Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	4.2.1 Reactor Accidents	
DA-30	p. 4-38 - The curie quantities of Ar-41 released by SRP reactors are second only to tritium estimated for L-Reactor: (19,500 Ci/yr vs. 54,900 Ci/yr from Table 4-10), yet no mention is made of the release of any Ar-41 following an accident. Granted, Ar-41 has a short halflife (1.83 hr) and much would decay during transit to the site boundary. However, considering the distance to the site boundary to be 9 km (5.6 miles), half the Ar-41 would survive to the site boundary assuming a wind speed of only 3 mph. Thus, Ar-41 should be included in an accident analysis of L-Reactor, or an explanation given as to why it has not been considered.	A small annulus surrounds the reactor tank; ventilation air flows through it during normal operations. Argon-41 is formed by neutron capture of argon-40 present in the air, which is vented through the airborne activity confinement system and the 61-meter stack. Because argon is a noble gas, it is not trapped by the confinement system. In the event of an accident, the reactor is promptly shut down; argon-41 production essentially stops. The dose contribution from argon-41 is negligible compared to that from noble gas fission products in any accident scenario.
DA-31	p. 4-41, para. 2 - Isn't immersion in the plume a usual airborne exposure pathway considered, or have you considered this as plume shine? They are not the same and immersion should be considered.	Changes have been made in the EIS to clarify this point.
DA-32	p. 4-53, last two para. - Following an accident all coolant, ESC flow, and any other contaminated water is retained in holding tanks. Thus, none will be released to Steel Creek and the Savannah River. However, what releases will occur later during clean-up and reactivation of the reactor?	All water used in reactor cleanup and reactivation would be processed to remove radioactivity before its discharge.
	5.1.2 Radiological Effects of Support Facilities	
DA-33	p. 5-12, Table 5-7 - It is surprising that no U-238 is released to surface streams.	All effluents with detectable amounts of uranium will be discharged to seepage basins (Table 5-8). Thus, Table 5-7 lists no releases directly to surface streams.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DA-34	p. 5-12, 5.1.2. - Accidents and incidents in support facilities are not discussed as sources of radiation exposure, although their potential should be considered. Every few years, significant amounts of tritium are accidentally released to the atmosphere and elevated plutonium levels on site are due to such an accident.	The major sources of tritium releases are associated with SRP facilities that are involved in the production of tritium. Since the purpose of L-Reactor is the production of plutonium, only those support facilities involved in the processing of plutonium are discussed in this EIS. A new section, Section 5.1.2.9, has been added to this final EIS to discuss the incremental risk of accidents for support facilities.
DA-35	p. 5-13 and p. B-48 - The maximum organ dose to the adult, like the child, is to the bone (0.12 mrem/yr) rather than the total body dose of 0.022 mrem/yr given in the report. This should be mentioned. Also, eating fish and drinking water are the critical water pathways. Also, what radionuclides contributed most to the bone dose?	The main body of the DEIS generally presents only doses to the age group receiving the highest body or organ doses. Doses for all age groups and all organs are presented in Appendix B. Fish and drinking-water pathways accounted for most of the bone dose; strontium-90 contributed the most to this dose.
DA-36	Table B.30 to B.33 - A comparison of the dose received during the first year due to support facilities leads to an interesting observation that cannot be explained by the information provided. Except for the dose to bone, which is identical during the first and tenth years for the 80 km population, the maximum individual, and for the population drinking water (Beaufort-Jasper and Port Wentworth), a large increase (5-7 times) occurs to the organ doses of the population drinking water from the first to the tenth year that does not occur to the maximum individual or to the 80 km population. It does not appear that the release to surface streams from the seepage basins could account for this large increase. Only the thyroid dose increases similarly among the three groups (a factor of about 6) which is assumed to be due to I-131, but it should have totally decayed during the three to four year delay in reaching the surface streams from the seepage basins (p. 5-15).	Doses during the first year are based on direct releases to surface streams (draft EIS Table 5-7). During the tenth year, additional radioactivity will enter surface streams from seepage basins (draft EIS Table 5-9). Most of the dose increase to downstream individuals and populations between the first and tenth years is caused by the increase in tritium releases. This increase has little effect on the 80-kilometer-radius population because they do not consume river water. The exposure pathways for the 80-kilometer-radius population are fish, shoreline activities, swimming, and boating (Appendix B).

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

If there is a simple explanation for these increases in organ doses from support facility effluents, it should be given. See table below.

Tenth year dose/first year dose

Bone	Liver	T. Body	Thyroid	Kidney	Lung	G.I.
			80 km population			
1.0	1.0	1.1	5.1	1.1	1.4	4.1
			Maximum individual			
1.0	2.0	2.2	6.7	3.1	4.7	6.2
			Beaufort-Jasper and Port Wentworth			
1.0	6.5	5.5	6.8	5.9	6.7	7.2

DA-37

p.5-14, Table 5-8 - See above comment for Table 4-11; also consider I-129 in liquid effluent.

Only trace quantities of iodine-129 are released in liquid effluents. Such releases are included in the category "other beta, gamma" in Table 5-8. For purposes of dose calculation, "other beta, gamma" was conservatively assumed to be strontium-90 (Table 5-8, footnote C).

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DA-38	p. 5-15 - We believe that the critical pathways and radionuclides are important information. Although the pathways can be obtained from Appendix B, it would be useful to include it here. For example, the thyroid is the critical organ and the dose received is primarily due to consuming vegetables and milk containing radioiodine. Possibly the two short paragraphs presenting the doses from atmospheric releases can be expanded to include this information.	To avoid overburdening the reader with voluminous tables of pathway analysis in the main body of the EIS, this data is presented in Appendix B. Material has been added to Section 5.1.2.3 of the EIS to identify the pathways (milk and vegetation) and radionuclides (iodine-129 and -131) that contribute most to the maximum organ (thyroid) dose.
DA-39	p. 5-16, Table 5-10 - The tritium value seems to be for the first year, with ten times as much released after 10 years, but this is not mentioned. For the separations areas (F&H) the listed value for tritium (H-3) is 8.6×10^3 Ci/yr while DPST-82-1054 Savannah River Plant Airborne Emission and Controls report indicates a value of 8.6×10^4 Ci/yr for the separations areas.	Tritium atmospheric releases of 9.4×10^3 curies total do not increase for support facilities as they do for L-Reactor between the first and tenth years. Release estimates for tritium are correct for the type of operation planned for L-Reactor.
DA-40	p. 5-17, Table 5-11 - The lower total body dose from atmospheric releases after 10 years does not make sense in view of the much higher tritium releases. Neither does the explanation that maximum exposure locations are changed. To the best of our knowledge, the atmospheric dispersion model applied by SRP is simplified so that all sources are assumed to be released at a central location on site.	Atmospheric dose calculations for L-Reactor use L-Reactor as the release point; doses from support facilities are calculated as if releases occurred at the center of the Plant. The location on the site boundary where the maximum individual resides was selected as the place where the total maximum offsite doses from L-Reactor and support operations are predicted to occur. Because releases are constant over time from support facilities but increase over time for L-Reactor tritium, the geographic location of L-Reactor with respect to total releases becomes more important over time. Thus, the location of the individual receiving the maximum dose from L-Reactor plus support facilities changes with time. This is not caused by a change in atmospheric dispersion with time.
DA-41	p. 5-17, Table 5-11 - It is highly unlikely that the individual receiving the maximum airborne exposure will also be the same person receiving the maximum exposure through the aquatic pathway. It is probably not appropriate to add these two doses, but it does show a very small total dose.	As stated in Section 5.1.2.4 of the EIS: "The numbers listed as totals for individual and population doses are conservative maximums; to receive these doses, the composite individual (or population) would have to occupy several locations simultaneously."

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DA-42	p. 5-17, para. 1 - The maximum population dose of 8.1 person-rem for the tenth year is correct only if the Port Wentworth and Beaufort-Jasper population receives the 2.8 person-rem via the air pathway. It is assumed they would not be outside the 80 km radius. p. 5-17, last para. - The health effects checked by calculation were found to be correct using the factors given in Appendix B.6.	See the response to comment DA-41.
DA-43	p. 5-18, Table 5-12 - Is additional utilization of Savannah River water for public water systems downstream contemplated in view of current groundwater level lowering in the Savannah-Hilton Head area? Such increased consumption would increase the regional population dose. p. 5-18, Table 5-12 - Values listed in this table were correctly summarized from earlier tables.	Utilization of Savannah River water is based on projections for the year 2000; it includes growth in consumer population size caused not only by population growth but also by changes from well-water supply to river-water supply by a sizeable portion ofthe population for both Beaufort-Jasper and Port Wentworth.
DA-44	p. 5-19, para. 1 - Adding these doses is a very conservative approach, but is not appropriate (see similar comment above). It may conceivably be the same individual that receives the maximum dose from the liquid releases and radiocesium transport, but it is highly improbable that this person will also receive the maximum atmospheric dose. p. 5-19, para. 5 - The health effects were correctly computed for the U.S. population beyond the 80 km radius of SRP using the factors given in Appendix B.6.	See the response to comment DA-41.
	5.2.6 Cumulative Impacts-Radiological Effects p. 5-33, Table 5-19 - Values in this table agree with those in Appendix B.	
DA-45	p. 5-33, Table 5-19 - Values under the liquid release column (Regional Population Dose) have included in them the contribution from consuming water in the Beaufort-Jasper and Port Wentworth regions and, thus, should so indicate with superscript (c) on each value.	Through typographical error a Greek phi was printed after "Regional Population Dose" in Table 5-9. This has been replaced with a "c" in the Final EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DA-46	p. 5-33, Table 5-19 - Do these doses include the effect of I-129 releases based on actual measurements in vegetation and thyroids? The paper by Kantelo, Tiffany and Anderson in Environmental Migration of Long-Lived Radionuclides (IAEA, Vienna, 1982) p. 495 indicates a maximum (worst case) dose of 1.6 mrem/yr. The summaries are difficult to check because Appendix B dose compilations are not itemized by radionuclide; could this information be provided?	Doses listed in Table 5-19 are based on models described in Appendix B and include no doses based on actual environmental monitoring data. However, data from studies at the Savannah River Laboratory by Kantelo have been used to verify model calculations of iodine-129 dispersion in the environment.
DA-47	p. 5-34, Table 5-20 - According to footnote (a), concentrations of Co-60 in drinking water were based on a dilution with 300 cubic meters of water per second. However, there is no reduction in the Co-60 concentration between river water below the plant and drinking water at Port Wentworth or Beaufort-Jasper. Also, why is the Sr-90 concentration not considered for dilution along with some decontamination of the water treatment plants?	Cesium-137 concentrations in Beaufort-Jasper and Port Wentworth drinking water are based on studies made in the mid-1960s when cesium concentrations were more easily measurable in river and water-treatment-plant water. These concentrations take into account additional dilution downriver from other surface water and decontamination across the water-treatment plants. Decontamination data were not available for cobalt-60 or strontium-90; thus, no adjustments were made for these radionuclides in Table 5-20.
DA-48	p. 5-34, Table 5-20 - The I-131 concentration in milk due to L-support is inconsistently high relative to the entire SRP source; which is wrong? Similarly, the C-14 concentration in air due to L-Reactor is inconsistently high relative to the entire SRP source.	Typographical errors account for the apparent discrepancies in Table 5-20. Iodine-131 concentration in milk from L-Reactor support facilities should be 1.2×10^{-3} picocuries per liter rather than 1.2×10^{-1}. Similarly, carbon-14 in the air from L-Reactor should be 9.3×10^{-3} picocuries per cubic meter rather than 9.3×10^{-1} picocuries per cubic meter. The concentration of argon-41 from SRP should be 1.4×10^{1} picocuries per cubic meter rather than 1.4×10, making the total 2.3×10^{1} instead of 2.3×10. These have been corrected in Table 5-20 of the Final EIS. In addition, the footnote to this table has been changed to clarify how concentrations were calculated.
	p. 5-35, para. 1 - The computation of health effects are correct based on factors given in Appendix B.6.	
	6.1.1 SRP Monitoring Programs	
DA-49	p. 6-1, para. 3 - A brief description of the TRAC Laboratory Plume Monitor and its capabilities should be included in this discussion. It is certainly an asset to SRP airborne surveillance capabilities.	The TRAC plume monitor is a research vehicle and is not used in the routine environmental monitoring program. However, it is available and will be used in the event of a plant radioactivity release accident.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DA-50	p. 6-10, Section 6.2.4 - The monitoring for Cs-137 in the creeks accepting discharges, and especially in Steel Creek, and in the Savannah River adjacent to SRP, has special importance because this Report strongly indicates that this is the pathway (redistribution and transport of Cs-137 in creek sediments) that will have the greatest radiological impact due to L-Reactor start-up. Therefore, it is crucial that an intensive study be taken during the first year following start-up to monitor and measure the quantity of Cs-137 that is transported along the creeks and into the Savannah River. Also, the study should be continued after the first year to confirm if a decrease in Cs-137 transport occurs as is predicted. The document states that Cs-137 is below detectable levels in the Savannah River and that a special monitoring program for Cs-137 will be initiated. Does this special program include making absolute measurements of the Cs-137 in river water? It is believed that periodic measurements of the actual Cs-137 concentration in the river water should be determined before and after L-Reactor start-up. This can be accomplished by concentrating the Cs-137 from large water volumes by ion exchange with further concentration, if necessary, by published radiochemical techniques.	See the response to comment DA-10. When necessary, cesium-137 concentrations in river water will be monitored by techniques appropriate to the concentration levels. This includes the use of ion-exchange columns to remove and concentrate cesium-137 from water for radioanalysis.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF MARGUERITE S. RICE 3021 Fox Spring Rd. Augusta, GA 30909 November Melvin J. Sires III U.S. Dept. of Energy Savannah River Operations Office P.O. Box A Aiken, So. Carolina 29801 Dear Melvin Sires: I am an individual, a family member, a registered nurse in the Augusta area, concerned with maintaining health, preventing illness, and helping people regain their well-being. I am well aware, in this field, of how interdependent we are, not only with one another but with other animals, plants, air, water - in other words with everything that constitutes our environment. Major changes are not made in one area or with one segment of the population that do not have far-reaching effects on us all.	
DB-1	Such is the nature of my concern over the proposed restart of the L-Reactor at SRP. A tremendous increase in the amount of scalding water going into a CSRA creek is not only in violation of state water quality regulations but is a violation of the very life of plants and animals in that area which in the ecological balance affects not only their lives but ours as well.	See the responses to comments AA-1 and AA-3 regarding cooling-water mitigation alternatives and DOE's commitment to comply with applicable Federal and state environmental protection regulations, and the response to comment BM-1 regarding DOE's Record of Decision on this EIS.
DB-2	I am also totally opposed to using the Savannah River as a waste dump for radioactive and/or toxic chemicals.	See the response to comment BT-2 regarding water quality.
DB-3	The necessity of meeting production schedules is not a reasonable response to me or any others who have felt the health and safety of the area residents at severely increased risk over this proposed restart of the L-Reactor.	As pointed out in the EIS, the need for plutonium was established by two different administrations in Nuclear Weapons Stockpile Memoranda. Also see the responses to comments AA-3

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		and AB-17 regarding DOE's commitment to comply with all applicable Federal and state environmental protection regulations and the effects of past radiological releases.
	I sincerely hope that my views will not only be added to those of others but will be heard. Thank you. Sincerely, Marguerite S. Rice	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF MICHAEL MURRAY	
	Michael Murray 13 Warbler Lane Hilton Head Island, SC 29928 November 5, 1983	
	U.S. Dept. Energy P.O. Box A SRP Operations Office Aiken, SC 29801	
	ATTN: M.J. Sires III	
	Dear Mr. Sires:	
DC-1	The environmental impact statement addresses the epidemiological studies, but fails to study entomological studies: namely "Pacco Wave" Theory. Also Drs. Sergie Carpista of the USSR and Dr. Carl Sagan and Dr. Edward Teller agree in principle that a limited 5 megaton atomic warfare would eventually annihilate the world by blowing up the ozone, creating dust clouds and causing a freeze, starvation and billions of deaths. Why build more A bombs in light of these recent findings. Please do not reopen the L-Reactor until further studies are made.	The national policy on nuclear weapons, their deployment, and the need for increased weapons is beyond the scope of this EIS.
	M. Murray	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF LAWRENCE D. BENEDICT

Lawrence D. Benedict
38 Ivy Chase
Atlanta, Georgia 30342

November 7, 1983

Melvin J. Sires, III
Assist. Manager for Health, Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29801

Dear Mr. Sires:

I have previously addressed statements during Savannah River Plant EIS hearings representing the League of Women Voters, Savannah-Chatham and, at times, The Georgia Conservancy and Coastal Citizens for a Clean Environment. I presume our views still coincide. But we have moved from Savannah to Atlanta since last I testified at a scoping hearing in Savannah and present this written statement as a concerned citizen.

Please see address change above.

DD-1 I note with great satisfaction the declaration by the Environmental Protection Agency that the planned restart of the Savannah River Plant's idle L-Reactor is "environmentally unsatisfactory." Interestingly, that was a conclusion reached more than a year ago by EPA staffers, but muzzled by the then top administrators of the Agency. We also thought so, and said so, ever since the proposal to reactivate a 1953 piece of nuclear machinery surfaced in 1980!

