and (4) impacts on the groundwater ● nd its affects to both onsite and offsite users.

<u>Facts on F and H Area Seepage Basin Operations</u>

Wastewater flows from the F ● nd H Area Separations to the F and H-Area Seepage Basins ceased on November 7, 1988. 'Liquid ● ffluen that was discharged into the seepage basins is now processed at the H-Area Effluent Treatment Facility. Tritium is the primary

radionuclide in the ETF effluent. Because tritium is a hydrogen atom it cannot be separated from a water molecule which is made up of two hydrogen atoms and an oxygen atom. There is no known practical method for treating tritium contaminated water whether its ground water or surface water. Consequently, tritium is discharged along with the treated effluent into Upper Three Runs Creek under an NPDES permit. In 1989, the first year of full operation for the treatment facility, over 2,000 Curies of tritium were discharged to UpperThree Runs Creek (1). FACT: There is absolutely no difference in the health and environmental impacts from the tritium that is discharged from the permitted treatment facility and the tritium that seeps into the Four Mile creek. Unlike other radionuclides, tritium does not bioaccumulate in aquatic plant tissues or in the ecosystem. There is absolutely no documentation or research that tritiated water onsite has harmed or ever will harm land and aquatic plants and animals. The concern over tritium is the potential dose to people when tritiated water is used as a drinking water source.

Facts on Regulatory Authority Over Basin Closure and Ground Water Cleanup

Regulatory authority over the closure of the basins is fairly complex and is divided between the State of South Carolina and the EPA under two major laws, RCRA and CERCLA. The state enforces portions of RCRA and includes the regulation of contaminated groundwater from hazardous contaminants such as metals and organic chemicals. However, RCRA does not regulate radionuclides. Authority to regulate radionuclides comes under CERCLA which is administered by EPA. Basin M-3, which last received waste in 1962, is also regulated under CERCLA. RCRA was not enacted then and its rules cannot be applied retroactively. Consequently, any decisions made on groundwater cleanup actions for Basin H-3 fall under CERCLA regulations. Section 121(a) of CERCLA requires EPA to make certain remediation solutions are cost effective. The total" life cycle costs for this project exceed $270 million and will be demonstrated not to be cost effective (s). The State regulates other groundwater contaminants not included under RCRA such as nitrates (same as fertilizer) and sodium (same as salt). The State also sets and regulates water quality standards for surface streams. Streams on the SRS have the same water quality designation as does the Savannah River, Class B (7). This dual regulatory 'authority and who was going to be the lead agency was a source of problems in negotiating closure and post basin closure activities with the State and EPA when X was there five years ago. State's rights were a big issue and sometimes during negotiations I thought we had traveled back in time 134 years to Fort Sumter in Charlston, South Carolina.

After waste water discharges ceased in 1988, a formal permit under RCRA was agreed upon by all parties and physical closure activities begun. After inspection by an independent engineer, the State and EPA agreed and confirmed in 1991 that the basins had been closed based on the conditions of the RCRA permit. EPA reviewed the

closures and formally determined that the closures were protective of human health and the environment {10). How the ground water was to be treated was decided in a separate permit action from the closure action.

F and H Area Basin Ground Water Facts(7,8&9)

Simplified, there are three aquifers in the F and H seepage basin area. The shallow water table is characterized by low flow and is not used onsite or offsite for drinking water or irrigation purposes. Some of the monitoring wells are boated in perched aquifers which cannot provide a sustained yield of water. In other words, they would not support the water needs for a home. For example, the Federal home loan programs require that you have a well that provides a sustained yield of six gallons per minute. If you don't have a well that yields the minimum amount you will not get the loan. Water from the water table or shallow aquifer discharges into Four Mile Creek through a seep line near the creek. There is an aquitard that separates the shallow water table aquifer from the middle aquifer, - however, it is not complete and contaminated groundwater 180 moves from the shallow aquifer into the middle aquifer. Groundwater from the middle aquifer discharges several miles away into Upper Three Runs Creek which is also on the SRS. A second, more complete aquitard, exists between the middle and lower aquifer. This aquitard provides significant protection from the contaminated groundwater in the middle aquifer from entering the lowest aquifer. In addition, this lowest aquifer is under higher hydraulic pressure due to geologic conditions than the middle aquifer. This means that if the aquitard is breached the ground water will flow up towards the surface and not down. Ground water from the deepest aquifer discharges into the Savannah River. FACT: Geologically, water from the contaminated aquifers have not migrated into the groundwater beyond the site's boundary nor can it ever contaminate offsite groundwater aquifers because they all discharge into on site streams.

The primary ground water contaminants are radionuclides (principally tritium), nitrates, metals (principally cadmium in F-Area and mercury in H-Area), and sodium. Tritium, sodium, and nitrates are very mobile contaminants whereas metals will not move as fast through the ground water. For example, sodium concentration exceeding 200,000, ug/L were found. Other contaminants such as plutonium move very little, if at all.

With the closure of the basins, two major positive impacts to the ground water occurred: (1) a waste source comprising many millions of gallons of waste water was eliminated and (2) further movement of contaminants from the basins into the groundwater were virtually eliminated due to the clay cap constructed over the basins (the clay cap isolates the waste from coming into contact with rainwater that would have infiltrated the soil above the waste). FACT: Groundwater sampling from over 240 monitoring wells has confirmed that the water quality from the contaminated aquifers has improved dramatically and will continue to improve without any further

action regarding ground water treatment.

Surface Water Facts(7, 8, 49)

contaminated ground water from the ? and H area seepage basins discharge *into* Four Mile Crack a long a seep line. In 1993, the only radionuclides detected in Four Mile Creek were tritium and strontium. Estimated values have been reported for iodine 129 but I am personally aware that the source document used to develop the iodine inventory was of poor quality. The field work that resulted in quantifying the iodine inventory was superficial at beat. In addition, there was a calculation error in the reported inventory which results in an over estimate of the iodine 129 inventory. Strontium concentrations have bean declining every year since 1988 and decreased by 23% from 1992 to 1993 in the F area (394 mCi to 150 mCi) and 17% in the H area (78 mCi to 65 mCi). Based on measured inventory, tritium is the largest contributor *to the* creek. There is no known environmental impact to the environment that tritium at the existing concentrations can cause (for example, it has had no impact on plant or animal species diversity or abundance). Tritium migration or flux from the basins have also decreased dramatically since closure and capping. From 1992 to 1993 there has been a 49% decrease in the Curies of tritium seeping from the F basins. For the same time period there has been a 38 decrease from the H basins. This trend of improving water quality will continue without any additional action such as pump and treat with reinfection. In 1993 an estimated 2,180 Curies *of* tritium seeped from the F basins and 1,020 Curies from the H basins(1,2, and 3 only). Due *to* plume mingling it is not possible to differentiate tritium from H-4 and the nearby radioactive burial ground, 643G (a CERCLA site). However, it is projected that from 1994 on that 4,500 Curies of tritium, which represents two thirds of the tritium flux that maps into Four Mile Creek, will come from the old burial ground and not the seepage basins. By way 02 comparison, there were 11,300 Curies of tritium released in liquid form from all sources. Releases from the F and H seepage basins accounts for only 3,200 Curies *or* only 28% of the total. Liquid releases are completely dwarfed by air releases. In 1993, 191,000 Curies of tritium was released to the atmosphere which is sixty times *greater* than the release from the *F and H* basins and seventeen times greater than all liquid releases. Most *of the* tritium released to the atmosphere combines with water molecules in the air and returns to the surrounding areas both *on and* offsite in the form of rain or snow. This *phenomenon.* has *been* confirmed through the drilling and testing of groundwater wells and shallow springs *on the* Georgia side *of the* Savannah River where well water concentrations of 2,000 pCi/L have been found "and onsite where rainwater with tritium has been found in concentrations exceeding 42,000 pCi/L(over two times current drinking *water* standards). This tritiated rainwater either runs off to surface streams such as Four Mile Creek or becomes part of the groundwater on site, or under goes evapotranspiration. This is why you can find detectable, but acceptable, levels of tritium in drinking water supplies for cities such as Aiken, North Augusta, New Ellenton,

Jackson , and Augusta.

Water samples f ron Four Mile Creek, other surface streams on sits, and the Savannah River are routinely collected and analyzed. The Savannah River is an important recreational source and drinking water source *for* Beaufort, *South* Carolina and Savannah, Georgia. Radiological *contaminant* concentrations including such parameters as gross alpha and nonvolatile bats are the same ● bovm and below the SRS with two exceptions: *(1)* tritium and *(2)* cesium 137. Cesium is *not* released from the seepage basins. Tritium, some of which originates from the F and H area basins, is well below EPA ● stabZi8hod health based standards. If the tritium that originates from the F and H Area basins could be ● 2imimat8d completely (they *can 't)* there would be an insignificant change in the tritium concentration in the drinking water systems in Beaufort and Savannah. This is due to the ETF discharges (2,000 Curies in 1989) , iischgr ● from other seepage basins and the burial ground, and down wash. ng of tritiated rainwater from the over 190,000 Curies per year of tritium released to the atmosphere. The prestigious Academy *of* Natural Sciences of Philadelphia has monitored water quality on the Savannah River since 1951 and in 1990 conducted a special study on plant and animal life including sensitive indicator species. There was no difference in species richness or ab ·dance due to SRS activities and no detectable difference in water quality factors due to SRS ● ct$vitios that could affect the species richness and abundance. This documentation of no impact to the *Savannah River* over the past forty years is in spite of the feet that the discharge of radionu-elides and other contaminants were much higher in the past. In fact, the amount of tritium released to the river has been higher by ● factor of ten (approximately 1S0,000 Cur'es) in 1963. If the river or human health was being negatively impacted a marked improvement would have been observed due to the continuers and intensive monitoring *by* the Academy of Natural Sciences. The fact is no ● nvironmental impact has bean observed because there has baen *no* impact. Over thirty parameters ● ffecting stream water quality are routinely sampled on Four Mile Creek including organics, gross alpha/beta, nitrates, ● odium, and heavy metals. There is *no* difference in water quality for these parameters (samples taken from Road A and A7) when compared to the Savannah River ● xcept for tritium. The only measurable radionuclides discharging from the seep area are tritium and strontium. FACT: Tritium ● nd other contaminants released frcm th·. F and H Area seepage basins have no impact on human health or the ● vkommoat in the Savannah River or to ● 0UZGC8 down stream tnat use the Savannah River ● s ● drinking water source.