EPA's "environmentally unsatisfactory" rating is based primarily on a concern that no final agreement had been reached with the State of South Carolina on cooling-water discharges and a National Pollution Discharge Elimination System Permit. DOE is working with both the state and EPA to resolve these concerns. Also see the response to comment AA-1 regarding cooling-water mitigation alternatives.

DD-2 Furthermore, we do not believe the DEIS findings produced anything to assuage our anxieties about damages to be caused by super heated water discharges and escape of radioactive gasses.

L-Reactor direct cooling-water discharges to Steel Creek would be at about 73°C and, hence, would not be super-heated in the ordinary sense, although they would be above South Carolina

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Bashear, according to UPI, did state, "the environmental impact statement is essentially OK, but a final EIS must be approved," we wonder if there is time left to produce an acceptable statement? Obviously EPA is as concerned as we are about ground water contamination, the discharge of heated effluent into Steel Creek and "uncertainties involving the disposal of various potential and actual hazardous wastes generated from reactor operations."	standards for discharge to Class B streams. Also see the response to comment AA-1 regarding cooling-water alternatives in this Final EIS. Airborne radionuclide releases from the Savannah River Plant are about a factor of 10 below the proposed new EPA standard and are thus not expected to be a major problem; a continuing effort is underway to reduce these releases. Also see the response to comment AJ-1 regarding groundwater contamination.
DD-3	We fail to see in the DEIS any signs of mitigation measures to correct the widely recognized L-Reactor deficiencies. There is passing mention of cooling towers and containment domes, but no indication they will be in place prior to reactivation. I personally will insist these measures be installed. I'm sure the League of Women voters will agree, as will other Georgia and South Carolina environmental groups.	Mitigation measures are discussed in detail in Section 4.4 of the EIS. See the responses to comments AA-1 and AB-13 regarding cooling-water mitigation alternatives, and the response to comment BF-7 regarding containment domes.
	The very concept of rushing into reactivation without considering the warning of EPA and ignoring the wishes and concern of the majority citizenry of the SRP area, is foolish, perhaps disastrous. We hope this administration takes heed. Thank you.	
	Sincerely,	
	Lawrence D. Benedict	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF EUGENE J. CARROLL, JR. Center for Defense Information 303 Capitol Gallery West 600 Maryland Avenue, S.W. Washington, D.C. 20024 November 1, 1983 Mr. M. J. Sires, III Assistant Manager for Health, Safety and Environment U.S. Department of Energy Savannah River Operations Office P.O. Box A Aiken, SC 29801 Dear Mr. Sires:	
DE-1	The Center for Defense Information is unable to address in detail the important environmental issues surrounding restart of the Savannah River Plant's L-Reactor, but we can speak directly to the actual need for a fourth strategic materials production plant at Savannah River. Even setting aside for the moment very pertinent questions about the military utility of adding thousands of nuclear weapons to an already overburdened U.S. arsenal, CDI can identify no compelling need to restart the L-Reactor.	See the response to comment AB-8 regarding the need for material.
DE-2	Reductions in planned nuclear weapons production programs made over the last two years clearly obviate the 1980 decision to restart the L-Reactor. The planned number of Air-Launched Cruise Missiles has apparently been cut by more than 1,000. The number of MX warheads has been cut in half by 1,000. To date, Congress has foreclosed production of 1,000 155mm neutron artillery rounds. Production of 500 warheads for the Sentry anti-ballistic missile and another 500 for the Standard Missile-2 anti-aircraft weapon has been moved to the out-years. Although the Reagan Administration is still calling for an unconscionably large growth in the U.S. nuclear arsenal,	The national policy on nuclear weapons, their deployment, and the need for increased weapons is beyond the scope of this EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	3,000 weapons have been cancelled outright and another 1,000 delayed since the initial decision to restart the L-Reactor.	
DE-3	At the same time, it is reported that higher levels of production at the P-, K-, and C-Reactors resulted in a 500-kilogram surplus of supergrade plutonium in FY 1982 and FY 1983. This plus planned introduction of more efficient Mark-15 production cores, put to rest the concerns raised in 1981 about a shortage of strategic materials to support the Reagan Administration nuclear buildup. Failure to obtain approval of the 155mm neutron artillery round and delay of the Sentry ABM, both heavy users of tritium, further reduce the requirement for new tritium production.	See the response to comment BL-20 regarding material needs as defined in the NWSM, and the response to comment BL-21 regarding production alternatives.
DE-4	It is difficult to square the Department of Energy's drive to restart the L-Reactor with the worry often aired by its officials that strategic materials production is too concentrated geographically. Current plans to restart the Purex Reprocessing Plant at the Hanford Reservation and build new production facilities at the Idaho National Engineering Facility certainly do more to meet these concerns than would restarting the L-Reactor.	Geographical distribution of defense nuclear material production facilities is one of a number of factors that is considered in the evaluation of future production capacity. However, restart of L-Reactor in combination with implementation of planned initiatives is necessary for meeting near-term defense nuclear material needs. There are no other viable options at other DOE sites that could provide the needed materials.
DE-5	Finally, if the Reagan Administration is truly committed to its assorted START and build-down proposals, the DOE will be able to reprocess more strategic materials from "built-down" warheads than it could ever need for a smaller number of new nuclear weapons.	See the response to comment BL-19 regarding utilization of material from retired weapons.
	Sincerely. Eugene J. Carroll, Jr. Rear Admiral, USN (ret.) Deputy Director	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF SUZANNE A. SHUMAN 128C E. 60 Savannah, GA 31405 Oct. 28, 1983 Representative Thomas:	
DF-1	As a concerned citizen, mother, and teacher, I am writing to you concerning the L-Reactor's E.I.S. I think the EIS conclusions are unacceptable. Please establish an oversight committee of the Savannah River Plant facility. I am also concerned about not having provisions for cooling towers or a containment dome.	See the response to comment BQ-2 regarding existing oversight mechanisms, the response to comment BF-7 regarding containment domes, and the responses to comments AA-1, AA-3, and AB-13 regarding cooling-water mitigation alternatives.
	Thank you for your concern, and efforts. Sincerely, Suzanne A. Shuman	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF AMY G. DARDEN	
	October 31, 1983	
	Dear Representative Thomas:	
	The Department of Energy's Draft Environmental Impact Statement, L-Reactor Operation, Savannah River Plant overlooks several significant points that I would like to bring to your attention.	
DG-1	In the thirty years of plant operations at SRP there has never been an independent study of the health and environmental effects of the reactors at SRP that was not conducted by, financed by, or based on data collected by the DuPont Company. DOE's EIS is overwhelmingly based on DuPont publications. The people who live in Georgia and South Carolina deserve to know what the health effects of SRP are; it appears that we will have to wait longer since no one in a position of authority seems concerned that an independent study has not been undertaken. According to the South Carolina Bureau of Vital Statistics infant mortality rates and cancer rates in counties adjacent to SRP are 4-10X higher than in other areas of the state.	See the responses to comments AV-8 and CG-1 regarding health effects and epidemiological studies.
	As every high school biology student learns, there is no safe dose of radiation. It takes only one radioactive particle, one cell, and one gene to start the cycle of cancer and genetic mutation.	
DG-2	But at SRP's reactors there are no containment domes and no cooling towers. Is there any logic as to why reactors making weapons grade materials are not held to the same safety guidelines as commercial nuclear power plants? With its emissions of radioactive gases and cooling water the L-Reactor will have an impact on the health of human, plant, and animal populations in Georgia and South Carolina.	Estimates of atmospheric releases from L-Reactor and its support facilities are given in Sections 4.1.1.6, 4.1.2.1, and 5.1.2.2. These releases result in ambient air concentrations that fall within all applicable state and Federal guidelines. Also, see the response to comment BF-7 regarding containment domes, and the responses to comments AA-1, AA-3, and AB-13 regarding cooling-water mitigation alternatives.
DG-3	The DOE has also failed to find the solution to the problem of solid wastes disposal. Solid wastes are considered much safer than liquid radioactive wastes which are already leaking from containers into the Tuscaloosa aquifer. But are we prepared to	No liquid radioactive wastes have been found to have leaked into the Tuscaloosa Aquifer. As described in the EIS, some contamination of Tuscaloosa wells has occurred from nonradioactive degreasing agents; see the response to comment AJ-1.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	protect the public from those wastes over the enormous periods of time that must pass before the wastes lose their radioactivity? The SRP has been described as the "bomb that has already been dropped." As a biologist concerned with life and particularly with human life, I am appalled at the flagrant oversights in the EIS and the massive duping of the public by the Department of Energy. The L-Reactor was commissioned to make plutonium and tritium for nuclear warheads to be used in our nation's defense. When is someone going to defend the citizens against the bomb makers? I will appreciate your evaluation on the safety of life in our area if the L-Reactor startup proceeds in January 1984. Yours for a safe and healthy world, Amy G. Darden 7911-A Tybee Rd. Savannah, GA 31410	With respect to the disposal of high- and low-level radioactive waste see the responses to comments AV-2 and BA-5.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF DORETHEA SMITH Oct. 31, 1983 Mr. Melvin J. Sires, III U.S. Department of Energy Savannah River Operations Office Post Office Box A Aiken, South Carolina 29801 Attn: EIS for L-Reactor Dear Mr. Sires, I'm very concerned about the environment we live in today, we have the Department of Energy (DOE) along with the Environmental Impact Statement. The L-Reactor Operation at the Savannah River Plant should be study very careful because we are talking about human being, and the environment which we live in.	
DH-1	The startup of the L-Reactor will increase by 33% the load on seepage basins currently leaking toxic chemical into freshwater source for much of the Southeast. The amount of liquid high-level wastes produced at the Savannah River Plant will increase by 33%.	See the response to comment AJ-1 regarding the use of seepage basins and the responses to comments AV-2 and BA-5 regarding the disposal of high- and low-level radioactive waste.
DH-2	The Department of Energy plans involve the flushing of radioactive cesium into the Savannah River. This is not safe and I feel the startup of the L-Reactor should be avoided in South Carolina.	See the response to comment AA-2 regarding the relationship of radiocesium and radiocobalt concentrations to EPA drinking water standards.
DH-3	The Department of Energy facilities should be required to comply with federal and State Environmental Standards applicable to commercial reactor sites; and very serious steps be taken to avoid damage to the environment before startup. And if proving not to be safe for our environment that we live in, I urge you and others not to start up the L-Reactor in South Carolina for the production of plutonium.	See the responses to comments AF-1, BF-7 and BF-8 regarding the differences between SRP reactors and commercial light-water reactors, and the responses to comments AA-1, AA-3, and AF-2 regarding DOE's commitment to comply with all applicable Federal and state environmental regulations and to take all reasonable steps to mitigate impacts.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	I would like to have a copy of the Final Draft Environmental Impact Statement along with any other information you can share with me. Thanking you in advance for your assistance, Sincerely, Dorethea Smith	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF FRANCES HART

ENERGY
RESEARCH
FOUNDATION
2530 Devine Street
Suite 201
Columbia, South Carolina 29205

Frances Close Hart
Board Chairperson

John M. Lawson
Executive Director

Dear Mr. Sires,

I enclose a statement by Dr. George W. Rathjens of the Massachusetts Institute of Technology regarding the need for plutonium as it relates to the startup of the L-Reactor.

I submit this for the EIS record for Dr. Rathjens, along with a copy of his professional biography which I would like to put on the record with his statement.

The hearing seemed extremely well-organized, as usual, and thank you for allowing us to appear, and well as for your always prompt and pleasant help in our requests for information.

I look forward to seeing the final EIS.

Sincerely,

Frances Hart

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT BY DR. GEORGE WILLIAM RATHJENS November 1, 1983	
	I do not have the expertise, nor have I had the time, to review the parts of the Environmental Impact Statement that address the effect of reactivation of the L-Reactor on the environment. My impression is that a competent job has been done and that the statement fairly describes what might be expected. The unclassified version of the statement does not, however, provide enough information on alternative means of increasing plutonium and tritium production for me or, I believe, other readers, to judge whether its conclusions in this respect are sound. And most importantly, it is totally unconvincing in justifying the need for increased production of these materials. Indeed, it makes no attempt to do so, claiming that the relevant data, projections, etc., must be classified. This is the area I wish to address.	
D1-1	The initiative to increase production of plutonium was taken in 1980 after review of weapons stockpile needs by a high-level committee. Since then a great deal has happened that suggests that we will need less plutonium for new weapons than had been anticipated at that time and that more will be available from old weapons being retired from other sources. Specifically: 1. The programs for the MX missile and the air-launched cruise missile have been cut back. 2. The 1982 review of the ABM treaty has not resulted in any changes in the treaty and there is now no prospect of an early ballistic missile defense deployment. The Sentry ABM program has been cancelled. 3. The production of 155 mm artillery shells has been delayed.	The national policy on nuclear weapons, their deployment, and the need for increased weapons is beyond the scope of this EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	4. A decision has been announced to withdraw 1400 nuclear warheads from Europe.	
DI-2	5. The Congress has refused to support continuation of the Clinch River Breeder program, which would have required large amounts of plutonium.	Requirements for the supply of fuel-grade plutonium to CRBR were not included in the determination of plutonium supply and demand in the Nuclear Weapons Stockpile Memoranda because this plutonium for CRBR would be obtained from sources outside the defense nuclear material complex. Material from sources under consideration (commercial spent fuel and purchases from foreign countries) would not be available to the weapons program because of existing law and restrictions expected to be imposed by the country providing the material. Furthermore (even if these restrictions did not exist), this plutonium could not be used for conversion to weapons-grade plutonium within a time frame that would affect the need for L-Reactor, because the Special Isotope Separation process is not expected to be available in 1990 and DOE has enough fuel-grade plutonium for blending during this period.
DI-3	With these changes there is not likely to be any need for reactivation of the L-Reactor in the near future, and possibly ever. In addition, any progress in arms control would very likely further reduce demand for plutonium. In this connection it should be noted that: 1. The concept of a "build down" of nuclear weapons requiring that two old warheads be given up for each new one acquired has gained increased acceptance, and a variant of it is now reflected in the President's arms control proposal - a variant that would require that the rate of retirement of strategic weapons be at least five percent per year.	See the response to comment DI-1 regarding the scope of this EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	2. The U.S. remains committed to giving up or limiting the deployment of intermediate range nuclear weapons in Europe if a suitable agreement can be reached with the Soviet Union.	
	Finally, some of the nuclear weapons programs that would require new warheads that have been approved by the President can, and should be, seriously questioned. Examples are the MX and the enhanced radiation weapons, or neutron bombs.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

GEORGE WILLIAM RATHJENS

Born June 28, 1925 in Fairbanks, Alaska
Yale University, B.S., 1946
University of California, Ph.D. (Chemistry), 1951

Columbia University
Instructor, Chemistry, 1950-1953

Weapons Systems Evaluation Group, Office of the Secretary of Defense,
U.S. Department of Defense Scientific Advisor, 1953-1958

Harvard University
Fellowship (Office of Naval Research), 1958-1959

Office of the Special Assistant to the President (Science and *Technology*)
Member of the Staff, 1959-1960

Advanced Research Projects Agency, U.S. Department of Defense
Chief Scientist, 1960-1961
Deputy Director, 1961-1962

United States Arms Control and Disarmament Agency
Deputy Assistant Director, Science and Technology, 1962-1964
Special Assistant to the Director, 1964-1965

Institute for Defense Analyses
Director, Weapons Systems Evaluation Division, 1965-1967
Director, Systems Evaluation Division, 1967-1968

Massachusetts Institute of Technology
Department of Political Science, Visiting Professor, July 1968-July 1969
Department of Political Science, Professor, July 1969-present

United States Department of State
Deputy U.S. Representative for Non-Proliferation and *Chairman, Management Committee for American Participation* in the International Nuclear Fuel Cycle Evaluation, 1979-1980

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Dr. Rathjens graduated from Yale University in 1946 with a B.S. in Chemistry, and received a Ph.D. from the University of California in 1951, also in chemistry. He taught, and continued with research on molecular structure, at Columbia University from 1950-1953. He left Columbia University in 1953 to join the staff of the Weapons Systems Evaluation Group of the Department of Defense. With the exception of one year (1958-1959), during which he did research in physical chemistry at Harvard, he remained in Washington for the next 15 years in positions involving: the analysis of military research and development, and weapons acquisition programs; the development of national security policy, including arms control policy, in areas where technical problems were of importance; the administration of the work of others so involved and of military research and development programs.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF JOHN WINTHROP JOHN WINTHROP & CO., INC. 140 Broadway New York, New York 10005 (212) 480-9080 November 4, 1983 Mr. Melvin J. Sires, III U.S. Department of Energy Savannah River Operations Office Post Office Box A Aiken, South Carolina 29801 Dear Mr. Sires:	
DJ-1	As a landowner in South Carolina and as an American citizen, I am deeply concerned that the DOE facilities on the Savannah River and elsewhere be required to comply with all environmental standards applicable to commercial reactor sites. Furthermore, I hope I am correct in assuming that steps are being taken to avoid damage to the environment BEFORE startup. Please let me know if I can be helpful in furthering these important objectives. Sincerely yours, John Winthrop JW:ss	See the responses to comments BF-7 and BF-8 regarding the differences between SRP reactors and commercial light-water reactors, and the responses to comments AA-1, AA-3, and AF-2 regarding DOE's commitment to comply with all applicable Federal and state environmental protection regulations and to take all reasonable steps to mitigate impacts.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF B. G. CLOYD BY W. H. RICE, JR.

U.S. Department of Transportation
Federal Highway Administration
South Carolina Division Office
1835 Assembly Street
Suite 758
Columbia, South Carolina 29201
November 8, 1983

Mr. M. J. Sires, III
Assistant Manager for Health,
Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
P. O. Box A
Aiken, SC 29801

Dear Mr Sires:

Subject: Draft Environmental Impact Statement -
"L-Reactor Operation, Savannah River Plant,
Aiken, South Carolina" (DOE/EIS-0108D)

Reference is made to the draft EIS and your letter of September 23, 1983. Thank you for the opportunity to comment on the document. We do not foresee any significant effect on the highway system as a result of the L-Reactor operation. We furnished a copy of the draft to the South Carolina Department of Highways and Public Transportation and inquired if they wished us to include any comments with our response. They advised they did not have any comment for us to include.

Although we see no significant effect, we do list the following comments for your consideration:

DK-1	Shipper's safety reliance rests primarily in packaging (DOT Specification) and in specially trained escort personnel. This is in keeping with usual procedures involving high risk transportation and appears adequate on its surface.	DOE complies with DOT packaging and escort regulations regarding the transportation of high-risk materials.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DK-2	Accident risk is hypothetical since there is no prior history of accidental release of material contained in Type B vessels.	DOE takes credit for the safety record of type-B vessels in their shipping procedures, and their safety and impact assessments.
DK-3	We would be more concerned with incoming shipments of flammable products such as gasoline. If outside vendors are used, what control is exercised to assure compliance with Title 49 over these vendors? Are cargo tanks routinely examined on entry to SRP? What controls are exercised in the off-loading of products? The statement is silent in this regard.	Agreements, contracts, or purchase orders issued by DOE or its prime contractor for vendor transport services include requirements to operate within all DOT and other agency regulations. The performance of these vendors is routinely monitored to assure compliance with requirements. DOE-SR and SRP implementation plans include procedures for proper identification and examination of all shipments, including cargo tanks, entering the SRP. These plans also include procedures for off-loading and handling of various classes of materials and containers commensurate with their potential hazard. These procedures are part of the general safety practices of the Plant, but include special procedures for handling and storing high-level materials.

Sincerely yours,

B. G. Cloyd
Division Administrator

By W. H. Rice, Jr.
District Engineer

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF H. WAYNE BEAM South Carolina Coastal Council James M. Waddell, Jr., Chairman H. Wayne Beam, Ph.D, Executive Director November 10, 1983 Mr. M. J. Sires, III Assistant Manager for Health, Safety, Environment U.S. Department of Energy Savannah River Operations Office P.O. Box A Aiken, South Carolina 29801 Dear Mr. Sires: The S.C. Coastal Council remains concerned over the environmental impacts of the proposed re-start of the L-Reactor.	
DL-1	The staff has reviewed the DEIS which shows that the Beaufort and Jasper Counties portion of the coastal zone will be affected through the use of the Savannah River for drinking water and the consumption of fish and shellfish from the estuary. It is our opinion that the DEIS is not detailed enough, due to a lack of study, on the impacts of radiation from the L-Reactor and the other Savannah River Plant facilities on the estuarine environment and man's use of it.	The EIS contains an extensive discussion of radiological and ecological impacts, including cumulative impacts, due to the proposed restart of L-Reactor. These discussions are specifically contained in Sections 4.1.1.4, 4.1.2, 4.4.2, 5.1.2, 5.2.4, 5.2.5, 5.2.6, 5.2.7, and Appendixes B, C, D, and I of the EIS. As contained in the EIS, the exposure of the public to radiation resulting from L-Area operation would be minimal compared to applicable standards or the exposure from natural or other man-made radiation sources.
DL-2	The cumulative effect of all of the Savannah River Plant's operations on the estuary should be detailed so that the level of impact and health risk of the proposed L-Reactor restart can be fairly judged. The information presented to date fails to provide a comprehensive view of the Savannah River Plant radiological effects on South Carolina's coastal zone. The proposed effects of the L-Reactor should not be reviewed in such a vacuum.	Section 5.2 of the EIS describes the cumulative effects of present and proposed SRP facilities and those of other nuclear operations in the vicinity of SRP.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DL-3	It is our recommendation that the restart of the L-Reactor be delayed pending initiation of studies that will monitor the radiological effects of the Savannah River Plant's operation on the estuarine environment. In this way the actual risk to the users of South Carolina's coastal resources in the affected area from current and proposed Savannah River Plant operations can be known and evaluated. Thank you for the opportunity to comment.	The Savannah River Plant has had a continuous comprehensive environmental radiological monitoring program since before startup of the Plant in 1952. Releases from the entire Savannah River Plant are controlled to the extent practicable. The amounts of radioactive releases and their impacts on the population within an 80-kilometer radius and on downstream consumers of Savannah River water are published in an annual series of reports available to the public, entitled: Environmental Monitoring in the Vicinity of the Savannah River Plant. The most recent of these reports, for 1982, is DOE document DPSPU-83-30-1. In addition to the monitoring programs conducted by the Savannah River Plant, the States of South Carolina and Georgia and other Federal agencies also independently monitor releases. These monitoring programs are discussed in Chapter 6 of this final EIS. The current reports documenting the radiation monitoring programs of the states are Environmental Radiation Surveillance Report, Summer 1980-Summer 1982, Georgia Department of Natural Resources, and Nuclear Facility Monitoring, South Carolina Department of Health and Environmental Control.

Sincerely,

H. Wayne Beam
Executive Director

HWB:dms/0018d

cc: Senator James M. Waddell, Jr.
Mr. Duncan C. Newkirk

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF CAROLYN A. TUCKER November 3, 1983 403 Tatrall St. Savannah, GA 31401 Representative Lindsay Thomas 427 Cannon Office Building House of Representatives Washington, DC 20515 Dear Representative Lindsay Thomas:	
DM-1	I am writing to you because I am quite concerned about the impending re-start of the L-Reactor at the Savannah River Plant. Despite assurances of the safety of the reactor and the need for reactivating it that are stated in the Environmental Assessment and the draft Environmental Impact Statement, I am not convinced of either the safety or of the need. There are no plans for a containment dome or for cooling towers. A part of any radioactivity released, either planned or accidental, will end up in Savannah as well as in other parts of Georgia.	See the response to comment AB-2 regarding information in this EIS on need, the response to comment BF-7 regarding containment domes, and the responses to comments AA-1, AA-3, and AB-13 regarding cooling-water mitigation alternatives and DOE's commitment to comply with all applicable Federal and state environmental protection regulations.
DM-2	In addition is there a real need for the additional plutonium to be produced by the L-Reactor?	See the responses to comments AB-3, AB-2, BL-15, and BL-18 regarding the need for additional materials.
DM-3	I feel that it is absolutely necessary for an independent oversight committee to be established to review the L-Reactor as well as the other facilities at the Savannah River Plant. I know you are also concerned about the quality of the public health and the environment. Please use your influence to help protect these things. Sincerely, Carolyn A. Tucker	See the response to comment BQ-2 regarding existing oversight mechanisms.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF JAN BEYEA

National Audubon Society
950 Third Avenue
New York, N.Y. 10022
(212) 832-3200
CABLE: NATAUDUBON

October 25, 1983

Mr. M. J. Sires, III
Assistant Manager for Health
Safety and Environment
U. S. Department of Energy
Savannah River Operations Office
P. O. Box A
Aiken, SC 29801

Re: Comments on the D.E.I.S. Prepared for the Savannah River L-Reactor

Dear Mr. Sires:

I have reviewed the accident analysis for the Savannah River L-Reactor presented in the Draft Environmental Impact Statement* and related documents.**

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*U.S. Department of Energy, "Draft Environmental Impact Statement," L-Reactor Operation Savannah River Plant (Report DOE/EIS-0108D, P. O. Box A, Aiken, South Carolina 29801, September 1983).

**a. William S. Durant, Robert J. Brown, "Analysis of Postulated Core Meltdown of an SRP Reactor" (deleted version of final report, DPST-70-433, E. I. DuPont de Nemours & Company, Savannah River Laboratory, Aiken, South Carolina 29801, October 1970).

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	I find the following deficiencies:	
DN-1	1. The analysis considers only extremely optimistic accident sequences. In fact, only accidents much less severe than the Three Mile Island accident are considered credible. 2. No accident sequences are presented that would challenge the confinement system, despite the fact that the capacity of the system for handling escaping steam is limited.	See the responses to comments DN-2 and DN-3.
	My specific comments are as follows:	
DN-2	A) Accidents in which partial cooling of the core takes place are not considered. TMI was such an accident. In fact, although there was little actual core melting at TMI, 70 percent of the noble gases and at least 50 percent of the radioiodine escaped from the fuel.* Any impact analyses for the L-Reactor which does not consider such a challenge to the confinement system cannot be considered credible.	The release of radioiodine from the fuel to the coolant in the TMI-2 accident is largely irrelevant to an assessment of the potential for offsite exposures resulting from a similar accident at the L-Reactor. The relevant factor is the release from the coolant to the containment atmosphere at TMI-2. That release, about 1 percent of the core inventory of radioiodines and all of the noble gas inventory (Pelletier, C.A., et al., 1983. Preliminary Source Term and Inventory Assessment for TMI-2.), has been assumed to have occurred into the L-Reactor confinement and the resulting doses have been calculated to be about 900 millirem to the whole body and about 960 millirem to the thyroid of the maximum hypothetical individual. Direct comparisons of the TMI accident with postulated accidents for SRP reactors are not appropriate because of major differences in the design characteristics of the two types of reactors. Other characteristics of particular importance include the design of the fuel itself. SRP reactor fuel is a metal or metal alloy; volatile and gaseous fission products within the fuel are released only if the fuel itself melts. This is in contrast to LWR power reactor fuel such as the TMI fuel. LWR oxide fuel pellets are relatively porous and allow volatile and gaseous fission products to migrate within the fuel rod. These gaseous fission products are retained within the fuel rod by cladding. At TMI relatively little core melted. However, embrittlement of the cladding occurred while the core was uncovered. When cooling was restored to the core, the thermal shock apparently ruptured embrittled cladding. At that point, the containment of the gaseous fission products by the cladding was breached and about 60% of the inventory of

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**b. J. P. Church et al., "Safety Analysis of Savannah River Production Reactor Operation" (deleted report, DPSTSA-100-1, Rev 9/83, E. I. DuPont de Nemours & Company, Savannah River Laboratory, Aiken, South Carolina 29808, September 1983).

c. S. P. Tinnes, "Airborne Activity Confinement System Performance First Five Hours after Reactor Accident" (Memorandum to G. F. Merz, DPST-79-555, Technical Division, Savannah River Laboratory, November 1, 1979).

d. E. Nomm and H. P. Olson, "Confinement Heat Removal System Proposals" (Memorandum to G. F. Merz, DPST-74-401, Technical Division, Savannah River Laboratory, October 1976).

*Bishop, W. N., Nitti, D. A., Jacob, N. P., Daniel, J. A., "Fission Product Release from the Fuel Following the TMI-2 Accident," in Proceedings of the American Nuclear Society/European Nuclear Society Topical Meeting: Volume I Thermal Reactor Safety (Knoxville, Tennessee, April 6-9, 1980).

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	And since the L-Reactor confinement system, unlike the system of TMI, provides minimal holdup of noble gases, a 70 percent release of noble gases to the environment is a credible event. The regulatory and public health significance of a 70 percent noble gas release should be analyzed in the final impact statement. The retention of radioiodine by the confinement system would be much better than for noble gases in a TMI-like accident, because the filtration system at the L-Reactor, if working, would trap a large percentage of radioiodine released from the fuel. Perhaps only 1/1000th of the material entering the filters would escape. Thus, 35 thousand curies of radioiodine might be released, not 35 million curies that could be released in the absence of the filters. In any case, a release of 35,000 curies should be analyzed as part of the final impact statement. Furthermore, accident sequences that might damage the filtration system should also be considered. (See next section.)	noble gases was released to the reactor containment. SRP fuel does not behave in this manner. Instead, if an assembly were to partially melt, then fission products would be relased only from the portion of the fuel that melted. In a loss-of-coolant accident in which less than 1 percent of the core would be damaged, no more than 1 percent of the inventory of gaseous fission products would be released from the fuel.
DN-3	B) The L-Reactor confinement system may not be capable of handling a partial-cooling accident in which emergency cooling water is restricted by steam binding, as at TMI. The L-Reactor confinement system is primitive in comparison with the civilian power reactors. The system relies upon exhaust fans to both force escaping radioactivity through filters and to prevent overheating of the filters. Yet, the amount of steam that might reasonably be expected to be driven through the exhaust fans during a severe core overheating accident could conceivably overload them. For instance, consider an accident in which emergency cooling water is being vaporized to steam. Although the vaporization process could well be sufficent to carry off the residual heat from the reactor, thereby preventing it from melting, copious amounts of steam would be produced. In fact, the steam produced in carrying off only 50 megawatts of core power would probably be sufficient to	Specific experiments have determined the power levels for which steam binding would prevent an individual assembly from receiving coolant from the reactor plenum in the event of a reactor accident. This steam binding only affects the assemblies whose power level exceeds this critical value. Steam from one assembly will not adversely affect flow to adjacent assemblies. The reactor power level is limited so that in the event of hypothetical maximum-rate leak of coolant, the resultant damage to the reactor core is no more than 1 percent. For all credible loss-of-ccolant accidents no fuel melting is anticipated even when assuming failure of the most active component in the emergency cooling system. Consequently, steam is produced only in a few assemblies (all the rest have sufficent coolant to prevent steam formation). Ten seconds after a reactor shutdown, the power of the reactor has decayed to approximately 350MW. A maximum of approximately 1 percent (corresponding to the 1

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	overload the exhaust fans.* Yet, the L-Reactor could require much more than 50 megawatts of cooling under loss-of-cooling conditions. For instance, experimental data shows that, 10 seconds after scram, the L-Reactor would still be putting out 350 megawatts of power (assuming it had been operating before scram at maximum power of 2900 megawatts).** Experimental data concerning the decay heat rate beyond 10 seconds does not exist*** and the theoretical function used in L-Reactor safety analyses for times greater than 10 seconds is not given in the references available. Consequently, it is not possible to determine for this brief review the length of time that	percent of the core that may be damaged) of this power (3.5 MW) could be converted to steam and even formation of this amount of steam is temporary and localized within assemblies. Significant if not total quenching of this steam would occur before it reaches the reactor process room. If steam binding within an assembly ultimately leads to melting of the assembly, the molten material would be quenched in the moderator tank and no more steam would be formed. The maximum theoretical amount of steam produced under the above conditions would not challenge the integrity of the airborne confinement system. All credible accidents and some accidents not considered credible are analyzed to assure protection of the confinement system. None of the credible accidents result in enough steam formation to challenge the confinement system.

*When two fans are operating, the exhaust system can remove steam at the rate of 60 cubic meters per second (m^3/sec). [DEIS, op. cit., Volume 2, Figure G-1, P. G-15.] This figure might be cut to 36 m^3/sec. due to steam "binding." [Durant and Brown, op. cit., P. 58.] One operating fan appears to be able to exhaust gas at the rate of 35 m^3/sec. [S. P. Tinnes, op. cit., P. 6.] Consequently, it is reasonable to pick 35 m^3/sec. as a representative value under actual operating conditions. 35 m^3/sec. of escaping steam would carry off 50 megawatts of decay heat. Analysis: According to standard steam tables, the volume of steam at 212°F is 27 ft^3/lb and the energy required to convert water to steam is 1000 Btu/lb. [E.g., Handbook of Chemistry and Physics, Chemical Rubber Company, Cleveland, Ohio.] Thus, each cubic foot of steam carries with it 37 Btu in latent heat, which is equivalent to 1.4 million joules per cubic meter. Therefore, an exhaust rate of 35 m^3/sec of steam would remove 50 megawatts of power.