<u>Environmental and Health Risks from the F and H Area Seepage Basin Groundwater Facts (7, 8, &9)</u>

The EPA sets the drinking water standards for communities. Limits prescribed are conservatively derived i.e. they err on the ● M8 of over protecting individuals. For radioactivity in drinking water, EPA has determined that concentrations that provide ● dose cf

mrem per year is protective of human health and the environment. The maximum dose received by the public from drinking tritium contaminated water is 0.4 mrem (1% of the allowable dose) and 0.05 mrem *par year* (1.25* of the allowable dose) ● t Beaufort, South Carolina ● nd Port Wentworth, Georgia. This is in contrast to water wells in Georgia that have tritium concentrations that are 10% of the allowable limits (the source of which tritium released from ● *ir* emission sources on the site which are in turn ovar sixty times greater *than that* released from the F and H area seepage basins. These doses measurements are based on a tritium limit of 20,000 pCi/L and will decrease by ● factor of three when the proposed limits of 60,900 pCi/L are implemented by EPA. Cesium, which doss not originate groin the F and H basins, is found in the water system but it too is ● l- v*11 below ● ll-ab3e drinking water standards. In summary, there is no unacceptable human health or environmental risk to the Savannah River as ● drinking water supply. If the F and H area seepage basin radionuclide contribution to the Savannah River was completely removed there would be an insignif icant change in the radiounuclide due to other regulated emissions and discharges from the SRS. There is no unacceptable human health or environmental *risk to* the onsite workers. Over 20,000 personnel work onsite on a regular basis. There are twenty seven onsite drinking water systems, some of which have been in operation since plant startup. Over 1,400 samples for chemical analysis were perf ormed in 1993 and all systems met EPA's primary health based standards. In *other words,* the personnel onsite use drinking water taken from the same ● quifars onsite that ● apposedly are in danger of being contaminated and have dons so for over forty years while meeting all drinking water standards established by EPA and SCDHEC. . Even under worst case conditions, where a theoretical "Bubba" spent most of his time living on the site boundary swimming, water ski ing, hunting and fishing, drinking water *from* the Savannah River, eating contaminated fish and wildlife, could only receive an . estimated 0.25 mrem par year dose. If someone would pay me to live - this life style I'll do it. This way the site could collect real data and I could then justify why I wear white socks. This 0.25 mrem per year dose compares to an average dose of 300 mrem per year from natural causes. In other words, if the SRS could crease emitting all radioactivity (it can't) people would still be ● xposad *to over* 99.92% of the radiation that they are currently being exposed to. A measure of the risk 0.2S mram/year presents is provided through the loss of life expectancy (LLE) calculation. LLE is the average amount by which one's life is shortened by the risk under consideration. ror example, being overweight reduces your life expectancy one month for each pound you are over weight. Unless I lose weight I have shortened my life by over three years. Being poor and/or unskilled reduces your life expectancy from semi-skilled, clerical/sales people by 2,4 years and an ● ddit$ona? 1.5 years when compared to professional/managerial personnel. The LLE for a *person* in Harrisburg, Pennsylvania from the Three Mile Island nuclear power reactor was 1.5 minutes. The LLE for 0.25 mrem/year is functionally equivalent to ● regular smoker smoking on. extra cigarette ● *vary* fifteen years or an over weight person like myself increasing my weight by eight tenths of an ounce, about half a

candy bar.

Environmental damage is typically determined through a decline in the number plant/animal species and the abundance or total numbers of plants and animals. The only environmental damage noted has been some very minor vegetative stress along the seep line between where the basins seep into Four Mile Creek. The source of the vegetation stress is not known. However, it is highly likely that the stress is due to elevated soil/water concentrations of aluminum, *sodium*, and nitrates and *not* radionuclides or heavy metals. What is important is that since the basins were closed the vegetation has begun to recover and continues to recover. It is also *important* to note that the *plant and animal* populations along Four Mile Creek are not unique and do not support any threatened or endangered species. With the exception of very localized areas described above, the plant and animal species and populations along Four Mile Creek, are both diverse and abundant which is indicative of a healthy ecosystem. .

FACT: There has been no significant impact to the environment in the vicinity of the F and H seepage basins. What damage that has been noted **is recovering naturally. Water quality in Four Mile Creek continues to improve. There is no difference in species richness *or* abundance above and below the seep areas or in Four Mile *Creek.***

Proposed Mitigation (Pump/Treat/Reinject) Facts (5, 10)

The SCDHEC and the *EPA are* requiring the DOE install a series of interceptor groundwater wells, pump clown the aquifer, treat the water, and reinject the treated groundwater upgradient to the basins. SCDHEC requires that rein jected groundwater meeting drinking water standards before it is reinject. They both admit that tritium cannot be removed from the *treated* water, therof or it cannot meet drinking water standards, but will be rein jected anyway. Nitrates, which also exceed drinking water standards, will be reinfected without treatment even though treatment technology exists for nitrates.

Normally under RCRA, regulated contaminants must be cleaned up to drinking *water* standards. Under specified conditions, a variance is allowed called an Alternate Concentration Limit. ACL's are known when the hazardous constituents (not radionuclides-they 're regulated under CERCLA) are not capable *of* posing a substantial threat currently or a potential hazard to human health and the *environment in the* future. DOE pursued this approach as was prepared to evaluate in the field some innovative technologies but was denied the ACL. Consequently, DOE was required to implement ground water cleanup. One of the treatment options rejected was to install the pumping wells, pump to a collection/treatment tank, adjust the pH, and discharge the water to the Savannah River under

a NPDES permit. This approach meets all regulatory requirements under RCRA for treatment and discharge. However, SCDHEC and the EPA required that a more expensive treatment system be implemented and the water reinjected. The purpose for the reinjection is to allow for the natural decay of tritium. However, as pointed out before there is *no* health or environmental risk for discharging the tritiated water or for allowing it to continue to seep out. In fact, a technical evaluation (5) conducted by DOE's office of Environmental Restoration (EM-40) concluded that after 2005 (ten years) there would be no difference in the off site tritium flux to the Savannah River whether the corrective action was implemented or not (8*8 previously discussed facts). DOE estimates (1993) that $12.6 million has already been spent on this project with an estimated $24 million budgeted for %994/199S and an estimated life cycle cost of $270 million.

The proposed ground water treatment may in fact cause additional problems. In response to questions at the public meeting on January 9, 1994, Ms. Kathy Lewis indicated they will not be able to intercept or control the contaminant plumes in their entirety nor can they guarantee that relatively immobile contaminants that don't presently show up in Four Mile Creek, such as plutonium, will be mobilized.

FACT: Reinjection to control tritium flux is a fallacious argument by SCDHEC and EPA. Tritium ground Water contamination in the contaminated aquifer= baa improved dramatically over the past six gears and will continue to improve. Tritium, because of its half life of 12.3 years, will continue to be removed permanent ly through decay. In 24.6 years 75% of the existing tritium inventory will permanently "go away" through radioactive decay. Of fsite and onsite drinking water quality are already protected with no further action, that is, without having to.spend over a quarter of a billion dollars.

The proposed action has a high probability of failure and does not address one of dominant ground water contaminants, nitrates. Under the proposed remedy, the major contaminants (tritium, nitrates) will *not be* treated. Minor contaminants such as mercury and cadmium are in most cases just slightly above drinking water standards. The *National* Academy of Science has recently reviewed pump and treat technology (1). Their Conclusion is that remediation by pump and treat is a slow process which can easily take tens, hundreds, or thousands of years. and that the ability to restore *contaminated* groundwater to drinking water *standards* is uncertain at many sits. According to the NAS, geologic factors and the contaminants may make restoring contaminated ground water to drinking water standards technically infeasible. In addition, in public documents EPA has acknowledged "some ground water contaminant cannot ha completely cleanad, no matter how long we pump and treat". As of 1990, based *upon research* performed by the Oak Ridge National Laboratory (3), there has been no documented case where a single aquifer in the United States has been confirmed to have been successfully restored through pumping and treating.

There is already onsite, documented evidence that pump/treat cannot restore an aquifer to drinking water standards. Ground water cleanup of organics using pump and treat has been ongoing since 1985 in the M-Area. There is no technically competent person onsite (or offsite) that will state or predict that the aquifer in the M-Area will be restored to drinking water standards for organics using pump and treat only.

DOE's Office of Environmental Restoration (EM-40) recognizes the futility of the F and H Area pump and treat systems. DOE identified all proposed pump and treat projects *within* the complex and categorized them into three categories: (1) technically sound and reduces *risk to the* public, (2) limited risk reduction to the public, and (3) little or no risk reduction and may be technically unsound. The proposed pump and treat system for the F and H seepage basins falls into category three, "No measurable risk" with a recommended path forward to "negotiate with regulators for combined institutional control and innovative technology demonstration". This approach has been rejected by the regulators. It is most important to note that in *12.3* years of institutional control, half of the tritium decays away, in 24.6 years 75% - *without taking into account* any 1088 *of* tritium through seepage.