**Church et al., op. cit., Figure 15-18, p. 15-48.

***Church et al., op. cit., p. 15-51.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	escaping steam would overwhelm the exhaust fans. However, the time period could well be in excess of several hours.#	
	During that several hour period the pressure inside the reactor complex would become positive, driving steam and possibly radioiodine out through unfiltered paths, including the air inlet tunnel, i.e., the filters would be bypassed. Exactly how much radioiodine would be released from the fuel during this initial period is not clear, but based on TMI, it most likely would be more than the amount assumed to escape to the environment over the entire accident through the filter pathway analyzed in the DEIS. (Even minor damage could release radioiodine.)	
	Of equal seriousness is the impact on the fans of positive pressure. The fans might be damaged, or if the pressure rose to between 0.4 and 2 pounds per square inch, the fan housings would burst, rendering the fans useless.## And without operating fans, the exhaust filters would overheat, compromising their ability to retain radioiodine* released at any time during the accident. Thus, a radioiodine release much larger than 35,000 curies would become credible.	
	For all these reasons, it appears to me that the optimistic assumptions made in the DEIS concerning the adequacy of the L-Reactor confinement system are highly questionable under *plausible accident sequences*.	
	#For a conventional power reactor, the time would be about 25 minutes. [Anthony Nero, Jr., A Guidebook to Nuclear Reactors, University of California Press, Berkeley, 1979, p. 54.] However, the decay heat for the L-Reactor appears (at least initially) to be a greater percentage of the rated power than for a civilian reactor.	
	##The fans have been estimated to fail at an overpressure somewhere between 0.4 to 2 psig [Durant and Brown, op. cit., p. 581.	
	*E. Nomm and H. P. Olson, op. cit.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DN-4	In addition to concerns about the assumed release of fission products in credible accidents, I find the back up electrical system for the exhaust fans to be inadequate. In accident sequences in which electrical power is lost, the current confinement system relies on diesel generators. Yet diesel generators are notorious for failure to start. If the L-Reactor should ever be operated, an additional generator to power the fans driven by steam escaping from the damaged reactor should be installed to add an additional margin of safety. Sincerely, Jan Beyea, Ph.D. Senior Energy Scientist JB:db cc Carlyle Blakeney	There are three redundant sources of electrical power to the confinement system exhaust fans. Two of three fans are normally online although only one is necessary to maintain negative pressure in the reactor process area. A loss of normal electrical power to the exhaust fans would not cause an accident that would require the use of the fans. In any event, emergency power to the exhaust fans is available from both (1) diesel generators that supply emergency power to the reactor building and (2) dedicated diesel generators that supply power to backup motors for the fans. Based on test data explicitly for these generators, the probability that, if required, emergency power will not be available to at least one fan is less than 5×10^{-8} per demand, and the probability that there will not be emergency power to at least two fans is less than 4×10^{-6} per demand. The probability of these failures concurrent with loss-of-normal power from either of two substations is so small as to be essentially zero. The suggestion to have an additional generator driven by steam escaping from a damaged reactor is not applicable. In addition to the lack of need for an additional generator, it would be poor design practice to base the operation of a protection system upon the occurrence and consequence of the very accident it is designed to protect against.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF GEORGE P. LUPTON, M.D. 8 November 1983 2431 Terrace Way Columbia, SC 29205 Mr. Melvin J. Sires III U.S. Dept. of Energy Savannah River Operations Office Post Office Box A Aiken, South Carolina 29801 ATTN: EIS for L-Reactor Dear Mr. Sires: As a concerned U.S. and South Carolina citizen I am writing in reference to the proposed re-activation of the L-Reactor at the Savannah River Plant. I am a physician very worried about the health and environmental consequences that the proposed reactiviation may produce.	
DO-1	In order to make clear my concerns I am demanding that DOE facilities be required to comply with federal and state environmental standards applicable to commercial reactor sites.	See the responses to comments AA-3, AF-1, and BF-7 regarding DOE's commitment to comply with applicable federal and state regulations and the differences between SRP reactors and commercial light-water reactors.
DO-2	I also urge that every possible step be taken to avoid damage to the environment and possible adverse affects on the human population in that area of S.C. and Georgia before the L-Reactor has become reactivated. I am displeased with the original DOE environmental assessment that was performed. I urge you to consider the well-intentioned and very significant facts recently re-emphasized about the adverse affects of the L-Reactor on the marshlands and water supplies to a large human population. Let us not place the manufacture of weapons of destruction ahead of the safety of our citizens and the preservation of the planet. Sincerely yours, George P. Lupton, M.D.	See the responses to comments AA-3 and AF-2 regarding DOE's commitment to comply with applicable federal and state regulations and to take all reasonable steps to mitigate impacts.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF WILLIAM JH CALDICOTT MB, BS November 7, 1983 Mr. M. J. Sires III Assistant Manager for Health, Safety and Environment U.S. Department of Energy Savannah River Operations Office P.O. Box A Aiken, South Carolina 29801 Dear Mr. Sires: I wish to submit comments on the preparation of the Environmental Impact Statement (EIS) for the proposed recommissioning of the L-Reactor at the Savannah River Plant.	
DP-1	The EIS process is incomplete without definition of the need for the product of the L-Reactor, namely, additional nuclear weapons-grade material. It is self-evident that no risk to the public and to the environment is justified if the product of the reactor is superfluous, or imposes extreme and totally unacceptable hazards. The public has a right to be informed about all the risks to them and their environment, including those from the nuclear weapons that will be manufactured from the plutonium and tritium produced in the L-Reactor.	See the responses to comments AB-2 and AB-3 regarding the need for defense nuclear material.
DP-2	A recently completed study of the environmental impact of the use of nuclear weapons, conducted by Drs. Carl Sagan, Paul Erhlich et al., the results of which have been confirmed by thousands of scientists in this country and around the world, including the Soviet Union, has shed new and important light on this subject (Parade Magazine, Sunday October 30, 1983 [to be published in detail in "Science"]). It has shown that with the use of only a small fraction (10 percent, or less) of the existing strategic arsenals of the US and USSR, all life on earth may be destroyed. Currently the two arsenals contain a total of about 13,000 megatons of explosive capacity. It has been recommended as a matter of urgency, in light of the above findings, that the combined arsenals be reduced to levels below	These comments are outside the scope of the EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	the threshold for these catastrophic environmental effects, which is thought to be in the order of 1,000 megatons. The atmospheric effects of multiple nuclear explosions would include an extended period of darkness (lasting for weeks, and possibly months), caused by the injection of dust and debris into the atmosphere by multiple nuclear ground-burst explosions, and photochemical smog from fire-storms. The darkness would stop photosynthesis, killing animals and humans which are all dependent on plant life. It would also induce dramatic cooling, probably to between -25 and -50 degrees F in the northern hemisphere: the temperature differential would force these changes on the southern hemisphere also. As the atmosphere cleared, lethal levels of ultraviolet radiation would reach the earth's surface because of ozone depletion. The study also showed that the levels of radiation at the earth's surface would be higher than previously estimated, and extremely threatening to human existence. The above information adds weight to the conclusions of experimental biologists, and the medical and scientific communities of this country, as expressed in resolutions of their national societies. For example, the Federation of American Societies for Experimental Biology (FASEB), with a total membership of 18,267 scientists, and the American Association for the Advancement of Science (AAAS), with a membership in excess of 25,000, passed resolutions outlining the dangers of nuclear weapons and calling for both an end to the nuclear arms race, and increased efforts dedicated to the persuit of arms reductions negotiations. In light of this knowledge, the possession by any country of an arsenal of nuclear weapons beyond the capacity to destroy all life on earth must be seen as a reckless disregard for all life. Both the US and the USSR currently have such dangerous excess capacities. The L-Reactor will be used to increase the present US nuclear stock-pile and as such is a real and lethal danger to all life on this planet. How can an EIS seriously concern itself with the environment if the most important environmental impacts are ruled as classified, and excluded from the public debate? Obviously it cannot.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	It is critical for the integrity of this enquiry, and the safety of the people of this region, the nation, and the world that the restrictions of classification be lifted, so that the wisdom of all the people can be applied to their collective survival. Nothing less is conscionable in a free and democratic society.	
	Department of Radiology Children's Hospital Medical Center 300 Longwood Avenue Boston, MA 02115	Yours Faithfully, William JH Caldicott MB,BS Assistant Prof. Radiology, Harvard Medical School

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF TIMOTHY F. ROGERS

South Carolina House of Representatives
P.O. Box 11867
Columbia SC 29211
Telephone 758-5240

November 10, 1983

Mr. M. J. Sires
Assistant Manager for Health,
Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
Post Office Box A
Aiken, SC 29801

Dear Mr. Sires:

I would like to submit these comments for the record concerning the startup of the Savannah River Plant's L-Reactor, and the draft environmental impact statement.

Not being a technical expert, I am not going to comment specifically on the accuracy or completeness of the draft's treatment of environmental areas. Rather, I will comment in general about assumptions which appear to be made in DOE's planning for the L-Reactor.

DQ-1 Public pronouncements from DOE in recent weeks refer to a January startup date. The draft EIS dismisses mitigation alternatives because to protect our environment is supposedly impossible due to "production schedule" demands.

The purpose of the EIS is to evaluate the environmental consequences of the proposed restart of L-Reactor. In accordance with the Council on Environmental Quality's regulations implementing the procedural provisions of NEPA, the Department's preferred alternatives (including mitigation alternatives) are identified in this final EIS.

The Record of Decision on this EIS will state the alternatives to be implemented. The Record of Decision will address the alternatives considered in reaching the decision, environmentally preferable alternatives, and preferences for alternatives based on technical, economic, and statutory missions of the agency, and whether all practicable means to avoid environmental effects from the selected alternative have been adopted.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DQ-2	This claim, supposedly founded on information inaccessible to the public, has been called into question recently by experts in the field of strategic policy, such as Dr. George Rathjens, whose knowledge cannot be disputed. According to Dr. Rathjens and others, changes in weapons systems since the 1980 decision to restart the reactor, and other alternative production possibilities, make any claim that the immediate startup is essential appear to be absurd. I would request that the final EIS deal with this question in a more thorough way. I do not believe that a general explanation in this area would present a national security threat. Given that the information appears to show that a delay in L-Reactor startup for three years would have no effect on national security (according to the testimony of Dr. Thomas B. Cochran of the Natural Resources Defense Council) I would suggest that the following goals be reached before startup:	As indicated in Section 1.1.1 and Appendix A (classified) of the EIS, the defense nuclear material requirements of the FY 1984-1989 Nuclear Weapon Stockpile Memorandum support the need to restart L-Reactor as soon as practicable. In addition, Section 2.1.3 of the EIS summarizes the fact that implementation of partial production options that would provide the greatest material production would only provide a small fraction of needed defense nuclear materials that could be produced by L-Reactor. Specific response to the comments of Dr. Rathjens and Dr. Cochran are contained in this Appendix under comment letters "DI" and "BL."
DQ-3	1) The phaseout of all seepage basins on site, including those in the support facility areas. Seepage basins for waste disposal are not acceptable environmental practice, and to increase the load on these basins before dealing with already severe groundwater contamination should be avoided.	As discussed in Chapter 5 of this EIS, the incremental L-Reactor impacts due to the use of seepage basins are expected to be minor. The proposed restart of L-Reactor is independent of the continued use of these seepage basins in that the seepage basins in the A-, M-, F-, and H-Areas are currently being used in support of other operations that are not within the scope of this EIS. DOE is committed to perform mitigative actions at SRP to reduce pollutants released to the ground water and to establish with the State of South Carolina a mutually agreed-on compliance schedule. The State of South Carolina (SCDHEC), U.S. Geological Survey, and Environmental Protection Agency are reviewing the detailed ground-water monitoring being performed at SRP to track the movement of the chlorinated hydrocarbon plume from M-Area operations (see Sections 5.1.1.2 and F.5.4) and to provide information for cleanup operations. These agencies are also reviewing proposed plans for impeding the growth of the contaminant plume and for removing the chlorinated hydrocarbons with a combination of recovery wells, a large air stripper (to be permitted by SCDHEC), and an injection well and/or spray irrigation system, if required. As noted in Section F.6, the SRP ground-water management and protection plan will be the subject of a separate NEPA review.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DQ-4	2) The implementation of some sort of cooling water discharge alternative to direct discharge into Steel Creek. Any alternative chosen should comply with state thermal standards before startup. Although it is understandable that operating reactors be allowed to come into compliance over a period of time, it is not acceptable to start up the L-Reactor, incur severe environmental damage, and put into place mitigation measures at some time in the future.	Section 4.4.2 of the EIS, which discusses cooling-water mitigation alternatives, has been revised based on public comments received on the draft EIS. Specifically, Section 4.4.2 has been revised to provide a detailed discussion of additional combinations of various cooling-water. In Section 4.4.2, each of the cooling-water mitigation systems is evaluated for attaining the thermal discharge limits of the State of South Carolina. Section 4.4.2 and a revised Appendix I, Floodplain/Wetland Assessment, discuss the wetland impacts of each of the systems considered. The Department of Energy has been reviewing and evaluating alternative cooling-water systems for L-Reactor. Based on these reviews and evaluations, and consultations with the representatives of the State of South Carolina regarding a mutually agreed upon compliance approach, a preferred cooling-water mitigation alternative is identified in this EIS. This preferred cooling-water alternative is to construct a 1000-acre lake before L-Reactor resumes operation, to redesign the reactor outfall, and to operate L-Reactor in a way that assures a balanced biological community in the lake. The Record of Decision prepared by the Department on this EIS will state the cooling-water mitigation measures that will be taken which will allow L-Reactor operation to be in compliance with the conditions of an NPDES permit to be issued by the State of South Carolina.
DQ-5	3) The implementation of some sort of improved safety features which would bring the L-Reactor into compliance with standards demanded of commercial reactors, including those having to do with possible dangers to the public in the case of a severe accident. In general, I believe that the reactors - and all the facilities at the Savannah River Plant - should comply strictly with all regulations which apply to commercial reactors. And the Department of Energy should obey all laws and regulations which a commercial industry would face.	Chapter 7 of the EIS presents the Federal and state environmental protection regulations that are applicable to the restart of L-Reactor. The restart of L-Reactor will comply with all of these regulations. For example, the proposed restart of L-Reactor will be in compliance with an NPDES permit issued by the State of South Carolina, and the restart of L-Reactor will be in compliance with DOE radiation protection standards that are comparable to those of the Nuclear Regulatory Commission (10 CRF 20) for a production facility (i.e., 500 millirem to the whole body in any one calendar year). With respect to engineered safety features such as a containment dome, the need for specific engineered safety features is based upon limiting potential radiological consequences. The potential radiological consequences are related to the design and operation of the specific type of reactor being considered; for example, the Fort St. Vrain reactor, which is a gas-cooled

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		commercial reactor in Colorado, has no containment dome and was licensed for operation by the NRC.
DQ-6	It is simply not sufficient to respond that national security demands a certain schedule - with no explanation in the face of increasing evidence that such is not the case - and continue to contaminate our environment. The toxic pollution of the Tuscaloosa Aquifer is a threat to our security perhaps more immediate than any we face if the L-Reactor startup is delayed. Thank you. Sincerely, Timothy F. Rogers TFR/rhl A54	See the responses to comments DQ-1 through DQ-5.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF DANIEL L. CHILDERS

University of South Carolina
Columbia, SC 29208

Marine Science Program
(803) 777-2692

November 10, 1983

Mr. M. J. Sires, III
Assistant Manager for Health,
Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29801

Dear Mr. Sires:

As a part of the public comment process provided for by the National Environmental Policy Act of 1969, this letter is directed at the draft Environmental Impact Statement (Draft EIS) prepared for the Savannah River Plant L-Reactor (DOE/EIS-0108D). My comments are both general--regarding the extensive loss of valuable wetlands and bottomland forests, and the adverse and possibly illegal effects on wildlife--and specific--regarding the failure of the Draft EIS to establish ecosystem bounds which would allow adequate study of large scale impacts of the L-Reactor operation.

I am currently a masters degree candidate in the Marine Science Program at the University of South Carolina, Columbia, SC. My training is in ecosystems ecology, with particular emphasis on wetlands, and I am presently working on the modeling of salt marsh ecosystems. This letter contains my interpretations, comments, and recommendations only. I do not represent the University of South Carolina, the Marine Science Program, or any person affiliated with either.

DR-1 There are a number of environmentally devastating effects that the L-Reactor restart would have on the Steel Creek ecosystem. It is unfortunate, and perhaps illegal, that these destructive

Sections 3.6.1, 4.1.1.4, 5.2.4.1, and Appendixes C and I address the impacts to wetlands from the L-Reactor reference case thermal discharge. Section 4.4.2 and Appendix I address

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	consequences have been essentially ignored as "inevitable" by the Department of Energy. Among the effects to which I am referring, one of the most significant is the immediate loss of nearly 1000 acres of freshwater wetlands and bottomland forests. By itself, this prospect is tragic. To date, over half of the 215 million acres of wetlands once found in the contiguous United States have been lost, and presently over 485,000 acres are lost every year. Clearly, the loss of the Steel Creek wetlands must be avoided. Beyond aesthetic considerations, these wetlands are crucial to the environmental stability and ecological balance of the surrounding ecosystem. They are intricately linked to the reduction of hydrologic storm effects and to the efficient removal of nutrients and sediments from the water column. These wetlands also provide critical habitat to a wide diversity of wildlife--vertebrate and invertebrate. Habitat interspersion and isolation from public hunting make the Steel Creek delta and Savannah River Swamp important sanctuaries and refuges for regional waterfowl (Page 3-51, EIS). American alligators, listed and protected as an endangered species by the U.S. Fish and Wildlife Service, use the Steel Creek delta and swamps as feeding and breeding grounds (page 3-50, EIS). American alligators are sensitive to increases in ambient temperature, and [irrespective of wetlands losses] the elevation of the local water temperatures above the alligator's tolerance limits, as proposed, may have [illegal consequences.	wetland impacts associated with the implementation of a cooling-water mitigation alternative. Critical habitat, as defined and protected by the U.S. Fish and Wildlife Service, does not exist on the SRP, including the Steel Creek ecosystem. Chapter 7 of this EIS has been revised to reflect the current status of consultations with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. Also see the response to comment AA-1 regarding the cooling-water alternatives in this Final EIS--including DOE's preferred alternative--and the responses to comments AD-3, AF-2, and AP-4, regarding the wood stork, American alligator, and cooperation with the Department of Interior in using the Habitat Evaluation Procedures (HEP).
DR-2	Heated water would have a drastic and detrimental effect on the anadromous American shad population that spawns in the Steel Creek/Savannah River region. Gravid fish would be completely isolated from their spawning grounds by an impenetrable thermal barrier (Appendix C, page 47, EIS). In many estuarine systems, such as the Chesapeake Bay, drastic reductions in American shad fisheries have been linked to the sensitivity of this anadromous species to disruption of its freshwater spawning grounds.	Section 4.1.1.4 of the EIS addresses the ecological impacts to anadromous fish, including the American shad for the direct discharge of cooling water. Isolation of spawning grounds above the mouth of Steel Creek could occur with direct discharge, but analysis of data supported by prior studies show that a zone of passage will be maintained in the Savannah River. Sections 4.4.2., 4.4.2.6, 4.5, and Appendix L of this Final EIS discuss DOE's preferred cooling-water alternative. This alternative would provide a balanced biological community in a 1000-acre lake and would not affect spawning of riverine and anadromous fishes below the delta of Steel Creek.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DR-3	Certainly, the details of proposed general ecological losses are far more extensive than I have mentioned here. The point of these few important examples cited is to emphasize the extensive ecological degradation that may occur, and to underline the obvious importance of preventing such potential losses. However, the primary objective of this letter is to present an important inadequacy of the Draft EIS with regard to an insufficient coupling of ecological destruction, environmental degradation, and hydrological changes with the effects of each of these on the entire Savannah River ecosystem. The first major misconception of the EIS is in regard to the arbitrary boundaries applied to the threatened ecosystem. These boundaries, and thus the extent of the EIS, include only Steel Creek and the Savannah River Swamp (where Steel Creek meets the Savannah River). In a lotic [flowing water] situation, such as this, particularly where impacts are being projected, it is crucial that the ecosystem in question be considered beyond the limit of any possible downstream impact. In the L-Reactor situation, this boundary must, by necessity, extend through the estuarine zone of the Savannah River and to the point in the coastal oceanic environment where the Savannah River has no significant effects on the local ecology and environment. This is because of the inherent dependence of flowing-water ecosystems on upstream sources of energy, the most important of which is suspended particulates--detritus. Detritus-based food webs are the most significant feature of aquatic ecosystems, particularly in estuarine subsystems. In a river dominated ecosystem such as the estuarine Savannah River, fluvial detrital inputs provided the bulk of the energy base for food webs. This riverine detritus is derived from either terrigenous runoff or from erosion of bottom sediments. It is this erosional source that is important here.	In addition to the detritus that is produced by the Steel Creek ecosystem, the estuarine zone of the Savannah River receives detrital inputs from aquatic and terrestrial habitats as far up river as Clarks Hill Reservoir, a distance of approximately 220 river miles. The Steel Creek ecosystem is emphasized in the EIS because it is the area of greatest potential impact. In addition to extensive ecological analyses in the immediate vicinity of the SRP, studies have also been performed in estuarine environments in the vicinity of Savannah, Georgia.
DR-4	According to the Draft EIS, page 3-61, about 284 curies of radiocesium have been discharged into Steel Creek since 1955. Because cesium displays a characteristic tendency to flocculate with clay and silt particles, most of this radiocesium is associated with the clay/silt sediments of Steel Creek, the Steel Creek delta, and the Savannah River Swamp. In Steel Creek and the delta, 69% of the cesium is associated with the upper 20 cm of sediments, and 86% with the upper 40 cm (page 3-62, EIS). The swamp shows even more concentrated cesium levels, with 70%	Section 3.7.2.1 and Appendix D discuss the distribution of cesium-137 in Steel Creek-Creek Plantation Swamp soils, and the inventory of cesium-137 remaining in these areas. Information provided in Sections D.2 and D.4.5 shows that the concentration of cesium-137 is greatest in Steel Creek, not in Creek Plantation Swamp. An area in Steel Creek, about 580 acres, contains about 0.106 curie per acre. This is 4.7 times the 0.022 curie per acre found in Creek Plantation Swamp, which has an area of 940 acres.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	of all cesium associated with the top 6-7 cm of sediments. It should be noted that the swamp discharges directly into the Savannah River proper. The Steel Creek delta is a typical fluvial deltaic fan with organic and alluvial deposits overlying a sand layer and stabilized by vegetation. The surface depositional layer is 65% clays and silts (Table 3-18, EIS). In wetland environments, submerged aquatic vegetation and emergent vegetation stimulate the settling of fine colloidal particles (clays and silts) by reducing local water velocities and effectively holding these fine sediments in place. This vegetation is critical to maintenance of the substrate during storm events as well, when it serves to dampen the erosional energy of increased discharge. In environments (such as Steel Creek, the delta, and the swamp) where the surface sediments are contaminated, it is even more critical that this vegetative buffer be maintained. The initial effect of cooling effluents released at 70+°C (160°F) into Steel Creek, as proposed, would be to kill off this crucial vegetation. This is documented in the Draft EIS.	The importance of vegetation in soil stabilization and reducing flow rates is well known; it accounts, in part, for the facts that cesium-137 distributions in Creek Plantation Swamp have not changed areally and that the cesium-137 is confined to the upper centimeters of swamp soils. Historic data, however, show that the vegetation of Creek Plantation Swamp will not be affected appreciably if direct discharges of L-Reactor cooling water to Steel Creek are resumed. In contrast, the vegetation in the Steel Creek-delta area will be adversely impacted and much of this vegetation containing cesium-137 will be transported to the Savannah River. The estimate of cesium-137 transport from Steel Creek includes 0.4 curie as contaminated vegetation during the first year.
DR-5	In addition to the thermal stresses noted above, drastic increases in flow rates and stream discharge due to the L-Reactor operation will contribute to the destruction of essential vegetative buffers in the Steel Creek ecosystem. The expected average base flow discharge of Steel Creek at Road A, midway between the L-Reactor and the Savannah River Swamp, is 1 m^3/s, with maximum storm even discharges of 4-8 m^3/s (page 3-22, EIS). The 15 years this system has had to "recover" since the L-Reactor shutdown is a short time, ecologically. No aquatic ecosystem (as I have defined here) can reach the species diversity and niche separation essential for stability in this period of time, and an unstable, developing ecosystem such as that found in Steel Creek is more vulnerable to environmental perturbations. More importantly, the Steel Creek-Savannah River Swamp subsystem has "evolved" under a standard flow regime of 1 m^3/s, with storm maxima of 4-8 m^3/s. The proposed effluent discharge from the L-Reactor into this system is 11 m^3/s, far above naturally occurring rates. Even if thermal stress was eliminated, this drastic and immediate increase in base flow could not be tolerated by the submerged and emergent plant communities.	The relationship between species diversity and ecological stability is not clearly understood, nor is the scientific community in agreement that stability can ever be measured. As contended, however, if thermal stress was eliminated, flow rates will destroy nearly all of the submerged and emergent plant communities of the Steel Creek corridor and portions of its delta. Impacts to vegetation from the discharge of cooling-water are discussed in Section 4.4.2.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DR-6	The result of combined thermal and flow stresses, at proposed levels, would be to eliminate the vegetation crucial to maintenance of the contaminated Steel Creek, deltaic, and swamp sediments. Coupled with a 12-fold increase in the base flow discharge, elementary hydrology predicts rapid erosion of these fine sediments and virtually complete entrainment in the water column. The radiocesium would then be taken up quickly by bacteria associated with the detrital particles, and by benthic and nektonic detritivores and omnivores. Thus, as this plume of radiocesium-contaminated suspended sediments flows with the Savannah River, it is being incorporated into the important detrital food web, and the result is an apparent "dilution" of cesium in the water column (reported in the EIS). Within the food web, however, a classical case of biomagnification will concentrate radiocesium levels at an exponential rate across trophic levels, from bacteria and zooplankton to upper carnivores and omnivores (both benthic and nektonic). Many of these upper trophic level species living in the Savannah River and the Savannah River estuary support important local fisheries, and as a result man may be the eventual consumer and concentrator of the radiocesium presently trapped in Steel Creek sediments. The key concept here is the dynamic quality of lotic ecosystems. The effects of cesium on downstream populations are functions not of the cesium levels detected downstream, as is implied by the Draft EIS, but rather of the trophic level interactions occurring throughout the ecosystem. Until this critical aspect of the radiocesium question has been examined, the Environmental Impact Statement is not complete.	As noted in Section D.2.3.1, less than 20 percent of the cesium-137 currently being transported from Steel Creek is associated with the suspended sediment (detrital) fraction. About 80 percent is transported in the dissolved-colloidal fraction. This situation is not expected to be altered appreciably after the loss of vegetation in the Steel Creek corridor-delta area. Bioaccumulation is discussed in Appendixes B and D and is also taken into account in the dose calculations presented in Section B.3. The dose calculations are conservative because they did not consider the decrease in cesium-137 concentration with distance downstream from the mouth of Steel Creek. A decrease of 52 percent has been measured between the Highway 301 and Highway 17 bridges over the Savannah River.
DR-7	The National Environmental Policy Act of 1969 initiated the Environmental Impact Statement process to protect our natural environment from unnecessary and irresponsible damage. While I do not want to open the "Pandora's Box" issue of the real, or apparent, need for operation of the L-Reactor, I will point out that it is now accepted by all parties involved that a delay in the scheduled restart of the L-Reactor will have no significant impact on the defense industry, or on national security. There is no reason for restarting the reactor until all environmental and safety questions have been answered.	See the responses to comments BL-15 and BL-19 regarding the need for defense nuclear materials.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
DR-8	It is in the best interest of the public and the Steel Creek/ Savannah River ecosystem that the Savannah River Plant L-Reactor remain dormant. I stand firmly behind this decision as the only viable alternative. I do realize, however, that this solution is probably not favored by the Department of Energy "decision makers." To that end, I pose the following limitations to L-Reactor operation, and I will actively protest any attempts to operate this unit without at least these rudimentary protective measures: 1. Effluent temperatures into Steel Creek must never exceed 30°C, and appropriate cooling apparatus must be installed to insure this upper limit. Furthermore, to minimize effects of the outfall on ambient seasonal trends in temperature locally, the effluent temperature must not exceed 20°C in the winter. 2. Effluent discharges of 11 m^3/s are unacceptable. The reactor restart must be gradual, and outflow controls must be installed in order to achieve the following outfall flow regime: - Initially, discharge flow must not exceed 2 m^3/s - over a period of 2-3 years, discharge is gradually increased at a rate not to exceed 2 m^3/s per year - effluent discharge must never exceed 8 m^3/s - during storm events, discharge is reduced so total flow through the Steel Creek ecosystem never exceeds 8-10 m^3/s In monitoring both of these parameters (temperature and discharge), it is important that only instantaneous maxima be considered and not time averaged values. In order to protect critical submerged aquatic and emergent vegetation, and thus prevent erosion of contaminated sediments resulting in cesium poisoning of the entire Savannah River ecosystem, these recommendations must be viewed as minimal, and expanded upon. Neither technology, nor money, nor time is a limiting factor, and the SRP L-Reactor must operate within the confines of federal law.	See the response to comments AA-1 and AB-13 regarding cooling-water mitigation alternatives in this final EIS. Section 4.4.2 of this EIS, discusses impacts due to both temperature and flow rate of the cooling-water mitigation alternatives. Also see the response to comment AA-2 regarding resuspension of radiocesium and its relationship to EPA drinking-water standards.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Please send me a copy of the finalized Environmental Impact Statement for the SRP L-Reactor restart proposal, and keep me fully informed about the full decision-making process. If you have any questions regarding my observations, comments, or recommendations, please feel free to contact me. Thank you for your time, Sincerely yours, Daniel L. Childers 803 777 3945	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF ALEXANDER SPRUNT, IV

National Audubon Society
Research Department
115 Indian Mound Trail
Tavernier, Fla. 33070
(305) 852-5092

9 November, 1983

Mr. M. J. Sires, III
Assistant Manager for Health, Safety
and Environment
Department of Energy
Savannah River Operations Office
P. O. Box A
Aiken, SC 29801

Dear Mr. Sires:

This letter is in response to the Draft EIS for L-Reactor Operations, Savannah River Plant. We are concerned with the effect of loss of foraging habitat for Wood Storks on the future of the species.

DS-1 Our research has shown that the Wood Stork population has declined from about 10,000 pairs in 1960 to about 4300 pairs in 1983. Loss of foraging areas that could cause a drop in productivity or, at worst, complete failure or abandonment of a colony site could have serious effect on overall stork populations.

Data given in the Draft EIS indicate that more Wood Storks foraged in 1983 on the Savannah River Plant (SRP) than on surrounding areas. This, however, is incomplete information. The first sighting given is for 23 June, about two months after nesting began at the Birdsville colony. Information needs to be gathered for the entire nesting period and the percentage of

The final EIS in Appendix C, Section C.3.2, contains more detailed information on the wood stork than was available for the preparation of the Draft EIS. In addition, Chapter 7 of this final EIS presents the current status of consultations with the U.S. Fish and Wildlife Service on the woodstork. Responses to comments contained in comment letter "AD" also provide additional information on the woodstork.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	storks foraging at the SRP compared with that for the surrounding area in order to determine the importance of the SRP lands as foraging sites. To proceed with restarting *L-Reactor on the basis of the partial information given would* be a blatant disregard for the future of a proposed endangered species.	
DS-2	We see no mention of plans to provide alternate foraging habitat before the current SRP sites are destroyed by the proposed start-up of L-Reactor. Further, we see no serious consideration of <u>any</u> of the 12 alternatives to direct discharge into Steel Creek previous to initial start-up. In view of the possible damage to Wood Stork populations and our concern for the future of this species, we object to the start-up of L-Reactor until adequate research and mitigation can be agreed upon. Very truly yours, Alexander Sprunt, IV Research Director	The mitigation of thermal impacts to endangered species could be attained by the implementation of alternative cooling systems, which are described in Section 4.4.2 and Appendix I of the EIS. Also, see the response to comment AA-1 regarding cooling-water mitigation alternatives.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF LINDA MORGAN Linda Morgan 1011 Woodland Drive West Columbia, South Carolina 29169 November 11, 1983 Mr. Melvin J. Sires, III U.S. Department of Energy Savannah River Operations Office Post Office Box A Aiken, South Carolina 29801 Dear Mr. Sires,	
DT-1	Protecting our environment has future implications for the welfare of our citizens. State and Federal regulations for commercial nuclear reactors were carefully formulated to allow for protection of our environment, as well as to allow for production of energy. At the present time, weapons materials are being produced at the Savannah River site without regard to the state and Federal regulations. Reactors at SRP can comply with regulations and still produce materials that the government feels is necessary. An overriding concern for me is the damage inflicted on the environment. I would like to see the operations at SRP comply with state and Federal regulations as soon as possible and that steps be taken to ensure that the L-Reactor comply with the regulations before startup. Sincerely, Linda Morgan	See the responses to comments AA-3 and AF-2 regarding DOE's commitment to comply with applicable federal and state regulations and to take all reasonable steps to mitigate impacts, and the response to comment BF-7 regarding differences between SRP reactors and commercial light-water reactors.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF ROBERT WINTHROP II Groton Land Company, Inc. Route 1, Box 98 Luray, South Carolina 29932 (803) 625-4160 November 11, 1983 Mr. Melvin J. Sires, III U.S. Department of Energy Savannah River Operations Office Post Office Box A Aiken, SC 29801 Dear Mr. Sires,	
DU-1	I would like to register my concern about safety at the Savannah River Plant, specifically the startup of the L-Reactor. I urge you to do everything in your power to make sure that the L-Reactor is not made operational before it is ascertained to be completely safe.	See the response to comment CF-3 regarding startup of the L-Reactor, and the responses to comments AA-3 and AF-2 regarding COE commitments to comply with applicable Federal and state environmental protection requirements and to take all reasonable steps to mitigate prior to restart.
	Yours sincerely, Robert Winthrop II RW:JJ	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF LIZ PAUL

GROUNDWATER ALLIANCE
Box 4090
Ketchum, Idaho 83340

Mr. Melvin J. Sires, III
U.S. Department of Energy
Savannah River Operations Office
Post Office Box A
Aiken, South Carolina 29801

Subject: Comments on DEIS for L-Reactor

Mr. Sires,

DV-1 Regardless of the local environmental impact of resumption of operations of the L-Reactor, which stand alone as reason enough to never operate the reactor again, operation of the L-Reactor will bring the world closer to a nuclear exchange which would have catastrophic effects on the global environment. The production of nuclear materials in the L-Reactor will allow the U.S. to increase its nuclear arsenal creating greater global tension which may spark a nuclear exchange. The simple presence of an increased nuclear arsenal also increases the possibility of error, human or technical, which may cause a nuclear exchange.

The national policy on nuclear weapons, their deployment, and the need for increased weapons is beyond the scope of this EIS.

Explosion of only a small portion of the nuclear warheads existing today will damage the global environment so severely that the continued existence of life will be in question.