Comments and Questions

In order for the public to fully understand the impact, *or* lack of impact, to the environment please provide the following information in your response to my questions. What has been the water quality trends over the last six years on Four Mile Creek at sampling stations 1B, 1C, 28, 2, 3A, 3, 6, and A7 while describing the source terms that contribute to the contaminants? What data indicates that the contribution of hazardous substances to Four Mile Creek, including radionuclides, will increase over time with no further action. Over thirty water quality parameters are sampled routinely. Identify those parameters that *do* not meet SCDHEC water quality standards for Class B streams on a consistent basis (50% of the time or more). For noncompliant parameters provide documentation that the impact is due to releases from the seepage basins, that is there is a significant difference between upgradient and downgradient values from the F and H area basin seep lines along Four Mile Creek. Provide documentation that the flora and fauna on Four Mile Creek downgradient from the seepage basin are significantly different based on species diversity and abundance. Provide similar documentation for the area between the seep line and Four Mile Creek. Provide a map shoving the ecotypes and acreage along the Four Mile Creek and calculate the acreage and percent of the total ecotype harmed by discharge from the basins. Provide documentation on the presence and/or bioaccumulation of all those contaminant found in wells above drinking water standards in the water, flora and fauna from the seep line to Four Mile Creek and along Four Mile Creek (for example, gross alpha/beta, heavy metals, transuranics, etc.)? Finally, tritium production is currently at an all time low. However, at some future *time* tritium production may have to increase. Please document the maximum

allowable trj tium emissions from air sources and the H Area Effluent Treatment Facility and compare then to current discharges to Four Mile Creek from the F and H area ● 8epago basins (excluding the contribution from the old burial ground) and in 22.3 years (assuming no seepage from the basins). Numerous wells in the F and H area seepage basins are poor quality, 10V yield yields from parched water tables. How many of the water table wells provide less than ● ix gallons per minute continuous yield. that is , are unsuitable for home use as a drinking water ● mxrce? What is the water quality for these wells? How many of these wells do not yield enough water to provide ● representative sample (minimum of three casing volumes) ? How many of the wells evidence faulty well installation? Does SCDHEC and EPA require the ● am* ground water protection *for* perched water tables which are unsuitable for a drinking water ● UPPIY system as for legitimate ● q'df ers? Provide documentation on the level of contamination that is discharged from the Congaree aquif *u to* Upper Three *Runs* Creek. Provide similar documentation for the deeper aquifer that discharges into the Savannah River. Finally, provide trend data over the past six years for those RCRA contaminants and radionuclides that ● ro discharged to *Four Xii.* Creek on select but key downgradient groundwater wells far the shallow water table and Congeree aquifers. As ● comparison, include upgradient wells particularly , those that show contamination from the old burial ground. Discuss and comment on whether the data trends support an improving or deteriorating groundwater quality. Provide the same information for nitrates and sodium. If the water quality is *improving* ● nd there is *no* longer ● source term recharging the basins does the risk of contamination of the deepest ● quif ● r increase *or* decrease? Simi larly, for the Congaree does the risk of contaminated discharge to the Upper Three Runs Creek increase *or decrease? Numerous* wells have *been* identified where gross alpha and nonvolatile beta are above drinking water standards and/or drinking water ● tandardm for other radionuclides are exceeded based on ● maximum dose. Radiological dose is baaed on an ● v u a g e dose - not ● single maximum datum point. What has been the average gross alpha and beta values? Is the data normally distributed or is a geometric mean more representative? If the geometric mean is more representative, is It ● bove the established standard?

The EPA has determined that capping is protective of human health and the e nvironment capping. Is capping and institutional control an ● llowable remedial alternative* under CERCLA? Since implementation of capping, groundwater has improved dramatically thus decreasing future risk to human health ● *nd* tha.environment through institutional control. What period of institutional control was considered by SCDHEC/EPA in ● valuating the *no* action alternative under CERCLA. If it wasn't ● valuated why not? As ● means for comparing the effectiveness *of* pump and treat onsite as a viable technology, how long will it take the existing pump and treat system to clean up the ground water in the M-Area to drinking water standards and ● t what cost?

SCDHEC requires that ground water used in the reinjection wells

meat drinking water standards . How can SCDHEC ● now tritiated groundwater that is 1, 000 times drinking water standards be reinjected. How can it ● lbw nitrates that are 10-100 drinking water standards be reinjected when treatment technology exists to treat nitrates.

Pumped water can simply be adjusted for low pH and discharged to the Savannah River *meeting* ● U health and safety requirements of *both* EPA and S DHEC ● *t* signif icant cost savings over the required remedy. What is SCDHEC's and EPA's justification, under RCRA, for *not* requiring the most cost effective remedy which meets ● l l drinking and ● rface water quality standards?

The remedial action for H area includes Basin H-3. This ● it= is a CERCLA site and *not* ● RCRA site. Based *on* groundwater monitoring data it alro the primary source of the metal contaminants down gradient from the basin complex. Under what authority was this site included under the RCRA regulations and where was the public input. Why isn't this site considered separately?

A different environmental remedy for the same site can be arrived at under CERCLA versus RCRA. In fact, the DOE ● -ttal tc SCDHEC and EPA *for* the proposed remedy under CERCLA is that no ● ction be taken (10) . Wh.. has been SCDHEC's and EPA's response to DOE's proposed remedy under CERCLA of no further ● *otion (Rev. O,* Proposed Plan for F and H Area Groundwater Operable Units). What was your basis for rej ● cting the proposal, particularly for basin H-3 which is not regulated under RCRA.

The risk assessment process used is *f* lawed. Proposed ' tritium standards *are* three times higher *than* current standards. When performing *your* risk assessments you used proposed concentration 1 imi ts when they were higher than ● xisting limits. However, in the case of tritium you used the existing limits when proposed limits are over three times higher. There is *no* rational basis for ignoring nitrates in the risk assessment process *nor* is there any health/ environmental bread reason for pumping/treating and recirculating the tritium plume to maintain a *20,000* pCi/mL contour. *If* you ● re not maintaining the drinking water standard isopleth then 200, 000 pCi/mL or current levels are as ● gually valid as the 20,000 pCi/ml isopleth for tritium. Why weren't the proposed tritium standards used (60,900 pCi/L)?

The State and the EPA have specific areas of regulatory authority. The State does not regulate ground water contaminated by radionuclides. Does SCDHEC claim regulatory authority over radionuclides? Under what ● uthortty and has the Federal government given up its sovereign immunity?

Besides t h e DOE SRS, SCDHEC regulates municipalities, private businesses, ● nd other State end Federal ● genchs. For example, there is tritium contaminated groundvater ● t the ● djacent Chem Nuclear facility in Barnwell. Municipalities frequently fail to meet solid waste and groundwater requirements. Federal military

bases have a variety of environmenta1 problems. Does the DOE SRS receive equal treatment under the law relative to enforcement or fines? What other facilities ● ro being required to pump/treat ● nd rein ject ● s ● remedial ● ct$on? How many are ● llowed to reinject contaminated water above drinking water standards? What concentrations? How many ACL's have been granted by SCDHEC in the last five years? How many by EPA Region IV in past five years? Given the number of approvals, are ACL's in *f* ● *ct* ● viable alternative to restoring aquifers to drinking water standards? How many pump and treat actions of similar scope in South Carolina have resulted in the return of the Contaminated aquif●r to drinking water standards?

Regulatory oversite by SCDHEC ● *t* SRS is funded *by* ● grant from DOE. How many municipalities, private industries, arid other government agencies fund their own regulatory oversight? How does SCDHEC avoid a *conflict* of interest , that is , the more remedial actions required the higher the *funding* level for SCDHEC?

As ● xpensive and futile ● s the proposed remedy is there was another solution which met the requirements under RCRA, complied with all other ● nvironmental laws, presented so signif icant risk, and was a lot cheaper. The remedy is *to pump* the ● hallow ● quifsr, ● djust *for* Ph , and discharge to the Savannah River. Has the SCDHEC/EPA required municipalities, private businessses, or other State/government agencies in South Carolina to implement the most expensive ground water treatment option when ● second, less costly alternative would meet all of the State ● nd EPA requirements for protection of human health and the environment? Would the State be w i lling to pay the incremental cost between the two options? Under the law, can the EPA war conclude under CERCLA that no further act ion was required where RCRA requires that ● remedial action be implemented? Has the DOE been asked/requested/pressured to include the CERCLA site, 643G (Old Burial Ground) , under RCRA? What has been DOE's response? If yes, what was the justification?

SUMMARY AND CONCLUSIONS

Due to the holidays I was unable to obtain additional data supporting the position that no further *action* is required. consequently, I have asked that comments be held open for an ● dditional 90 days (given the lengthy time required to obtain documents under the Freedom of Information Act) and that ● second public meeting be held so that ● ll questions can be addressed.

I have polled friends ● nd family in the Aiken, South Carolina ● raa. When I describe what is being proposed and how ● uch it will cost they are dumb founded. They have seen the public notices *regarding* these activities but they do not highlight the facts I have included nor do they ● ddrqs the questions I have posed *nor do* they make the public aware of the costs. Ian ● ppallsd, ● t the lack of ● ff8ctive public communication.

I will be forwarding my comments to my Congressiona 1

representatives from Tennessee. Copies will also be sent to Senator Strom Thurmond and the Governor of South Carolina. Incumbents were removed from office because of governmental actions such as this and new people elected to make government accountable. This process reminds me of the EPA proposed action for the ski resort town in Colorado which has lead contaminated soil from a mining operation in the 1800's. EPA's remedy was to dig up four feet of the town and backfill with clean dirt. It wasn't until after several years of arguing with the residents that they finally looked at lead blood levels in children and found that they were below the national average. The selected remedial action is still being disputed. Signs have been posted in the town by the residents - the stake holders those who are impacted by the site the most - for or EPA to 90-8. This type of action at SRS does not enhance a person's belief or confidence that the regulators are here to help you. The proposed remedy at SRS appears to be along the same line as the Colorado incident. However, this is just the first of many ground water remedial actions that will be implemented by SCDHEC and EPA and SRS. In other words, the quarter of a billion dollar is just a down payment. Wasteful expenditures on this 80818? without a real benefit or enhancement of the environment or human health, undermines and distorts the productivity of our economy. I'm hopeful that during a time of huge Federal deficits I will get a $i audience with the new Congress as they seek methods to cut the Federal budget and make government accountable. One method is to have Congress withhold funding for this activity. Under the Federal Facility Agreement, the DOE can only be held accountable for activities that are funded. I will also be encouraging my Congressional representatives not to support DOE funding in general for projects of this type. A quarter of a billion dollars could achieve measurable, quantifiable improvements to human health and the environment through a myriad of other programs such as education, job training, weight reduction programs, etc. It won't achieve measurable, quantifiable improvements to human health and the environment through the proposed remedial action of pump, treat, and reinject.