> "Enormous amounts of light-absorbing and light reflecting particulate debris will cloak the atmosphere in a dark veil which will hinder sunlight for months. In the Northern Hemisphere vast fires will almost certainly sweep over expanses of forest land and agricultural fields, and these fires along with those in oil and gas fields ignited by the thousands of nuclear explosions will load the lower atmosphere with tiny particles of tar, soot and ash. When the fires burn out and the particles eventually fall to

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

the ground, the changed chemistry of the atmosphere would be such that a severe photochemical smog could form over much of the Northern Hemisphere...A large reduction of the stratospheric ozone layer is also possible...In addition to wartime destruction and poisoning, the natural environment might suffer such grave long-term changes as to severely threaten the survivor's fight for recovery."*

The L-Reactor must be decommissioned not restarted. Operation of C, K and P reactors at SRP and the N reactor at Hanford must stop also.

Sincerely,

Liz Paul, Groundwater Alliance

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*Ambio, Royal Swedish Academy of Sciences, Volume XI, Number 2-3, 1982.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF M. R. JOHNSON	
	Mr. Melvin J. Sires, III U.S. Department of Energy Savannah River Operations Office P. O. Box A Aiken, SC 29801	
	Dear Sir;	
DW-1	I am sending this letter to let you know of my concern over the restart of the L-Reactor at the Savannah River Plant. This reactor is obsolete and if reactivated will not conform to NRC standards and will further strain relations between the citizens of South Carolina and the Savannah River Plant.	See the responses to comments AF-1, BF-7, and BF-8 regarding the differences between SRP reactors and commercial light-water reactors.
	Please let me know of any further opportunity for public comment and concern.	
	Sincerely,	
	M. R. Johnson 16 Meadow St. Lyman, SC 29365	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF SALLY BATTLE	
	Mr. Melvin J. Sires III U.S. Dept of Energy Savannah River Operations Office PO Box A Aiken SC 29801	
	This is a confirmation copy of a telegram addressed to you:	
DX-1	Protect our environment: before any L RX startup assure DOE facilities compliance with state and Federal standards applicable to commercial reactor sites.	See the responses to comments AA-3 and AF-2 regarding DOE's commitment to comply with applicable federal and state regulations and to take all reasonable steps to mitigate ~~impacts~~, and the responses to comments AF-1, BF-7, and BF-8 regarding the differences between SRP reactors and commercial light-water reactors.
	Respectfully, Sally Battle 418 Maple Columbia, SC 29205 21:41 EST MGMCOMP	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF JOHN E. ALCOCK United States Department of Agriculture Forest Service Southern Regional Office 1720 Peachtree Rd., NW Atlanta, GA 30367 Reply to 1950 Date October 31, 1983 Mr. Richard P. Denise Acting Manager Department of Energy Savannah River Operations Office P.O. Box A Aiken, South Carolina 29801 Dear Mr. Denise: The USDA Forest Service has reviewed the DEIS, titled, "L-Reactor Operation, Savannah River Plant, Aiken, South Carolina." Our personnel at the SRP and in the Regional Office in Atlanta were involved in the review.	
DY-1	We have no major comments on the DEIS. One editorial change should be made in the FEIS. In Appendix C, page C-71, second paragraph, last sentence, the amount of seedlings planted in 1980 should be changed to 1,530,000 seedlings of loblolly pine and 160,000 seedlings of longleaf pine. We appreciate the opportunity to review this DEIS on the "L-Reactor Operation." John E. Alcock Regional Forester cc: SRFS WO (EC)	The change has been made as noted.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF LARRY L. CALDWELL

November 10, 1983
1449 Thayer Drive
Richland, WA 99352
Phone: (509)-946-9039

Mr. M. J. Sires, III, Assistant Manager
Health, Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
Aiken, South Carolina 29801

Mr. Sires:

Attached are my comments on the Draft Environmental Impact Statement: L-Reactor Operation Savannah River Plant Aiken, S.C. (USDOE [DOE/EIS-0108D], September 1983, 2 Volumes) pursuant to Federal Register notices and appropriate Federal statutes.

Sincerely yours,

Larry L. Caldwell

LLC/lb

Distribution: (4) to Savannah River
(2) to file

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT L-REACTOR OPERATION SAVANNAH RIVER PLANT AIKEN, S. C.	
	Larry L. Caldwell 1449 Thayer Drive Richland, WA 99352 November 10, 1983	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	After having perused the Draft Environmental Impact Statement: L-Reactor Operation Savannah River Plant Aiken, S C. (USDOE [DOE/EIS-0108D], September 1983, 2 Volumes), I am, indeed, incensed and, at the same time, sick-at-heart. That so-called "rational and intelligent" people could produce such a document is apt comment on the psychosis that has brought us Savannah River, Oak Ridge, Hanford, etc., etc., etc., and pointedly illustrates that George Orwell's 1984 has already arrived.	
DZ-1	With over 16,000 million equivalent TNT tons of nuclear weaponry crammed into every cranny of the globe--enough nuclear weaponry, by the way, for over three (3) tons/person on the *earth--to rationalize, as this DEIS does, that more* weapons-grade plutonium-239 and tritium is necessary to insure "national security" is the height of Orwellian "newspeak" and indicative of a "world-turned-upside-down" mentality. To openly advocate such nonsense borders on the insane. For any Administration to propose such a policy through something called a "Nuclear Weapons Stockpile Memorandum" is sad. And, for the Savannah River Operations Office to blindly follow this lead--ala the brown-shirts of Nazi Germany--is sickening. If we learned anything from the Nuremburg experience, it was that ultimately each of us are responsible for our own actions before the bar of International justice. We cannot cite higher authority to excuse crimes against our fellow humans. The people who compiled this DEIS should carefully consider that fact in preparation of the final EIS. As for myself, I am opposed to the "restart" of Savannah River's L-Reactor under any circumstances that the Administration/Department of Energy/Savannah River Operations Office can concoct. It is not necessary; we do not "need" it; it will be destructive to our frail environment, a wasteful expenditure on an already strained treasure, a squandering of our natural resource, and a dangerous threat to humankind. I will not, therefore, dignify the warped reasoning and the deplorable science contained in this DEIS with any further comment.	These comments are outside the scope of this EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF GEOFFREY I. SCOTT, PH.D., and CHARLES E. FEIGLEY, PH.D. University of South Carolina Columbia, S.C. 29208 School of Public Health Department of Environmental Health Sciences Benson School, Room 306 (803) 777-6994 November 11, 1983 Mr. M. J. Sires Asst. Manager Health, Safety and Environment U.S. DOE Savannah River Operations Office P.O. Box A Aiken, SC 29801 Dear Sir: This letter is written in response to review of the Draft EIS prepared by the U.S. Department of Energy in regards to environmental impacts resulting from the start-up of the L-Reactor. Close inspection of this document by members of the faculty in the Department of Environmental Health Sciences at the University of South Carolina, has revealed several deficiencies or shortcomings in the proposed restart of the L-Reactor including:	
EA-1	(1) Deficiencies and inadequate consideration of the increased quantities of hazardous waste generated from restart.	See the responses to comments DA-2 through DA-7 regarding hazardous waste.
EA-2	(2) Inadequate consideration of these additional quantities of waste, in regards to present groundwater contamination stemming from inadequate storage and treatment of present levels of hazardous wastes.	See the responses to comments AJ-1, DA-2, DA-5, DA-6, and DA-8 regarding ground-water contamination.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EA-3	(3) Inadequate consideration of potential human health effects from present hazardous waste groundwater contamination at the plant.	See the responses to comments AJ-1, DA-2, and DA-4 through DA- regarding ground-water contamination and its effects.
EA-4	(4) Lack of appropriate epidemiological risk assessment of multiple exposure risks from plant operation. (There has been no consideration of additive and/or synergistic effects of halogenated groundwater contamination problems and slightly elevated radiation levels in surface waters which would result from L-Reactor restart.)	Contaminated ground-water wells have been shut down so that onsite personnel cannot drink water with elevated levels of chlorinated hydrocarbons. In addition, the health of onsite personnel will be protected by changes in the water distribution system, which now obtains potable water only from the A-Area Tuscaloosa wells that are unlikely to be contaminated from ground water from the Tertiary aquifers. Information on ongoing and health effects/epidemiological studies is provided in Section 6.1.5. In regard to synergistic effects, the 1982 Report of the U.N. Scientific Committee on Effects of Atomic Radiation, "Ionizing Radiation: Sources and Biological Effects," states (p. 762): "For humans in environmental circumstances the Committee has been unable to document any clear case of synergistic interaction between radiation and other agents, which could lead to substantial modifications of the risk estimates for significant sections of the population.... A specific exception is the case of tobacco smoke, which raises essentially problems of industrial hygiene in some working environments."
EA-5	(5) Improper consideration of cooling towers as a viable option for mitigating thermal impacts. and (6) Deficiencies and mistakes in elimination of a cooling tower for mitigating thermal impacts to wetlands in the Steel Creek Corridor. In addition, site inspection of the L-Reactor has revealed significant improvements in worker safety at the L-Reactor, such as improvements in the containment area/basin and removal of an asbestos hazard at the site. These represent genuine and sincere attempts by U.S. DOE to improve the occupational safety of	See the responses to comments AA-1 and AB-13 regarding cooling-water mitigation alternatives.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	the plant and to reduce radiological impacts. Construction of a cooling tower to prevent external environmental impacts in the Steel Creek Corridor would seem consistent with DOE's present plant renovations. Additional considerations should be given to allow start up and direct discharge of heated effluent in the Steel Creek Corridor until a cooling tower can be built. This option seems completely inconsistent, whimsical, and capricious since the magnitude of thermal impact (amount of wetlands impacted) would be the same, only the time period for recovery would be changed.	
EA-6	Current NEPA regulations insist that significant impacts should be avoided. The destruction of 1000 acres of wetlands certainly is a significant impact. NEPA regulations make no mention of whether impacts should be reversible or irreversible nor has any mention of a time-frame for recovery been included in this legislation. Without specific guidelines for these questions, it would seem that the potential for impact whether reversible or irreversible should be seen equally under the law. Thus construction of a cooling tower should be mandated and restart should be postponed until completion of the cooling tower. This scheme would prevent the leaching of radioactive isotopes from sediments and would also prevent destruction of wetlands in the Steel Creek Corridor. The environmental benefits from this consideration (reduced thermal and radiological impacts) should far outweigh the economic justification implied by DOE as a reason for not constructing cooling towers. Sincerely, Geoffrey I. Scott, Ph.D. Charles E. Feigley, Ph.D. /alw	See the responses to comments AA-1 and AB-13 regarding cooling-water mitigation alternatives in this EIS, and the response to comment BM-1 regarding the Record of Decision on this EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF SUE CRAMER November 10, 1983 Dear Mr. Sires,	
EB-1	I am opposed to the Department of Energy's proposed plan to start up an old production reactor at the Savannah River Plant.	See the response to comment CF-3 regarding the L-Reactor startup.
EB-2	As a voting citizen of the United States of America I am encouraging you to require that the Department of Energy comply with federal and state environmental standards applicable to commercial reactor sites. The rights of all Americans are at stake and the impacts of this foolish and impulsive plan are avoidable. The outcome will be permanent. Thank you, Sue Cramer 406 N. Main St. Lancaster, SC 29720	See the response to comment AA-3 regarding DOE's commitment to comply with all applicable Federal and state regulations, and the response to comment BF-7 regarding the differences between SRP reactors and commercial light-water reactors.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF MICHAEL GARDNER	
	Mr. Melvin J. Sires, III	
	Dear Sir:	
EC-1	Please consider sacrificing natural environmental areas permanently to utilize, temporally, a L-Reactor plant that will increase our ability to destroy ourselves and our world, which has been entrusted to us. So please consider carefully the impact that will occur if Department of Energy facilities are not required to comply with Federal and state environmental standards.	See the response to comment AA-3 regarding DOE's commitment to comply with all applicable Federal and state regulations.
	Sincerely	
	Michael Gardner 2026 Middleton Pl. Rock Hill, SC 29730	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF WILLIAM P. DAVIS 517 N. Wilson St., Apt 3 Rock Hill, S.C. 29730 November 10, 1983 Mr. Melvin J. Sires, III U.S. Dept. of Energy Savannah River Operations Office P.O. Box A Aiken, S.C. 29801 Dear Mr. Sires: Please accept this letter as an expression of my grave concern over the start-up of the L-Reactor at the Savannah River Plant.	
ED-1	Since renewed operation is deemed essential to the national security and this project is bound to continue, I urge the Department of Energy to carefully consider the impact upon the environment.	See the response to comment AT-3 regarding preparation of this EIS.
ED-2	I am particularly concerned about the discharge of cesium into the Savannah River, not to mention the discharge of hot water in large quantities into the river.	See the responses to comments AA-1 and AA-2 regarding issuance of an NPDES permit for thermal discharge and the relationship of radiocesium and radiocobalt concentrations to EPA drinking water standards.
ED-3	I strongly feel that the plant should be made to comply with all state and federal environmental standards and urge the Department to ensure such compliance.	See the responses to comments AA-3 and BF-7 regarding DOE's commitment to comply with applicable Federal and state regulations and the differences between SRP reactors and commercial light-water reactors.
	Yours very truly, William P. Davis	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF CAROLYN N. TUTWILER 1217 Hermitage Rd. Rock Hill, SC 29730 Nov. 10, 1983 Mr. Melvin J. Sires, III U.S. Department of Energy Savannah River Operations Office Post Office Box A Aiken, South Carolina 29801 Dear Sir:	
EE-1	I am very concerned about the proposed resumption of operations of the L-Reactor at the Savannah River Plant. I urge that the Department of Energy be required to comply with federal and state environmental standards applicable to commercial sites.	See the responses to comments AA-3 and BF-7 regarding DOE's commitment to comply with applicable Federal and state regulations and the differences between SRP reactors and commercial light-water reactors.
EE-2	Measures need to be taken to protect the environment before the reactor is started up.	See the responses to comments AA-3 and AF-2 regarding DOE's commitment to comply with applicable Federal and state regulations and to take all reasonable steps to mitigate impacts.
	Sincerely yours, Carolyn N. Tutwiler	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF HARRY M. DALTON

November 11, 1983

Mr. Melvin J. Sires III
United States Dept. of Energy
Savannah River Operation Office
P.O. Box A
Aiken, South Carolina 29801

Dear Mr Sires,

EF-1 I am writing to express my concern about the premature start up of the L-Reactor at the Savannah River Plant. It would appear that we are proceeding with unnecessary haste in the matter. There is sufficient data already on record which brings into question the DOE claim and suggests that the delay of start up would in no way jeopardize National security.

See the response to comment BL-15 regarding the need and timing of defense nuclear materials.

EF-2 It is my thought and opinion that the DOE facilities be required to comply with federal and state environmental standards applicable to commercial reactor sites. It is important that you consider all precautions to avoid damage to the environment before the start up is allowed.

See the responses to comments AA-3 and AF-2 regarding DOE's commitment to comply with applicable Federal and state regulations and to take all reasonable steps to mitigate impacts, and the response to comment BF-7 regarding the differences between SRP reactors and commercial light-water reactors.

Very truly yours,

Harry M. Dalton
663 Glendale Dr.
Rock Hill, SC 29730

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF GEORGE C. BATTLE Mr. Melvin J Sires III US Dept of Energy Savannah River Operations Office PO Box A Aiken, SC 29801 This is a confirmation copy of a telegram addressed to you:	
EG-1	Protect our environment: before any L-Reactor start up assure DOE facilities compliance with state and Federal standards applicable to commercial reactor sites. Respectfully Sally Battle 418 Maple Columbia 22:01 EST MGMCOMP	See the responses to comments AA-3 and AF-2 regarding DOE's commitment to comply with applicable Federal and state regulations and to take all reasonable steps to mitigate impacts, and the response to comment BF-7 regarding the differences between SRP reactors and commercial light-water reactors.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF JOYCE P. DUBUC 1574-E Ester Ct. Rock Hill, SC 29730 Nov. 10, 1983 Mr. Melvin J. Sires III U.S. Department of Energy Savannah River Operations Office Post Office A Aiken, South Carolina, 29801 Dear Sir:	
EH-1	I trust the Department of Energy will seriously consider, prior to starting up the Savannah River operation, any damage that may be inflicted on our already damaged environment. Please be aware that many people are deeply concerned about the effect of your operation. Sincerely, Joyce P. Dubuc (Mrs. Guy J. Dubuc)	See the responses to comments AA-3 and AF-2 regarding DOE's commitment to comply with applicable Federal and state regulations and to take all reasonable steps to mitigate impacts, and the response to comment BM-1 regarding DOE's Record of Decision on this EIS.

Comment number	Comments	Responses

STATEMENT OF CHARLES T. HESS

C.T. HESS, PH.D.
NUCLEAR PHYSICIST

RADIATION MEASUREMENT
AND CONSULTATION

103 SPRING STREET
STILLWATER, MAINE 04489
PHONE 207-827-5991

November 12, 1983

Mr. M. J. Sires
Assistant Manager for Health Safety and Environment
Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29801

Dear Mr. Sires:

Enclosed please find my comments about the Environmental Impact Statement - L-Reactor Operation Savannah River Plant (L-Reactor EIS). I hope it is in a form suitable for your consideration.

Sincerely yours,

Charles T. Hess
Professor of Physics

CTH/rjl

Enc.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

Comments of Charles T. Hess, Ph.D.
Professor of Physics
University of Maine, Orono, Maine

REGARDING: The Draft Environmental Impact Statement L-Reactor Operation Savannah River Plant DOE/EIS-0108D Volume 1.