Finally, I would like to address the issue of effective public participation, or lack of it, in the decision, making process for selecting environmental remedies. It is not working and the response is narrowly orchestrated by such groups as the Energy Research Foundation and the NRDC who don't speak for the general public in the area. For example, how many comments were received from the public on the F and H Area post closure permit. How many of those originated from the ED?, other special interest grps and their members, other regulatory agencies, and how many originated from the public in general from the Aiken, Barnwell, and Allendale area? I had hopes that the Citizens Advisory Board would have addressed the issue of expensive remediation without environmental benefit but it appears that they too are unsuccessful in identifying and effectively communicating the concept of risk and the cost of cleanup to the public. I understand; however, there has been some lively discussion between some members over who gets reimbursed for meals. Is a possible reason for this immutable wall

of silence that key Citizens Advisory Board chairs dealing with risk assessment are held by ERF personnel?

I have a great faith in the American public. Give them the facts and they will make the right decisions. Simplify the regulatory mumbo jumbo and put in a context that the public understands. I believe once the citizens of the area understand what is really happening to them, the right decision will be reached and it won't involve squandering a quarter of a billion dollars.

REFERENCES

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3. Curtis C. Travis and Carolyn A. Doty, Can Contaminated Aquifers at Superfund Sites Be Remediated, *24* Environmental Science and Technology 1465, 1990

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5. Groundwater Pump-And-Treat Activities, Office of Environmental Restoration (EM-40), August, 1993

6. Proposed Plan for F and H Areas Groundwater Operable Unit, Rev.0, November, 1993

7. *Savannah* River Site Environmental Report for *1990*

8. Savannah River Site Environmental Report for 1992

9. Savannah River Site Environmental Report for 1993

10. Savannah River Site Interim Actions Proposed Plans for the F- and H-Areas Groundwater Operable Units, November, 1994

Groundwate
Pump-And-Trea
Activities

Office of Environmenta
Restoration (EM-40,

August 199
Final Dra

United States Department of Energy

United States Government | Department of Energy

memorandum

DATE:

REPLY TO ATTN OF: EM-42 (J. Fiore, 903-8141)

SUBJECT: Ground-water Pump-and-Treat Notebook

TO: R. ?. Whitfield, EM-40
J. Baubl itz, EM-40
R. Lightner, EM-45
W. Wisenbaker, EM-43
S. Mann, EM-44

I am pleased to forward the attached notebook on ground-water pump-and-treat activities managed by the Office of Environmental Restoration (EM-40). The *notebook* has *boos* compiled as a result of data collected to support ● July 2S, 1993, senior managers' review panel which met to critique all of EM-40's pump-and-treat projects.

The ● ffort which went into collectine and presentine data for the senior manager's review ~~ovided an opportunity for an in-depth study or type of remedi ● tfom activ..y common to all areas managed by EM-40. Please identify what, if any, actions you would like relative to keeping this book up to date.

James J. Fiore
Director
Office of Eastern Area Programs "
Office of Environmental Restoration

Att achment

cc:
K. Larson, EM-45
J. Lehr, EM-44
U. Murphie, EM-42
C." Turf, EM-43

Background

- IRB briefing identified pump-and-treat systems not cost effective for protection of human health and safety.
- EM-40 was tasked to review all pump-rind-treat projects to determine their contribution to off-site risk reduction.
- 25 projects identified across EM-40.
- Senior Manager's review panel met on July 25, 1993 to critique all 25 projects.
- Identified:
  - Three Category A projects - Technically sound; reduces risk to public health & safety;
  - Sixteen Category B projects - Limited risk reduction to public health & safety: and,
  - Six Category C projects - Little or no risk reduction to public health& safety; may not be technically sound.
- Category C projects are proposed for potential "Push Back."

Results From Review Board

- Six Category C projects:
  - o Two in the Eastern Area:
    - ■ General Separations Area (includes F&H) at Savannah River; and,
    - m TNX Area at Savannah River.
  - o One in the Northwest Area:
    - • Lawrence Livermore National Laboratory, Main Site. .
  - o* Three in the Southwest Am:
    - m South Valley in Albuquerque, NM;
    - ■ UMTRA site in Monument Valley, AZ; and,
    - m UMTRA sites at Tuba City, AZ.
- Two "low end" Category B projects:
  - 0 Site 300, Eastern General Services Area, Lawrence Livermore National Laboratory;
  - o Groundwater Treatment & Monitoring, Kansas City Plant

Results From Review Board

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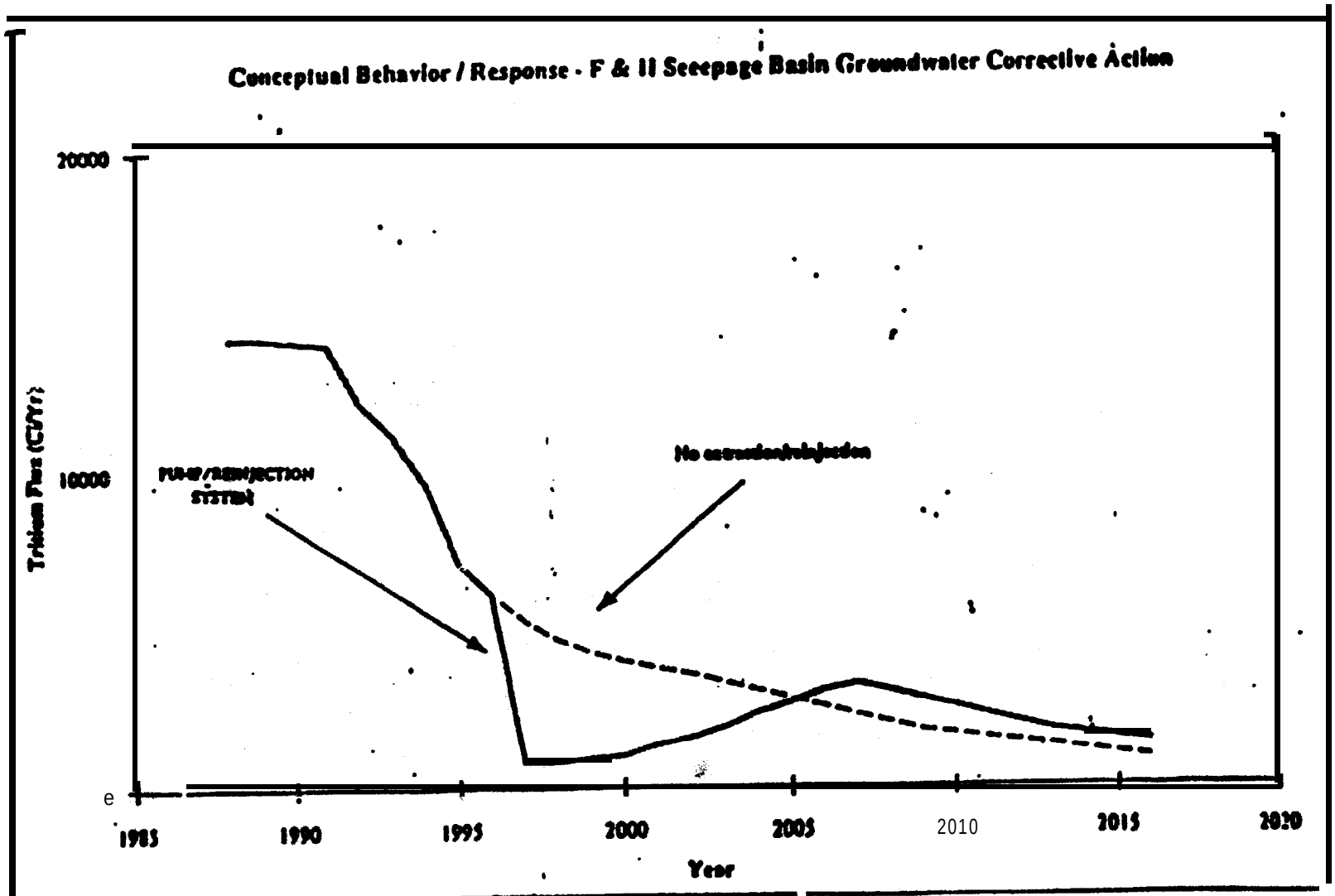
    - UMTRA sites at Tuba City, AZ.
- Two "low end" Category B projects:
  - Site 300, Eastern General Services Area, Lawrence Livermore National Laboratory;
  - Groundwater Treatment & Monitoring, Kansas City Plant

PUMP AND TREAT WORK SHEET

ADS: SR-515	Project: General Separations Area	Location: Savannah River	Office: EM-422

Purpose of Pump & Treat	Cleanup of contaminated GW.
Groundwater Treatment	Currently proposed is neutralization, settling, filtration ● nd reinjection of the ● uent as well as air stripping with catalytic oxidation off-gas.
Principal Contaminant[s)	Tritium; Trichloroethylene (TCE); lead: mercury; radionuclide metals
Other Contaminant(s)	Nitrate
Baseline Risk	1 X 10^{-7}
Post-Action Risk	No measurable risk reduction off-site
Amount of Water Contaminated (gal)	> 100 million
Pumping Rate (gal/day)	500,000 (347 gpm)
Estimated Initial Wires of Principal Contaminant [lbs]	Further characterization required
Estimated Removed Mass (to date) of Principal Contaminants(s) [lbs]	None - Corrective action not yet underway
Cost of Construction ($M)	$37.2 "- -
Cost of Operation ($M)	$186.0
Other Cost ($M)	$228.0
Start Date (FY)	1992
Completion Date (FY)	2040
Legal Driver	SCHW Part B permit issued in 1992 requires F&H CAP (Ott 1993);MWMF CAP (Nov 1993) par Settlement Agreement
Other Pertinent Information "	FY 9S Cost - ~~$12.3~~ 20 million Total Cost - $700 million Pump-and-Treat Operational in FY 97 Category C


Conceptual Behavior / Response - F & H Seepage Basin Groundwater Corrective Action
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TRITIUM MIGRATION IN GROUNDWATER

Refer to figure titled: Conceptual Behavior/Response of Tritium during F & H Groundwater Remediation.)

- **Concentration of Tritium in 1990 was at 15,000 Ci/yr..**
- **Concentration of Tritium in 1997 would be at 6,000 Ci/Yr with no action**
- **Concentration of Tritium would decrease rapidly with pump and treat, but would surpass the no action level in 2005 due to reinsertion.**
- **In the long run (2015) Tritium concentration levels would be the same with or without pump and treat**

[SRS Data, 1994]. Like tritium migration, strontium migration is expected to continue to decline from these closed seepage basins.

In 1993, no cesium-137 migration was detected from the F-Area or H-Area seepage basins. However, 160 mCi (5.9E+09 Bq) of cesium-137 were detected at the sampling location near the Four Mile Creek mouth over and above the 246 mCi (9.1E+09 Bq) cesium-137 detected in direct process discharges. This additional cesium-137 is attributed to desorption of past cesium releases from the stream bed.

An estimated 22 mCi (8.2E+08 Bq) of iodine-129 were projected to have migrated from the F-Area and H-Area seepage basins during 1993. Because iodine-129 emits very low energy beta/gamma radiation, it cannot be detected—using common radioanalytical methods—in dilute streams. However, as releases of other radionuclides from SRS continue to decrease, the percentage of the maximum individual off-site dose attributed to iodine-129, which has a long half-life of 1.57E+07 years, is likely to increase in future years. Therefore, beginning in 1994, the SRTC environmental laboratory, which has the sensitive instrumentation capable of detecting iodine-129, will be analyzing for iodine-129 in the F-Area and H-Area seepage basin migration samples.

Migration of Radioactivity from P-Area, C-Area, and L-Area Seepage Basins Liquid purges from the P-Area, L-Area, and C-Area disassembly basins have been released periodically to their respective seepage basins since 1978. Purge water is released to the seepage basins to allow a significant part of the tritium to decay before the water outcrops to surface streams and flows into the Savannah River. The delaying action of the basins reduces the dose that users of water from downriver water treatment plants receive from SRS tritium releases. The seepage basins were used for purging the disassembly basins from the 1950s until 1970, but disassembly basin purge water was released directly to SRS streams between 1970 and 1978. The earlier experience with seepage basins indicated that the extent of radioactive decay during the holdup was sufficient to recommend that the basins be used again in P-Area, L-Area, and C-Area. However, because these reactor areas have been shut down, no purges to the basins occurred during 1993.

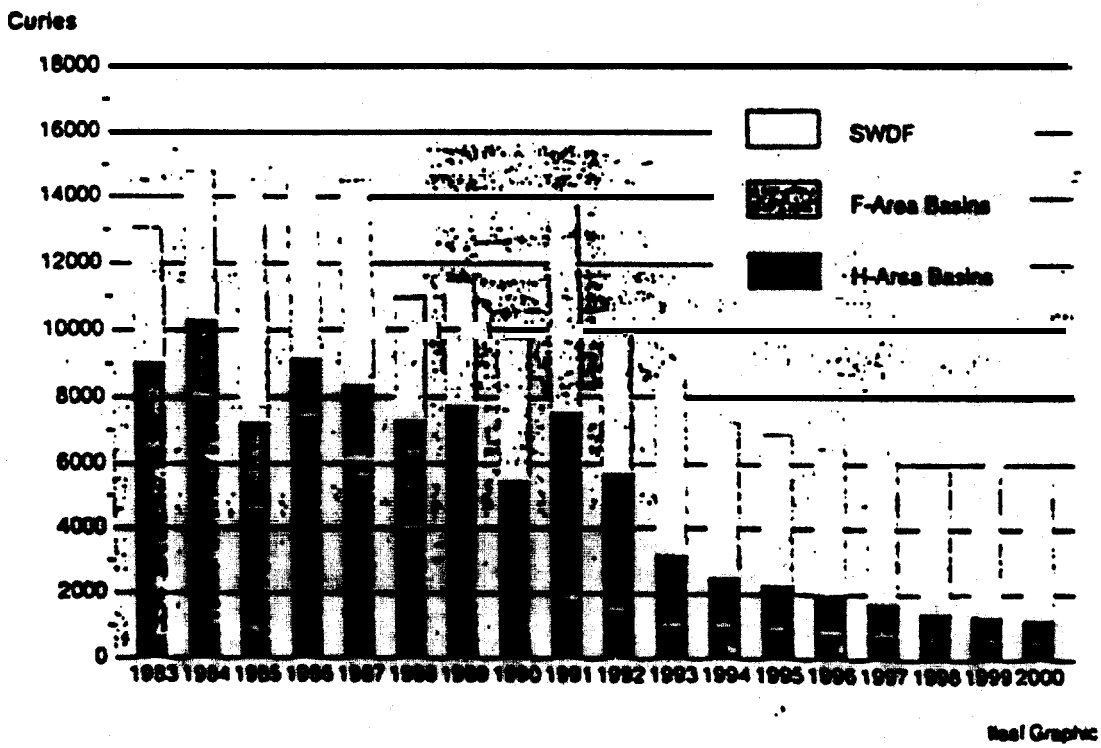

Figure 5-6 Past, Current, and Projected Tritium Migration Releases to Four Mile Creek from the F-Area and H-Area Seepage Basins and SWDF.

Letter #2 from Mr. Philip Brandt to the EPA

3325 Berkshire Circle
Johnson City, TN 37604
February 15, 1995

EPA Region IV
Attn: Jeff Crane
345 Courtland Street
Atlanta, GA 30365

Dear Mr. Crane:

Attached please find additional comments on the proposed F&H Groundwater Remediation.

Sincerely,

Philip Brandt

ADDITIONAL COMMENTS TO THE PROPOSED F&H GROUNDWATER REMEDIATION

1. During the extended comment period, I was able to ascertain that the NPDES permitted F&H Area Effluent Treatment Facility (ETF) is allowed to discharge to onsite surface streams up to 30,000 Curies of tritium per year. Will the regulators explain to the public the difference in potential environmental impact from the permitted discharge of 30,000 Curies of tritium and the estimated (1993) 3,200 Curies of tritium seeping from the F&H Seepage Basins and the estimated (1993) 12,200 Curies of tritium released to the Savannah River from all sources (discharge and all seepage basins)? If there is documented environmental harm from 3,200 Curies of tritium discharging to a surface stream then how can 30,000 Curies be allowed to discharge to a surface stream? If the RCRA decision making process selected determined that pump/treat/reinjection was the lowest risk option how can you justify or allow a potential 30,000 Curies of tritium be released to a surface stream?

2. The costliest and technologically weakest option, pump/treat and reinject, was selected under RCRA in 1992. At the public meeting held in North Augusta, South Carolina on January 9, 1995, the question was asked why wasn't pump/treat and discharge to a surface stream or Savannah River selected since it was (a) much cheaper and (b) met all regulatory requirements. The response was that there was concern over increasing the tritium dose to down stream users. Under a no action alternative and a pump/treat and discharge alternative wouldn't the drinking water standards of downstream water users be met? Aren't the EPA regulations

governing drinking water standards protective of the human health and the environment? On a relative risk basis, isn't there more risk from a 30,000 Curie tritium discharge than the 3,200 Curies from the F&H Area Seepage Basins? What is the legal basis for requiring the additional expenditures for remedial actions that are more protective to human health and the environment than required by statute particularly when the environmental threat is only 10% of that from the F&H ETF?

3. The 1992 RCRA permit required that groundwater be treated to the 10,000 pCi/L isopleth line. Based on the data I have received, which is two years old, the water quality has improved so dramatically that the proposed interceptor wells are already at or below the 10,000 pCi/L isopleth line in the F Basin area and rapidly approaching it at the H Basin area. In the H Area, Basin H-3 is the most significant contributor to groundwater contamination. What is the basis for now continuing with the pump/treat/reinject system when the groundwater quality has already improved and continues to improve beyond what was required in the RCRA permit? What is the basis for ignoring Basin H-3 under CERCLA in the remedial selection process when RCRA does not apply to it and it is the principal source term for groundwater degradation?

4. Given the dramatic and continuing improvement in the quality of the groundwater, it appears in retrospect that the State of South Carolina and the EPA used either (a) overly conservative risk assumptions in their analysis of remedial options or (b) made some sort of grievous error. The F&H Part B permit is up for renewal in March of 1995. Now that this "new" data is available which directly contradicts the conclusions and assumptions originally used and the RCRA permit is so close to renewal, shouldn't the remedial alternative selected be re-evaluated to reflect reality? Given the timing of the RCRA permit renewal, shouldn't this re-evaluation be coordinated and integrated with the CERCLA public participation process? The overly conservative assumptions used were justification for rejecting DOE's Alternate Concentration Limit submittal. Shouldn't the ACL application be revisited based on the "new" data? Doesn't this "new" data completely and significantly change the risk conclusions reached in the earlier RCRA permit? Aren't we all seeking to find the least cost option that is protective of human health and the environment?

5. At the public meeting on January 9, 1995, the EPA Region IV representative stated that the SRS was placed on the National Priorities List (the EPA list of the worst sites that are or present a threat to human health and the environment) and that she personally knew that the offsite drinking water risk alone was sufficient justification for placing SRS on the NPL. Can the EPA explain how an offsite drinking water dose that is only 1% of EPAs allowable drinking water standards qualify it for inclusion on the NPL? The EPA establishes radionuclide limits for drinking water that are protective of human health and the environment. Can the EPA explain how 30,000 Curies of tritium potentially discharged

from the F&H Area ETP can be legally allowable under an NPDES permit whereas a 12,200 Curie discharge (from all sources) is justification for placing the site on the list of the worst environmental sites in the country? I hope in the EPA response to this question that the EPA is astute enough to recognise there is sufficient real data to demonstrate that there is no credible mechanism for concluding that there is a measurable off site chemical or radiological risk other than tritium.