I am pleased to supply comments about the Environmental Impact Statement. I am mainly qualified to discuss the portions of the EIS which are concerned with the liquid releases from the L-Reactor. My experience has been in several environmental radioactivity studies in the vicinity of the Maine Yankee Atomic Power Plant, especially as it relates to radionuclide uptake in shellfish and distribution of nuclides in estuary sediments. I also study radioactivity in water supplies and have served as the chairman of the Occurrence Committee for the National Workshop on Radioactivity in Drinking Water, sponsored by the United States Environmental Protection Agency.

The importance of the liquid pathway radionuclides can be understood best by looking at the sources in table 4.11 EIS "Expected average annual liquid radioactive releases from L-Reactor operation (curies per year)". In this table is a list of radionuclides which are expected to be released to Steel Creek, to the seepage basin, or which will get into Steel Creek with movement of groundwater. These sources are totaled after 1 year or 10 years of operation. Radionuclides released into Steel Creek are just ^{3}H, ^{58}Co, ^{60}Co, ^{90}Sr, ^{137}Cs and unidentified beta-gamma and unidentified alpha emitters. In the seepage basin the releases are ^{3}H, ^{32}P, ^{35}S, ^{51}Cr, ^{58}Co, ^{60}Co, ^{89}Sr, ^{90}Sr, ^{91}Y, ^{106}Ru, ^{125}Sb, ^{134}Cs, ^{137}Cs, ^{144}Ce, ^{147}Pm and unidentified beta-gamma and unidentified alpha. The largest amount released per year and totaled to Steel Creek, is ^{3}H with 3.6×10^{2} curies/year. Others are ^{58}Co with ^{60}Co 4.5×10^{-2} curies/year, ^{90}Sr 1.6×10^{-4} curies/year, ^{137}Cs 4.1×10^{-1} curies/year. Unidentified beta-gamma 1.1×10^{-1} curies/year is assumed to be ^{90}Sr. Unidentified alpha 1.0×10^{-5} curies/year is assumed to be ^{239}Pu.

Some of these liquid sources such as ^{137}Cs, and ^{58}Co, ^{60}Co will be absorbed by sediments in the Steel Creek and Savannah River and will produce gamma exposures which be in excess of 25

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EI-1	mrem/year. Most of the swamplands up to 7 miles down stream from the plant range from 42 - 670 mrem/year for constant exposure according to exposure contours reported in 1974 from an Aerora-diographic Survey by Marter "Radioactivity from SRP Operations in a Downstream Savannah River Swamp." The upper limit of these levels 670 mrem/year even exceeds the D.O.E. restrictions on accessible areas near defense plants, a fact which is not stated in the EIS. These levels exceed the 25 mrem/year limit for radiation exposure to the public for outside the fence of a commercial nuclear power reactor, which is regulated by the U.S.E.P.A. Fortunately, these areas are not populated 100% by the people using them. The low time fraction reduces the accumulated dose from these operations to a small fraction of the natural background of 100 - 150 mrem/year. Access to this area by fishermen, and hunters should reflect this dose which is likely to be similar to the surveys in 1970's.	Both the DOE and EPA dose limits cited recognize occupancy as a significant element in determining compliance. As noted, occupancy of these areas is sufficiently low to assure that actual doses to individuals are well within the applicable limits.
EI-2	A second pathway of exposure is in the ingestion of nuclides which are released either in drinking water or by consumption of fish and shellfish which live in the discharge waters or in the Savannah River and its estuary. When we look at the U.S.E.P.A. interim drinking water standard for radionuclides, the regulated concentration produces a dose of 4 mrem/year to a population drinking 2 liters per day. The allowed maximum concentrations are 20,000 pCi/l for ^{3}H, 500 pCi/l for ^{35}S, 300 pCi/l for ^{58}Co, 100 pCi/l for ^{60}Co, 8 pCi/l for ^{90}Sr, 300 pCi/l for ^{125}Sb, 80 pCi/l for ^{134}Cs, 200 pCi/l for ^{137}Cs, 100 pCi/l for ^{141}Ce (not same isotope), 100 pCi/l for ^{149}Pm (not same isotope). The unidentified beta-gamma should use a worst case ^{129}I (1 pCi/l) instead of assuming 8 pCi/l for ^{89}Sr. For unidentified alphas 3 pCi/l will be allowed for radium, while the assumed nuclide ^{239}Pu has no specific standard. In addition to these releases, there are the old radionuclides which were buried in the sediments of Steel Creek and downstream portions of the Savannah River and its flood plain. These radionuclides were deposited by past use of the L-Reactor and other reactors operating since 1955. The major nuclides reported are ^{137}Cs, ^{90}Sr, ^{60}Co which are described in a later section of the EIS. There will be resuspension of these past radionuclides if L-Reactor is started. The major exposure to the population as	The EPA Interim Drinking Water Concentration Limits (40 CFR 141.15 and 141.16) apply to the finished water delivered by "a community water system," not to the raw water in the river. As presented in Table 5-12 of the Draft EIS, the dose calculated for the maximum adult individual due to liquid releases in the maximum year for L-Reactor and its support facilities (predominantly from Cs-137 resuspension) is 3.5 mrem per year based on fish and water intake directly from the Savannah River. The nearest downstream "community water systems" at Port Wentworth and Beaufort-Jasper have calculated doses of more than two orders of magnitude less than (i.e., 1/100) the EPA limits. The choice of surrogate for unidentified beta-gamma contributors is normally taken to be Sr-90 (not Sr-89) in water; changing to I-129 would produce no significant difference in the dose estimates.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	expressed in 4.1.24 of the EIS due to nuclides in drinking water is to the populations of Beaufort-Jasper, and Port Wentworth which have water treatment plants that draw water from the Savannah River downstream from Steel Creek. The concentration at this point is estimated to be of the order of .01 pCi/l (of ^{137}Cs) which is much less than the drinking water standard. The estimates are based on the resuspension of sediments during the resumption of the L-Reactor operations. The only places where the ^{137}Cs and ^{60}Co are easily measurable is in the area one mile below Steel Creek and at the Highway 301 bridge and Highway 17 bridge where the radioactivity in the first year will be almost 0.5 pCi/l in the first location and 0.25 pCi/l in the second location. However, although tritium concentrations are not reported at the above locations it is pointed out in a later section 4.1.2.27, *page 4-29 that the Beaufort-Jasper and Port Wentworth* population using the Savannah River for potable water, located 100 river miles downstream, and having an exposed population of 370,000 people, are exposed to (.0062 - 0.11 mrem/year) in the first and thirteenth year of operation. The estimated dose is 65% caused by tritium in the first year and 95% caused by tritium in the thirteenth year. Tritium is discussed as the major release nuclide as well. Reductions in population dose can be concentrated on reduction of these tritium releases to the water in Steel Creek. The maximum tritium concentration allowed in drinking water is 20,000 pCi/l. The liquid releases shown in DPST-81-241 page D-22 by H.E. Mackey, Jr. Table D-8 "Liquid Releases Dose Summary SKP-1980 Releases" show 27,000 Ci HTO, 0.002 Ci ^{60}Co, 0.4 Ci ^{90}Sr, 0.02 Ci ^{129}I, 0.19 Ci ^{137}Cs, 0.19 Ci ^{238}U and 0.006 Ci ^{239}Pu. This results in 0.214 mrem/year for fish consumption assuming 73.2% ^{137}Cs, 22.2% ^{90}Sr 4.89% HTO; and 0.438 mrem/year for drinking water, which is assuming, 86.7% HTO; 12.6% ^{90}Sr and 0.42% ^{137}Cs. This is 10% of the EPA safe drinking water limit. This means that a dilution of 10^{-13} is achieved by the released nuclide being mixed with Savannah River water. It also means that tritium may be the limiting nuclide for this *plant. Doses of .4 mrem/year will correspond to about* 2000 pCi/l of HTO in the water of the Savannah River. These amounts should be detailed in the EIS with the same care as is given for the discharged ^{137}Cs and ^{60}Co. Since these	
E1-3		See the response to comment E1-2 regarding applicability of EPA Drinking Water Concentration Limits and the small tritium contribution to near-site hypothetical individual or downstream community water supply users.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EI-4	levels are near 10% of the safe drinking water limit in normal operations, plans are needed for small accidents of moderator spill into Steel Creek as suggested in 4.1.2.4. Tritium releases could lead to serious contamination of the drinking water in Beaufort-Jasper and Port Wentworth. These towns need an alternative water supply during an accident. The EIS must consider the liquid pathway consequences of small accidents which have a higher probability of occurrence. Plans for these eventualities should include emergency water supply plans for the Beaufort-Jasper and Port Wentworth. The EIS should include water supply measurements for assessment of the consequences of abnormal releases and for verification of dose calculations for both normal and abnormal operations.	Section 4.2.1.4 projects a potential for release of airborne tritium from a moderator spill which has no effect on the Savannah River or its users and, hence, no basis for need of "an alternative water supply" or emergency water supply plans. As discussed in Sections 2.2.3 and G.3.1.5.3 of the EIS, leakage between the primary and secondary cooling loops is continuously monitored and limited to a value that would result in a radiological release that is only a small fraction of acceptable release limits. Should this limit be exceeded, operating procedures require that the reactor be shut down and the heat exchanger be isolated to prevent further leakage. The radiological impact of leakage is a small fraction of the impact of total reactor wastewater discharges to the process sewer, which are well below applicable limits.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF F. JOHN VERNBERG

November 14, 1983

Mr. M. J. Sires, III
Assistant Manager for Health,
Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29801

Dear Mr. Sires:

The following comments relate to the Draft Environmental Impact Statement, L-Reactor Operation, Savannah River Plant, Aiken, SC. This letter reflects my personal opinion and does not imply any official response by my employer.

By way of introduction, I submit a brief statement of my professional background. In 1951 I received a Ph.D. from Purdue University - my training was in ecology. Since then I was employed by Duke University (Instructor to Professor from 1951-1969) and the University of South Carolina (Baruch Professor of Marine Ecology and Director of the Belle W. Baruch Institute for Marine Biology and Coastal Research from 1969 to the present). One of my professional interests is in the area of wetlands ecology. I have published over 120 papers and books on pollution, physiology, and ecology. Further, I have served as President of the Estuarine Research Federation, President of the American Society of Zoologists, and Chairman of the Physiological Ecology Section of the Ecological Society of America.

EJ-1 Resumption of the L-Reactor operation will have obvious and immediate negative impact on wetlands and the aquatic biota, especially in Steel Creek. According to the Draft EIS at least 1000 acres could be impacted. Until relatively recent times, these habitats have been considered as useless and expendible based on the disappearance of hundreds of thousands of acres of wetlands because of various man-made developments. However, a tremendous literature, not cited in the Draft EIS, has

The operation of L-Reactor will eliminate between 730 and 1000 acres of wetlands for the direct discharge of cooling-water. The 1000-acre figure is a conservative estimate, and represents a maximum value. Cooling-water mitigation alternatives to direct discharge are discussed in Section 4.4.2 and Appendix I. These sections include an analysis of wetland impacts if the mitigation alternatives were implemented prior to or after the L-Reactor restart. Also see the response to comment AA-1 regarding cooling-water alternatives.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	demonstrated conclusively their economic, environmental, and societal values. It does not seem justified to again subject this region of South Carolina to environmental destruction as was done earlier when the L-Reactor was operational and before federal legislation began to protect the environment.	
EJ-2	The draft EIS appears to adequately describe the extensive damage to wetlands, aquatic life, morphology of Steel Creek, and wildlife due to nonradiological sources. Also the increased thermal discharge to the Savannah River has been projected. Have these projections taken into account potential future changes in Savannah River flow characteristics as a result of recent upstream modifications? If river flow drops significantly below previous values, how high would the river temperature go?	The thermal effects in the Savannah River resulting from the direct discharge of L-Reactor cooling water have been evaluated under a wide range of river flows, including flows less than the 7-day 10-year low flow of 159 cubic meters per second.
EJ-3	In contrast to the description of the adverse effects of certain nonradiological factors, the potential negative impacts from "normal" and accidental introduction of radionuclides and other chemicals are not as well documented. I did not see any assessment of the effects of previous radionuclide spills on Steel Creek and the Savannah River or recent disclosures of aquifer contamination. How adequately and extensively are environmental factors being monitored? On p 4-19 it is indicated that "most chemical contaminants are expected to be transported through the swamp into the Savannah River." On what is this expectation based? Does the swamp not act as a filter? What is the fate of these contaminants as they become part of the sediments? Have previous studies answered any of these questions?	The assessment of previous radionuclide spills on Steel Creek is extensively discussed in Appendix D and summarized in Sections 3.7.2 and 4.1.2.4. Environmental monitoring at SRP and L-Reactor monitoring programs are discussed in Chapter 6. The flow rate in Steel Creek, about 11 times the natural flow rate, would carry the cooling-water effluent from L-Reactor directly to the Savannah River, except during periods of flood which occur about 22 percent of the time. As discussed in Section 4.1.1.5 of the EIS, the water quality of the L-Reactor effluents discharged through the L-Reactor outfall to Steel Creek would be very similar to that of the intake Savannah River water. In addition, these discharges would be made under an NPDES permit issued by SCDHEC. The comprehensive cooling-water study (Section 6.1.3) will further assess radionuclide and heavy-metal remobilization, deposition, and effects.
EJ-4	The assessment of radiation doses resulting from exposure to persistent radioisotopes or to isotopes that tend to bioaccumulate appears to be inadequate. For example, calculations of radiation doses resulting from the injection of meat and vegetables are based upon estimates of the contamination of foodstuffs by radioactive material deposited from the atmosphere on	See the response to comment BA-2 regarding the use of bioaccumulation factors. Root uptake by vegetation is not a significant pathway since water from the Savannah River is not used in significant quantities for irrigation; hence, deposition of airborne radioactive material is the most significant pathway.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	vegetation (B-14). Apparently, this assumption would greatly underestimate exposure because no account was made of other routes of incorporation of isotopes into vegetation, such as absorption through roots, and no account was made of bioaccumulation. With regard to exposure to those isotopes with long half-lives that persist in the environment, estimates were made of 100-year dose commitments for exposure to H-3, C-14, Kr-85, and I-129; however, a population of 250 million was assumed (B-31) for the dose commitment calculations (Table B-18). The effect that this assumption has on the dose calculation needs to be explained.	
EJ-5		The 100-year environmental dose commitments for exposure to H-3, C-14, K-85, and I-129 beyond 80 km was based on a U.S. population of 250 million. Should a different population be used, the doses would increase or decrease in a proportional manner.
EJ-6	On page 8-2, lines 8 and 9, it is stated that after decommissioning and decontamination - this area can revert back to its natural state with minimal long-term effects." What is the justification for this view? What is minimal long-term effects? Section 4.6, Decontamination and Decommissioning, sheds little light on this point. Only one paper (a Master's Thesis by Repaske, 1981) had preliminary information or signs that the Savannah River swamp was beginning to recover. Will the proposed new indignity to this ecosystem be more drastic than that of the previous operating period of the L-Reactor? What other changes, such as in water table levels, use of Savannah River, or regional industrial development, have altered the regional ecosystem since 1951. The L-Reactor and its attendant activities are part of a larger ecosystem, one which is changing. I do not find any basis in this Draft EIS to support the thesis that this area will become productive over a long-term (not defined) period.	Justification for this view is based on the documented changes over time to the Steel Creek ecosystem following the previous operation of the L-Reactor. Minimal long-term effects means that the Steel Creek ecosystem, after a period of approximately 15 to 20 years, will achieve the level of community diversity and productivity that is present today. Changes to water levels in important aquifers is discussed in Sections 3.4.2, 4.1.1.3, 5.1.1.4, and 5.2.3 of this EIS.
	Sincerely yours, F. John Vernberg	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF RICHARD E. WATKINS November 14, 1983 Mr. Melvin J. Sires III U.S. Dept. of Energy Savannah River Operations Office Post Office Box A Aiken, South Carolina 29801 Dear Sir:	
EK-1	It is disturbing that the current plans for restarting the L-Reactor will result in the discharge of hot water into Steel Creek. This water, much hotter than permitted by state regulations, will needlessly destroy 1000 acres of wetlands and will	See the response to comment AA-1 regarding cooling-water alternatives.
EK-2	flush cesium into the Savannah River. Groundwater contamination is another significant concern.	See the response to comment AA-2 regarding the relationship of radiocesium and radiocobalt concentrations to EPA drinking-water standards, and the response to comment AJ-1 regarding ground water.
EK-3	Some of the environmental impacts are clearly avoidable, and steps must be taken before startup of L-Reactor to avoid these impacts. Savannah River Plant must be required to comply with the federal and state environmental standards which commercial nuclear reactor sites must meet.	See the responses to comments AA-3 and AF-2 regarding DOE's commitment to comply with applicable Federal and state regulations and to take all reasonable steps to mitigate impacts, and the response to comment BF-7 regarding the differences between SRP reactors and commercial light-water reactors.
	Yours truly, Richard E. Watkins 2-B Kirkwood Apts. Camden, SC 29020	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF ALFRED H. VANG

State of South Carolina
Water Resources Commission
Alfred H. Vang
Executive Director
November 14, 1983

Mr. M. J. Sires, III
Assistant Manager for Health,
Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
P. O. Box A
Aiken, South Carolina 29801

ATTENTION: EIS for L-Reactor

Dear Mr. Sires:

The Water Resources Commission staff has reviewed the "Draft Environmental Impact Statement, L-Reactor Operation, Savannah River Plant" and submits the following comments for consideration in developing the Final EIS and reaching an ultimate decision on the project.