6. I have never been involved in a CERCLA public meeting in which the selected remedy has been presented in such a circuitous manner. Ostensibly, the public meeting was held to see if there were any comments as to whether additional treatment was required above and beyond pump/treat and reinject. Has the NEPA process been subverted? Weren't alternatives, including a no action alternative, considered? Where has the public been involved in the CERCLA review process in the selection of the remedial alternative? As part of the NEPA process, a Citizens Advisory Board (CAB) was created to obtain representative comments from the affected communities. The Co-Chair, Mr. W. F. Lawless, of the Environmental Restoration Subcommittee of the CAB indicated that they had serious concerns over the proposed remedy i.e "no scientific justification" to support the choice. Mr. Lawless stated that the proposed remedy will be the subject of the CABs March meeting and requested an extension on public comments until after their meeting. Isn't it reasonable to extend the comment period so that the citizens group created under the CERCLA process can respond to and participate in the CERCLA decision making process? I request an even further extension since a draft RCRA permit is expected to be available from SCDHEC by March 1, 1995. The public will then have a 45 day comment period based on the latest facts. The environmental data clearly indicate improving water quality and that small, localized areas of stressed vegetation are coming back so there is no environmental harm in waiting. By postponing the CERCLA decision making process a more reasoned and logical conclusion can be arrived at, one that may be equally protective of human health and the environment but costs much less than a quarter of a billion dollars. What is the reason or basis for the State and EPA to reach a conclusion so quickly given the timing of the RCRA permit renewal and the concerns raised by the CAB? Do individuals at the state or Federal level receive any sort of merit award for the number of RODs completed? Is there a statutory requirement that requires the ROD to be completed within a certain time?

7. Would the State of South Carolina please explain to the public at what point in the geohydrological cycle that precipitation becomes waters of the state? Is it when it infiltrates the soil but prior to evapotranspiration? Is it after evapotranspiration? Does it include all soil water? Does it include near surface groundwater that discharges to surface streams? Are all shallow groundwaters considered waters of the state regardless of sustained yield and water quality parameters? If the answer to the last question is yes, is the State consistently enforcing the regulations to agricultural users, municipalities, other industrial

entities, and the general public? For example, is there equal enforcement in the protection of waters of the state to rural, private residences that utilize septic systems with leach fields or the farmer that utilizes compost and/or animal manure for fertilizer?

8. There have been recent, significant reductions in funding through out the DOE complex. Funding for environmental restoration has been cut. There is not enough funding to support all the currently identified environmental restoration activities. There are sites within the complex that do propose a real or potential threat to human health and the environment. If DOE prioritizes how the funding is distributed and there is not sufficient funding to support continuing the F&H groundwater remediation, what will be the State of South Carolina and EPA's response? From a chemical and radiological perspective there are a number of sites at SRS that should be "ahead of" sites like the F&H Basins and other sites such as the TNX basins. How about the old R Reactor disassembly basins whose water levels rise and fall with changes in the ground water table. What is the radiological water quality in those basins? Can you document that there aren't any source terms in the sediments and sludges in the bottom of the basin? What radionuclides and what are their concentrations along the canal system and intervaning ponds that discharged contaminated water from the reactors to the Parr Pond? What steps are being taken to prevent biological uptake and concentration in the flora and fauna in these areas?

9. The Energy Research Foundation in their January 31, 1995 response stated that the public has "had ample opportunity for input". Technically, I would have to agree with the statement that the requirements of the law regarding public comment have been complied with. However, has the intent of the law been complied with? How successful have you been in communicating the intent of your actions. At any time was the public informed in plain English as to how much the clean up would cost or that the contamination could never contaminate offsite groundwater? Exactly how many response were there from the stakeholders around SRS in Aiken, Jackson, Barnwell, etc. to the F&H groundwater permit? Considering the population base for that area does any one believe that there was a significant public response? I strongly disagree with the ERF statement "the evidence of the spread of contamination and its measurable impact on affected surface waters is a sound and compelling basis for the remedial action". What Class 3 water parameters were exceeded in Four Mile Creek and for the ones exceeded which showed a significant difference upgradient and down gradient from the seepage basins? Valid, scientific data supports the position that no further action is justified. The ERF believes that CERCLA should simply validate a prescriptive solution under RCRA. Does the ERF also believe that the CAB should have no input under CERCLA when the Environmental Restoration Subcommittee also questions the proposed remedy? Does the ERF also believe that there should be no meaningful CERCLA evaluation for Basin H-3 which is not a RCRA regulated unit? I would say to the ERF that the

intent of RCRA and CERCLA is to protect human health and t
environment and that sometimes this can occur under a no furth
action scenario. I would counter argue that it is entire
appropriate to challenge under CERCLA a bad decision arrived und
RCRA due to procedural requirements. By illuminating su
differences, may be at some point in the future we can inject so
common sense and reality into the remedial process instead
needlessly wasting resources on "improvements" in environment
quality that exist only on paper and benefit absolutely no one.

Response: Several of the comments identified in Mr. Brandt's letters have been previously addressed as part of the comment responses prepared for comments summarized from the public meeting transcript, and therefore, are not repeated. The following responses are provided for comments that have not been previously addressed and are numbered in order as they were extracted from the letters. The numbering sequence does not correspond to the question numbers that appear in letter #2.

1. What has been the water quality trends over the last six years on FMC at sampling stations 1B, 1C, 2B, 2, 3A, 3, 6, and A7 while describing the source terms that contribute to the contaminants? What data indicates that the contribution of hazardous substances to FMC, including radionuclides, will increase over time with no further action? Discuss and comment on whether the data trends support an improving or deteriorating groundwater quality? Does the risk of contamination of the deepest aquifer and discharge to Upper Three Runs Creek increase or decrease?

   Response: In the most recent report "Semi-Annual Sampling of Fourmile Branch and Its Seeplines in the F and H Areas of SRS: February 1993, July 1993, and April 1994", a summary of the water quality is provided in the introduction section with a comparison of analytes detected in 1989 samples. It is stated in this report and the 1993 Environmental Report that the sources contributing to these contaminants are the F&H Seepage Basins. There is no data that indicates that the radionuclides will increase over time with no further action.

   Levels of tritium in the groundwater plumes have been generally decreasing since use of the basins for disposal of wastewater was discontinued in 1988. Construction of the low permeability caps over the basins has served to control any further migration of contaminants to the groundwater. These source control measures have resulted in decreasing the risk of contamination to the deeper aquifer and Upper Three Runs Creek. However, levels of contaminants in the groundwater continue to be measured at levels which exceed primary drinking water standards.

2. Numerous wells in the F&H area seepage basins are poor quality low yields from perched water tables. How many of the water table wells provide less than six gallons per minute continuous yield, that is are unsuitable for home use 8s a drinking water source? What is the water quality for these wells? How many of these wells do not yield enough water to provide a representative sample (minim- of three casing volumes)? How many of the wells evidence faulty well installation? Does SCDHEC and EPA require the same groundwater protection for perched water tables which are unsuitable for ● drinking water supply system as for legitimate aquifers?

   Response: Wells at the F and H Area seepage basins have been installed to provide representative samples from the aquifer units that they monitor. No perched water zones are monitored. Low yield is not an indication of an inadequate monitoring well. Many of the wells monitor zones that have a high percentage of clays and fine grained materials. In some locations the water tabk surface is very close to the underlying confining unit; this results in a very thin water table aquifer. Wells in these zones (high clay content and thin water table) tend to produce a low yield. This is in contrast to wells which are installed to provide water fos domestic usc, which are specifically designed to extract water from thick units of coarse grained materials in order to ensure a high yield.

   The integrity of the monitoring network is evaluated regularly, and corrective actions m taken to repair and/or replace any wells which do nut provide representative samples or show evidence of faulty hardware or construction.

3. Provide documentation on the level of contamination that is discharged from the Congaree aquifer to Upper Three Rtms Creek? Provide *similar* documentation for the deeper aquifer that discharges into the Savannah River?

Response: Environmental monitoring indicates that contamination which is discharged to Upper Three Runs Creek and to the Savannah River from deeper aquifers is negligible.

4. The EPA has determined that capping is protective of human health and the environment. Is capping with institutional control M allowable remedial alternative under CERCLA? Since implementation of capping, groundwater has improved dramatically thus decreasing future risk to human health and the environment through institutional control. What period of institutional control was considered by SCDHEC/EPA in evaluating the no action alternative under CERCLA?

Response: A future land use policy for the Savannah River Site is currently being prepared. Until future land usc issues arc resolved and a policy is implemented, institutional control cannot be considered as ● remedial alternative under CERCLA.

5. SCDHEC requires that groundwater used in the reinjection wells mctt drinking water standards. How can SCDHEC allow tritiated groundwater that is 1000 times drinking water standards to be reinjected? How can it allow nitrates that arc 10-100 times drinking water standards to be reinjected when treatment technology exists to treat nitrates?

Response: Injection of water which contains tritium and nitrate in levels which exceed drinking water standards can be allowed in the context of this RCRA corrective action because overall groundwater quality in the aquifer will be improved.

6. Pumped water can simply be adjusted for low pH and discharged to the Savannah River meeting all health and safety requirements of both EPA and SCDHEC at significant cost savings over the required remedy. W iat is SCDHEC's and EPA's justification under RCRA for not requiring tha most cost effective remedy which meets all drinking and surf' water quality standards?

Response: It would not be acceptable to extract contaminated groundwater that is currently not used as a drinking water source and to only adjust for low pH and then discharge it to the Savannah River. One of the remedial alternatives considered for the F and H Seepage basins was to extract groundwater and pump it directly to the Savannah River with minimal treatment. It was estimated that levels in the Savannah River would remain below drinking water standards if this alternative were implemented. However, this alternative was not selected. It seemed to be counter intuitive to pump contaminated water out of the ground where it is relatively isolated from environmental receptors and place it directly in the Savannah River which serves as ● public drinking water source.

7. A different environmental remedy for the same site can be arrived at under CERCLA versus RCRA. In fact, the DOE submittal to SCDHEC and EPA for the proposed remedy under CERCLA is that no action be taken: What has been SCDHEC's and EPA's response to DOE's proposed remedy under CERCLA of no further action (Rev, 0, Proposed Plan for F and H Area Groundwater Operable Unit). What was your basis for rejecting the proposal, particularly for basin H-3 which is not regulated under RCRA.

Response: DOE is subject to the Federal Facility Agreement which mandates that all RCRA regulated units should be addressed under RCRA and then reviewed under CERCLA to determine if additional action is necessary to protect human health and the environment. (Reference comment response number 17 in the genera! response section)

8. The risk assessment process used is flawed. Proposed tritium standards ● rc three times higher current standards. When performing your risk assessmc nt you used proposed concentration limits wkn they were higher than existing limits. However, in the ass of tritium you used the existing limits *when* proposed limits ● rc over three times higher, There is no rational basis for ignoring nitrates in the risk assessment process nor is there any health/environmental based 'men for pdmping/treating and recirculating the tritium plume to maintain a 20,000 pCi/mL contour. If you

are not maintaining the drinking water standard isopleth then 200,000 pCi/mL or current levels arc 8s equally valid as the 20,000 pCi/ml isopleth for tritium. Why weren't the proposed tritium standards used (60.900 pCi/L)?

Response: *Quantitative Risk Assessment based on the most current data has not been performed.* Risk assessment work performed to evaluate the potential risk associated with groundwater contamination at the F and H Area Seepage Basins is based on an extensive list of hazardous and radioactive constituents. The primary drinking water standard for tritium (whether proposed or current) is not a significant factor in the estimation of risk.

9. The state and EPA have specific areas of regulatory authority. The state does not regulate groundwater contaminated by radionuclides. Does SCDHEC claim regulatory authority over radionuclides? Under what authority and has the Federal government given ttp its sovereign immunity?

Response: SRS signed a Memorandum of Agreement on April 8,1985, agreeing to comply with the substantive requirements of the South Carolina Pollution Control Act (PCA); the South Carolina Hazardous waste Management Act (SCHWMA) and regulations promulgated thereunder. The definition of pollutants under the PCA can be interpreted to include radionuclides. In addition, to the above, SRS entered into a Settlement Agreement (87-27-SW), as amended on June 14, 1989, in which DOE agreed to address the hazardous constituent contaminants in the groundwater as defined by RCRA as well as groundwater contamition by other constituents such as nitrates and radionuclides as defined by the SC PCA. These actions were taken as a matter of comity rather than as a waiver of sovereign immunity.

10. Besides the DOE SRS, SCDHEC regulates municipalities, private businesses, and other State and Federal agencies. Does the DOE SRS receive equal treatment under the law relative to enforcement or fines? What other facilities are being required to pump/treat and reinject as a remedial action? How many are allowed to reinject contaminated water above drinking water standards? How many ACL's have been granted by SCDHEC in the last five years?

Response: SRS receives equal treatment under the law as compared to other industrial and governmental facilities. The F and H Areas Seepage Basins groundwater plumes contain both hazardous and radioactive constituents that differ greatly from those found at most facilities requiring groundwater remediation. Therefore, the proposed corrective action is unique. No other facilities arc currently required to pump/treat and reinject, or to reinject water which exceeds drinking water standards.

No ACL's have been approved by EPA Region IV or SCDHEC in the past five years. However, ACL's are a viable alternative to complete restoration of aquifers 10 drinking water standards. In fact, the corrective action required by the RCRA permit specifically allows for evaluation of an ACL demonstration at the conclusion of Phase I.

1L Regulatory oversight by SCDHEC at SRS is funded by a grant from DOE. How many municipalities, private industries, and other government agencies fund their own regulatory oversight? How dots SCDHEC avoid a conflict of interest. that is, the more remedial actions required the higher the funding level for SCDHEC?

Response: Through permit fees and other funding mechanisms, all municipalities, private industries, and other government agencies fund their own regulatory oversight. There is no conflict of interest. The grant is based on a scope of work submitted by SCDHEC and approved by DOE on an annual basis so more remedial actions do not necessarily mean more funding as both parties must agtu as to the level of work necessary for the year.

Letter from Mr. George M. Mingt to the EPA

Response:

L Levels of tritium in the groundwater plumes have generally decreased since operation of the basins was discontinued in 1988. Additionally, the installation of the low permeability caps over the basins has further controlled the migration of contaminants into the groundwater. All of the tritium currently contained in the F&H Seepage Basins is due to pre-1988 operations. There is no contaminated water currently being contributed to the F&H Area Seepage Basins. Contaminated effluent water and any contaminated water due to processing of existing inventories is transferred to the Effluent Treatment Facility for processing.

As stated in the WSRC Report, "Assessment of Tritium in the Savannah River Site Environment," is a tritium balance for SRS operations from 1952 to 1991. The F&H Seepage Basins have received 669,790 Curies of tritium, released 268,533 to Fourmile Creek, released 202,567 Curies to the atmosphere through evaporation, and currently (as of 1991) the basins contain 37,618 Curies. Subtracting the last three numbers from the first gives a difference of 161,072 Curies, which is the amount of radioactivity eliminated through the radioactive decay process.

2. Currently, only funding for Phase I of the F&H Groundwater Remediation Project has been budgeted. Additional funding would be requested for the remaining phases, if required following a technical evaluation of the Phase I Operations.

3. Since the early fifties, a significant amount of research has been conducted on the transport, metabolism, and radiation dose due to tritium in the environment. One of the better references was published by the National Council on Radiation Protection and Measurements (NCRP) as NCRP Report No. 62, *Tritium in the Environment*. It may be ordered from:

NRCP Publications
7910 Woodmont Avenue
suite 800
Bethesda, MD 20814-3095

The International Commission on Radiological Protection (ICRP) has developed a quite thorough, although somewhat complicated_ for calculating radiation dose from ingestion, inhalation, and absorption of tritium through *skin. ICRP Publication 30, Part 1, contains tritium information in addition to a description of the radiation dose calculation system. It can be ordered through your local bookstore by referring to the identifier, ISBN 0080226388.

During the approximately 40 years of SRS operation, the tritium dose for customers of the Beaufort-Jasper Water Treatment Plant was about 3 millirem (WSRC-TR-93-214, Table 4-7). During the same time period, the very conservative EPA limit of 4 millirem per year would have allowed a dose of 160 millirem. Future liquid releases of tritium will decline since all reactors are shut down and the inventory of tritium in the seepage basins will be depleted by the natural decaying process.

GEORGE M. MINOT
3 Bat-au Road
Hilton Head Island, SC 2992$-3012
803-363"s1s0

Memorandum

To: SRS Remedial Project Manager, US. EPA, Region IV

From: George M. Minot

Date: February 6.1995

Subject: Resolution Regarding SRS F- and H-Area Groundwater Operable Units

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WHEREAS, the F-Area Hazardous Waste Management Area consists of a series of three hydraulically connected. unlined basins (F-1, F-2 and F-3) to which wastewater flow was terminated on November 7, 1988 and the H-Area Hazardous Waste Management Area consists of a series of three hydraulically connected. unlined basins (H-1. H-2 ond H-4) to which wastewater flow was terminated on November 7, 1988, ● id

WHEREAS. the radioactivity re cased to the unlined basins constituting the F-Area Hazardous Waste Management Facility and the H-Area Hazardous Waste Management Facility is due primarily to tritium, a radioactive form of Hydrogen with ● half-life of about 12.5 years, and

WHEREAS, currently, there is no known effective method to remove tritium from groundwater, and

WHEREAS, F- and H-Areas and vicinity are on ● surface and groundwater divide; shallow groundwater flows toward either Upper Three Runs or Fourmile Branch, both of which discharge directly into the Savannah River, and

WHEREAS ,the Maximum Containment Level (MCL) for tritium (i.e. the maximum pmnkibk.level of tritium in water that is delivered to ● user of a public water system) is 20 picocuries per milliliter (pCi/mL), and

WHEREAS, the Savannah River supplies domestic and industrial water for the Port Wentworth (Savannah, GA) water treatment plant and for Beaufort and Jasper Counties in SC and analytical results of calendar 1993 water studies indicated that the water in the Savannah River downstream from SRS showed a maximum reading during one sampling event of 1.92 pCi/mL of tritium (approximately 10% of MCL), and

WHEREAS, analytical results of calendar 1993 water studies indicated that the water quality of the Upper Three Runs and Fourmile Branch was "*generally acceptable, with the exception of the tritium concentrations*" (i.e., Fourmile Branch maximum reading during one sampling event was 68.9 pCi/mL or approximately 3.5 times the MCL: Upper Three Runs maximum reading was 17.9 pCi/mL or approximately 90% of MCL), and

WHEREAS, in mid-1993, the contaminated groundwater plume, as defined by the 1,000 pCi/mL tritium isoactivity contour (i.e., 50 times the MCL), in the F-Area was less than 400 feet from the Fourmile Branch and the contaminated groundwater plume in the H-Area was approximately 135 feet from the Fourmile Branch.. At the same time, it was reported that the F-Area plume contained zones of tritium concentrations as high as 30,000 pCi/mL or 1,500 times the MCL and the H-Area plume contained zones of tritium concentrations as high as 16,000 pCi/mL or 800 times the MCL. In addition, it should be noted that the aforementioned contaminated groundwater plumes are generally confined to the shallow aquifers

(i.e., Steed Pond, Upper Three Runs, and Gordon a.k.a. the Floridan Aquifer System) which are the primary source of domestic water supplies in Aiken County, SC, and

FURTHER, in 1987, DOE identified 56 major municipal, industrial and agricultural groundwater users within 20 miles of the center of SRS, and in 1992, the maximum tritium concentration measured in any one of the 217 wells in the shallow aquifer units within the area designated as "Separations and Waste Management" was 180,000 pCi/mL or 9,000 times the MLR, and

FURTHER, the Westinghouse Savannah River Company (SRC) has stated that "*Actual or threatened releases of hazardous substances from the site, if not addressed by the preferred alternative or one of the other action measures considered, may present a current or potential threat to public health, welfare, or the environment,*" but has not quantified the F- and H-Area Groundwater Operable Unit-specific risk(s) to humans (or the wildlife) resulting from exposure to groundwater contaminated with hazardous and radioactive constituents, including tritium, and

FURTHER, to the best of my knowledge, neither DOE, SRC, or any other entity has made available for public review in the SRS-area any recently de-classified Los Alamos National Laboratory or other studies involving human exposure to tritium and other radionuclides detected in the F-and H-Area groundwater in concentrations that require remediation.

FURTHER, the SRC Environmental Monitoring Section's Environmental Geochemistry Group (EGG), which regularly samples approximately 1,400 groundwater wells throughout SRS, has publicly stated "*groundwater aquifers can be a major pathway for hazardous and radioactive substances to move beyond the site boundary, as well as into the Savannah River.*" However, to my knowledge, the public has not been made aware of the rate(s) of migration of the identified hazardous and radioactive substances toward the site boundaries and/or the six SRS tributaries that drain to the Savannah River and/or the Savannah River, nor has the total estimated volume of contaminated groundwater to be remediated been disclosed.

THEREFORE, BE IT REQUIRE DTHAT, DOE and/or SRC promptly ,and before proceeding with Phase I of the preferred alternative for groundwater remediation at the F-Area and H-Area Groundwater Operable Units (at an estimated Capital Cost of approximately $32 million plus an estimated on-going Maintenance & Operation cost of $4 to $6 million per year for an unknown number of years), take all necessary actions to further quantify the "*current or potential threat to public health, welfare or the environment*" associated with Alternatives 1, 2 and 3 and, concurrently, provide more complete information regarding the tritium and other radionuclide concentrations in the groundwater plumes, the SRS streams and the Savannah River, and publish a response to the following comments and questions:

1. Given that the half-life of tritium is approximately 12.5 years, how much of the tritium concentration recently recorded is attributable to the pre-November 1988 operations conducted at the Separations and Waste Management area? How many liters of contaminated water at what pCi/L is being contributed daily, weekly, and/or monthly by the "*processing of existing inventories of materials for a variety of purposes*" within the F- and H-Area Groundwater Operable Units? Since seepage basin closure activities were reportedly completed on January 4, 1991 (F-Area) and on June 11, 1991 (H-Area), where, and in what manner are the contaminated wastes from continuing operations being stored? Is this waste stream being addressed by any of the alternatives?

2. Given that the geography/geology in question is located within portions of the SRS site that will undoubtedly continue to be DOE-owned and contractor-operated for a very long time, it is not obvious to me why the contaminated groundwater needs to be cleaned to residential drinking water standards to satisfy DOE objectives, nor is it clear from the public information provided that the preferred alternative for remediation will be able to meet this standard. Does DOE have in hand or has the U.S. Congress

budgeted sufficient ear-marked funds to fully implement all Phases of this project and still have funds available to address other alleged severe environmental remediation problems at SRS (i.e., the Canyons, High Level Waste tank farms, Plutonium storage, etc.) at the same time?

3. Inasmuch as *"there is no known effective method to remove tritium from the groundwater,"* it would seem appropriate for DOE/Westinghouse SR to establish a Human Studies Project Team to coordinate research efforts with the Los Alamos NL team and personnel/teams at other Research Laboratories (i.e., Argonne NL, Brookhaven NL, Idaho National Engineering Laboratory, Lawrence Berkeley Laboratory, Lawrence Livermore NL, Oak Ridge NL, Pacific Northwest Laboratory, Sandia NL, etc.) in an effort to determine the public health risks associated with absorption of tritium-contaminated water and water vapor through the skin, inhalation of tritium-contaminated water-vapor, ingestion of tritium-contaminated liquids, etc., and document the findings in various public reports, press releases, audio tapes, and video taped presentations as soon as possible! Also, it will be important to educate the public with regard to the origin of the radiation, the effects on humans and animals at different concentrations or dosages and how to recognize the symptoms of tritium poisoning.

c: *Drew* Slaton, Public Involvement Coordinator, Westinghouse SRC

Brian Costner, Energy Research Foundation

Letter from Mr. W. F. Lawless to the DOE

Response: The specific comments addressed regarding the lack of a scientific justification for the project and concerns regarding cleanup to a residential standard have been previously addressed in the general response section. (Reference comment responses for numbers 2 and 4)

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Division @budsdtJJu884dna&sw#a ..1235 Fifteenth Street Augusta, Georgia 30901-3182 (706) 82

Dr. Mario P. Fiori, Manager
Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29802

Dear Dr. Fiori: January la 199s

I was delighted last night to have the opportunity to attend the meeting in North Augusta on the proposed plans for remediation of contaminated groundwater beneath the F-Area and H-Area Seepage Basins. But I was disturbed by the lack of scientific justification provided to support what appears to be a high-minded fishing expedition by the EPA and DHEC. Both agencies repeatedly stated that the "pump-and-treat" method, at a capital and operating cost of $30-200 million dollars, is a five-year trial "to see what happens" to the groundwater contamination in the area. That makes the project, in my opinion, an experimental enterprise insufficiently justified as a full-fledged environmental remediation capital project.

Another concern that I have is that the cleanup standard of the residential alternative for this project was mandated by EPA/DHEC, yet no scientific justification was provided to support their choice. Further, this EPA/DHEC choice may conflict with a motion moving through the SRS CAB to zone the area encompassing the Seepage Basins as industrial for cleanup purposes.

Before continuing with the Seepage Basin project, I recommend that it be submitted to independent scientific peer review to determine whether or not the project is justified on a scientific, engineering, and cost basis.

Sincerely,

W.F Lawless
Associate Professor of Mathematics and Psychology

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Dr. Mario P. Fiori, Manager
Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29802

t4earDr.Fisk **January 25, 1s9s**

Re: My last letter to you on F/H Seepage Basin Groundwater Cleanup

I recommended to you in a letter dated January 10, 1995, that before DOE continues with the Seepage Basin project, the project be submitted to independent scientific peer review to determine whether or not it is justified on a scientific, engineering, and cost basis.

My recommendation was based on the following: there appeared to be a lack of scientific justification for the project; the cleanup standard of the residential alternative for the project was mandated by EPA/DHEC, yet no scientific justification was provided to support their choice; and the EPA/DHEC choice may conflict with a motion moving through the SRS CAB to zone the area encompassing the Seepage Basins as industrial for cleanup purposes.

As you are aware, the motion was passed by the SRS CAB. The reason that I am writing to you today is because the CAB's ER Subcommittee, of which I am Co-Chair, has decided to consider the F&H groundwater remediation project as the subject of its next motion to be presented at the CAB's March meeting. Not knowing how this new motion will be drafted (e.g., it likely will have input from EPA, DHEC, and others), and because of its timeliness and the need to involve the public in important discussions of SRS issues, I request that you extend the F&H Groundwater public comment period until after the March meeting.

sincerely,

WF Lawless
Associate Professor of Mathematics and Psychology

Letter from Mr. Tim Connor to the EPA

1. We see no evidence at this time that remedial actions beyond those currently being implemented under the RCRA Post Closure Care Requirements are necessary to protect human health and the environment.

   Response: The IROD has been modified and it is stated that the SRS RCRA permit is viewed as the primary decision-making authority and that the selected interim action under CERCLA is no further action beyond that required by the corrective action as identified in the SRS RCRA permit.

2. We respectfully take issue with the decision to seek public comment on a "No Remedial Action" option for the basins under CERCLA.

   Response: The "No Remedial Action" alternative is included in the description of alternatives section as one of the three alternatives that were evaluated for remediation of the contamination at the F-Area Groundwater Operable Unit. Alternative 3 (groundwater recovery, treatment, and injection) is the corrective action described in the 1992 RCRA Permit. This action has been determined to be protective of human health and the environment. Therefore, no further action is required under CERCLA.

ENERGY
RESEARCH
FOUNDATION

January 31, 1995

Tim Connor
Associate Director

Mr. Jeff Crane
U.S. Environmental Protection Agency, Region IV
345 Courtland street
Manta, GA 30365

Dear Mr. Crane:

The Energy Research Foundation (ERF) has the following comments with respect to plans submitted in December of t 994 by the U.S. Department of Energy's Savannah River Site (SRS) to meet the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as such requirements pertain to the F and H Area seepage basins at SRS.

ERFs interest in the timely remediation of the F & H seepage basins and the contaminated groundwater associated with the basins goes back several years. During that time our views on the issues involved have been repeatedlv conveyed to both the South Carolina Department of Health and Environmental Control (SCDHEC) and to SRS. Most recently, we submitted detailed comments on the Post Closure Care Requirements of the basins in October 1992 as part of the compliance process required by the federal Resource Conservation and Recovery Act (RCRA). This process led to SRS agreeing to install a remedial system at the basins designed to prevent the further spread of contamination into a surface stream at SRS which is a tributary to the Savannah River.

It was and remains our view that the *evidence* of the spread of contamination and its measureable impact on affected surface waters is a sound and compelling basis for the remedial action. Moreover, we believe the requirements imposed by SCDHEC are weft-anchored in the law and settlement agreements negotiated with and signed by SRS.

The only question which should be on the table now is whether additional ' remedial actions to contain contaminants from the F & H seepage basins are necessary to satisfy the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) . Our view on this is two-fold:

1) We see no evidence at this time that remedial actions beyond those currently being implemented under the RCRA Post Closure Care Requirements are necessary to protect human health and the environment.

507 Hardon Street
Columbia, South Carolina 29205
803-256-7298

2) We respectfully take issue with the decision to seek public comment on a "No Remedial Action" option for the basins under CERCLA. In our view, the Federal Facility Agreement for SRS (Section 4, paragraph A) is clear that EPA's CERCLA process will be used to augment, rather than supplant, corrective measures reached under RCRA permit. In other words, the CERCLA process ought not be used to undermine RCRA or RCRA-based consent agreements and enforcement by the State of South Carolina of its hazardous waste laws.

The most sensible approach is one we thought the FFA laid out whereby RCRA and CERCLA activities are coordinated to ensure a minimum of duplication and conflicting requirements. We agree that it is appropriate to examine RCRA-based decisions to ensure they satisfy CERCLA requirements. Yet, we don't believe the process is well-served when a CERCLA review invites challenges to remedial actions already agreed to by all parties via an open decision-making process in which all parties, including the public, have had ample opportunity for input.

It is our hope that potential future conflicts and confusion can be avoided. We strongly recommend that in instances like that presented by the F & H seepage basins--where a RCRA-based remedial action has been developed and approved in accordance with the SRS RCRA permit and other applicable requirements--that EPA replace the "No Remedial Action" option with a "No Further Remedial Action" option.

Notwithstanding EPA's consideration of the "No Remedial Action" option at the F & H basins, we believe the process and the outcome of the RCRA Post Closure Care Requirements were fair to all parties and consistent with the consent agreements and the law. We therefore urge EPA to accept the existing RCRA Post Closure Care Requirements as satisfying the requirements of CERCLA for the remediation of contaminated groundwater at the basins.

Sincerely,

cc. Tom Treger, DOE
Drew Station, WSRC
Keith Collinsworth, SCDHEC
Brian Costner, ERF