EL-1

1. As part of the scoping process for the EIS, we requested a thorough evaluation of the effect of project operation on surface water use throughout the Savannah River Basin. While the Draft EIS does contain some information on water use, we believe more evaluation is desirable. The evaluation should consider total SRP streamflow needs for water supply and waste assimilation, including thermal effluent, and the impact of these needs on current and projected water use throughout the Basin. Consideration should be given to a substantial interbasin transfer being planned by the City of Greenville, South Carolina and to water use agreements being negotiated by the States of South Carolina and Georgia with the Corps of Engineers (for withdrawals from Clarks Hill, Hartwell and Russell Lakes). All water uses both upstream and downstream should be included in this evaluation.

Withdrawal of Savannah River water for restart of L-Reactor and ongoing SRP operations are discussed in Section 4.1 and 5.2 of this EIS. Wastewater discharges from SRP will be in compliance with the NPDES permits as issued by the South Carolina Department of Health and Environmental Control. Alternative thermal mitigation measures for L-Reactor are presented in Section 4.4.2 of this EIS. DOE is presently conducting a thermal mitigation study for the selection of thermal mitigation measures for SRP operating reactors.

The Corps of Engineers maintains that in accordance with its agreement with Duke Power Company, the interbasin transfers from Lake Keowee to the City of Greenville cannot have an effect on the ability of the Corps of Engineers to generate electrical power at Lake Hartwell and Clarks Hill. The Corps of Engineers is presently assessing the request by the States of

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		South Carolina and Georgia regarding the withdrawal of water from Lake Hartwell and Clarks Hill. This assessment will include the ability of the Corps of Engineers to maintain its navigation project below the New Savannah Bluff Lock and Dam and to meet its electrical power generation requirements. This assessment will also consider the effects of the interbasin transfer. Until such time that the Corps of Engineers completes its assessment, flows below the New Savannah Bluff Lock and Dam will be maintained at the current levels by the Corps of Engineers.
EL-2	2. The consumptive water use by L-Reactor and other SRP operations should be indicated, rather than simply stating that most water withdrawn will be returned.	Based on Neill and Babcock (1971)--referenced in Chapter 4--it is estimated that the surface-water consumptive use for L-Reactor will be 0.85 cubic meter per second.
EL-3	3. It is the position of this agency that the L-Reactor should be in compliance with State water quality standards for temperature at the time of restart. This position has been provided to the South Carolina Department of Health and Environmental Control as part of the NPDES permit review process. We believe that any private industry proposing a similar thermal discharge would be required to comply with State standards and DOE should be subject to the same requirement.	L-Reactor operation will be in compliance with the NPDES permit issued by SCDHEC.
EL-4	The Draft EIS clearly indicates that DOE's preferred cooling water alternative of once through cooling with direct discharge to Steel Creek will 1) violate State thermal standards, 2) produce severe adverse impacts on the Steel Creek ecosystem, 3) alter the environment by greatly increasing streamflow, 4) introduce large amounts of suspended solids to Steel Creek, and 5) resuspend radioactive Cesium and Cobalt deposited in Steel Creek sediments. All of these adverse impacts could be alleviated by use of the recirculating mechanical draft cooling tower alternative discussed in the Draft EIS. In the interest of protection of our water resources and water users, we recommend the recirculating mechanical draft cooling tower method as the preferred alternative incorporated in the Final EIS.	Section 4.4.2 of the EIS, which discusses cooling-water mitigation alternatives, has been revised based on public comments received on the draft EIS. Specifically, Section 4.4.2 has been revised to provide a detailed discussion of additional combinations of various cooling-water systems. In Section 4.4.2, each of the cooling-water mitigation systems is evaluated for attaining the thermal discharge limits of the State of South Carolina. Section 4.4.2 and a revised Appendix I, Floodplain/Wetland Assessment, discuss the wetland impacts of each of the systems considered. The Department of Energy has been reviewing and evaluating alternative cooling-water systems for L-Reactor. Based on these reviews and evaluations, and consultations with representatives of the State of South Carolina regarding a mutually agreed upon compliance approach, a preferred cooling-water mitigation alternative is identified in this EIS. This preferred cooling-water alternative is to construct a 1000-acre lake before L-Reactor resumes operation, to redesign the reactor outfall, and to operate L-Reactor in a way that assures a balanced

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number		Comments	Responses
			biological community in the lake. The Record of Decision prepared by the Department on this EIS will state the cooling-water mitigation measures that will be taken which will allow L-Reactor operation to be in compliance with the conditions of an NPDES permit to be issued by the State of South Carolina.
EL-5	4.	In order to insure uniform application of and compliance with requirements of the Resource Conservation and Recovery Act (RCRA), we support the position of administration of RCRA by the South Carolina Department of Health and Environmental Control for L-Reactor and other SRP operations.	As stated in Chapter 7 of this EIS, the hazardous-waste management program of DOE meets the technical requirements of the EPA hazardous-waste regulations, and is compatible with the State of South Carolina DHEC requirements. SRP will cooperate with SCDHEC on all matters concerning solid and hazardous waste management. Recently, DOE and EPA have signed a memorandum of understanding regarding the applicability of RCRA to DOE's military activities. It is DOE's position that state RCRA permitting authority does not does not apply to activities or substances subject to the requirements of the Atomic Energy Act of 1954, as amended. The underlying issues of applicability were recently reviewed in the District Court of Tennessee. A decision adverse to DOE's position was rendered on April 3, 1984. The Department of Energy does not plan to appeal this decision to the Circuit Court of Appeals. The Department will implement the requirements of RCRA at the Savannah River Plant in accordance with the MOU, and will work closely with SCDHEC on all activities related to hazardous-waste management.
EL-6	5.	All of the mitigation alternatives discussed in Section 4.4 relating to safety systems, cooling water, liquid waste disposal and disposal of 186-Basin sludge are not preferred by DOE due to cost and/or impact on production schedule. We feel there are considerations more important than production schedule and cost, and that mitigation alternatives which protect the environment and public safety should be selected and committed to by DOE in the Final EIS.	Chapter 4 provides the decisionmaker the necessary information on economic, engineering, and environmental factors to formulate a thorough, reasoned, and knowledgeable decision on the potential implementation of mitigation alternatives in relation to the need for defense nuclear materials. The Record of Decision on the EIS will address alternatives considered in reaching the decision, environmentally preferable alternatives, and preferences for alternatives based on the technical, economic, and statutory mission of the agency.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EL-7	6. It is stated in the Draft EIS that no adverse ecological impacts are expected on the Savannah River except near the mouth of Steel Creek. In support of this expectation, studies by the ANSP (1953, 1957, 1961, 1967, 1970, 1977) are cited on page 4-18. Are these studies considered by DOE to be comprehensive and detailed enough to document that past L-Reactor and other SRP operations have not impacted Savannah River biota?	The ANSP references on page 4-18 of the draft EIS are to the statement "... to monitor the effects of SRP operations on the general health of the Savannah River." The statement that "... no major changes in the presence of species have occurred from past Savannah River operations at their stations or are expected to occur from the addition of heat and cooling water from L-Reactor..." is referenced by Matthews, 1982. The cited references and the statements that they reference do not refer to ecological impacts near the mouth of Steel Creek. The scope of the studies conducted by the ANSP are intended to evaluate the general health of the Savannah River; they are not meant to be a detailed study of the impacts of the SRP on a specific system such as Steel Creek.
EL-8	7. On page 4-12, reference is made to "...thermal effluent criteria of the South Carolina Water Classification Standards System (SCDHEC, 1981)...." It should be noted that these thermal criteria are actually thermal standards.	The word "criteria" has been changed to standards in the applicable sections of this final EIS.
EL-9	8. Section 3.4.1.1 indicates that the Corps of Engineers attempts to maintain a minimum flow of 178.4 cubic meters per second (6297 cfs) at the New Savannah Bluff Lock and Dam. Our information indicates that this figure should be 164.3 cms (5800 cfs).	In its Final Environmental Impact Statement, Operation and Maintenance of Clarks Hill Lake, Savannah River, Georgia and South Carolina, the Army Corps of Engineers (1981) states "3.63 Navigation. A minimum flow of 5,800 c.f.s. is required below New Savannah Bluff Lock and Dam for navigation. The Clarks Hill discharges are regulated to meet this minimum with re-regulation provided at Stevens Creek Dam. A discharge of 6,300 c.f.s. is normally provided 80 percent of the time."

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number		Comments	Responses
EL-10	9.	Page S-5, fourth paragraph mentions pollutants in the Congaree Formation, but no mention is made of chlorinated hydrocarbons in the Tuscaloosa Formation.	In 1982, wells producing from the Tuscaloosa in A-Area were found to have low concentrations of chlorinated hydrocarbons; concentrations in water samples from these wells ranged from less than 3 to less than 27 micrograms per liter. Entry of chlorinated hydrocarbons into these wells is believed to have resulted from Tertiary groundwater migration through defects in the cement grout of at least one production well to the Tuscaloosa (Geraghty & Miller, 1983). Chlorinated hydrocarbons above the limit of detection (1 microgram per liter) have not been found in recent M- and A-Area wells drilled to monitor Tuscaloosa water quality. One of these new wells is located within 80 meters of the A-Area production well (53A) that previously exhibited the highest concentration of chlorinated hydrocarbons. The summary of this final EIS has been revised to include a discussion of the chlorinated hydrocarbon contamination in the Tuscaloosa Formation.
EL-11	10.	Page 3-25, fourth paragraph states that the tan clay had disappeared in the M-Area. Although this is correct, there has been no mention of this unit previously and no description.	The tan clay is the lowest unit of the Barnwell Formation (Section F.2.7.1). Section 3.4.2.1 has been revised to provide a brief discussion of the tan clay.
EL-12	11.	Page 3-36, second paragraph states that "In areas where downward head differential does not exist, such as M-Area...." Although this is correct, there has been no mention of this unit previously and no description.	The text of the EIS has been revised to read "In areas where downward head differential exists, such as M-Area, the drawdowns increase the natural downward head differential in the area immediately around the pumping wells."
EL-13	12.	Page 4-7, third paragraph should read "...and 58.3 cubic meters per minute" instead of cubic meters per second.	The text of the EIS has been revised.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EL-14	13. Same paragraph as in 12. above, should read "...the 30-kilometer square area..."	Within about a 32-kilometer radius of SRP (an area of over 3216 square kilometers) the current (1983) projected water use from the Tuscaloosa Aquifer is estimated to be 63 cubic meters per minute (see Section F.3.1). The study area for the ground-water flux calculation lies within the 3216 square kilometer area (see Section F.4.2).
EL-15	14. Page 5-12, second paragraph states that "Local water levels at pumping wells are not expected to continue to decline appreciably." But they have been declining since about 1978 and with increased pumpage both in and peripheral to the plant site, they could continue to decline.	From 1972 to 1981 there has been a general decline in winter precipitation. This accounts in part for the declining water levels as shown by well AK-183 in the outcrop area (Section 3.4.2.5). Calculations indicate that the decline in SRP monitoring wells is associated primarily with increased pumping at SRP. The text has been revised appropriately. Also see the response to comment BT-7 regarding ground water.
EL-16	15. Figure F-9 on page F-20 shows the 172 foot water elevation in well P3C is closer to the 180 foot contour than is the 177 foot water elevation of well P54.	The 180-foot contour was drawn to "honor" all data points. Neighboring data points show elevations of 173 and 177 feet. Appropriate weight has been given to each of the three elevations in this cluster when drawing this contour.
EL-17	16. Figure F-22, page F-50. The water table surface should be labeled.	The water table in the referenced figure has been labeled.
EL-18	17. Figure F-28, page F-69. The Tuscaloosa piezometric surface should have an arrow to clarify location. The arrow for the Congaree piezometric surface is mislocated.	The figure has been modified to designate the locations of the Tuscaloosa and Congaree piezometric surfaces.
EL-19	18. The piezometric maps of various aquifers in various areas should be contoured on an interval that would show the effects of the production wells on the water levels (cones of depression).	The piezometric maps were drawn from data obtained in monitoring wells. The cones of depression at SRP are not extensive, particularly those in the Tuscaloosa Formation. The density of monitoring wells is insufficient to show the cones of depression. Information on cones of depression in the Tuscaloosa Formation is provided in Section F.4.3, Siple (1967) and Du Pont (1983; DPST-83-829).
EL-20	19. Some note should be made as to which wells are pumping, how long, and the withdrawal rates.	Individual well pumping rate information is not measured at SRP; instead, process and domestic ground-water use is measured on a system basis in each "Area" of SRP. Historical data (1968-1983) on ground-water withdrawal rates are provided on an "Area" basis in Section F.3.2. Other information is

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number		Comments	Responses
			provided in Siple (1967). Pumping histories of 12 selected wells from several formations have been portrayed graphically. Pumping information on an "Area" basis will be reported to SCWRC on a quarterly basis starting with the fourth quarter of 1983.
EL-21	20.	The text refers to data in the metric system whereas, many of the figures are labeled using the English system. They should be consistent.	Metric units were used whenever practicable. When English units were employed, appropriate conversion factors were provided. Re-drafting art work to change, for example, contours from English to metric units could distort the interpretations of the original preparer.
EL-22	21.	No mention is made of the clastic dikes located in and near the H-Area seepage basin. These dikes provide a mode for concentration of beta emitters and allow for more rapid transport of pollutants to Four Mile Creek.	Clastic dikes were mapped during the geotechnical investigations for the Defense Waste Processing Facility (DWPF). The map area included H-Area. This mapping effort does not show the presence of clastic dikes near the H-Area seepage basins. Clastic dikes at SRP are, typically, less permeable than the surrounding sediments. These dikes have an ironstone margin with a clay center. Ground-water travel times from H-Area seepage basins to seepline springs along Four Mile Creek have been measured by tracking tritium in the plume. Representative travel times are reported in Section F.5.3.
EL-23	22.	In several instances the text refers to the head in the Congaree being lower than that of the Tuscaloosa because the Congaree has been incised by several streams allowing for an area of discharge. Although this is true, the major reason for the lower head is that in the southwestern part of the plant site the recharge area for the Congaree is lower than the recharge area of the Tuscaloosa.	The pattern of upward head differential between the Tuscaloosa and the Congaree and the increase in this differential from the northeast towards the southwest (along an axis nearly coincident with Lower Three Runs Creek) suggests that stream/river incision plays the dominant role, not differences in elevations of recharge zones. The effects of incision by Upper Three Runs Creek and the Savannah River on the Congaree piezometric surface are discussed and displayed in cross sections in Section F.4.1.
EL-24	23.	In all of the piezometric maps, note should be made as to whether the water levels were made during pumping or under static conditions.	Water levels used to construct piezometric maps were measured in monitoring wells (not in pumping wells) during normal plant operations, including the withdrawal of process and domestic water from ground-water sources. Section F.1 of the FEIS has been revised to indicate conditions during ground-water level measurements.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EL-25	24. As we pointed out during the scoping process, approximately 6000 wells have been drilled at the SRP. Many of these (approximately 600) were pre-existing domestic wells, some penetrating the Tuscaloosa, that have been abandoned. The status of these wells is not known, but any open holes or rusted-out casings provide a direct route for water from contaminated shallow aquifers to the Tuscaloosa. Since this situation was not addressed in the Draft EIS, please include it in the Final EIS.	The text of Section 3.4.2.3 has been modified and a new Section F.7 has been added in this Final EIS to reflect this concern. No abandoned wells are known to exist at or adjacent to waste disposal sites that will be utilized by L-Reactor or SRP.
EL-26	25. The presence of mica and kaolinitic clays in the subsurface will make ion exchange a significant problem in controlling the movement of contaminants in ground water, especially in the McBean Formation. Please address this situation in the Final EIS.	The presence of micaceous and kaolinitic subsurface materials was considered during computation of dose commitments that could result from liquid releases via the ground-water path (seepage basin to onsite streams). Radionuclide concentrations at outcrops along streams were derived from input obtained from a ground-water model of radionuclide transport. The source-term radionuclides and their daughter products were considered. Radioactive decay, ion-exchange, and the adsorptive and absorptive properties of the micaceous and kaolinitic clays of the SRP were also considered (Section B.2). Ion-exchange, adsorption and absorption effects are accounted for by the distribution coefficient (Kd). In performing these calculations appropriate Kd-values were assigned each radionuclide species.

Thank you for the opportunity to comment on your Draft EIS. Please contact us if you have any questions regarding our comments.

Sincerely,

Alfred H. Vang
Executive Director

AHV:fw
cc: S. C. Water Resources Commissioners

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF RUTH THOMAS Environmentalists Inc. Founded 1972 November 12, 1983 Mr. M. J. Sires, III Assistant Manager for Health, Safety and Environment U.S. Department of Energy Savannah River Operations Office P.O. Box A Aiken, South Carolina 29801 Dear Mr. Sires: FINAL COMMENTS ON THE L-REACTOR DRAFT ENVIRONMENTAL IMPACT STATEMENT Introduction:	
EM-1	In our Preliminary Comments of October 6, 1983, we requested that a discussion meeting be arranged between consultants with NUS Corporation consultants, state/Federal officials and commenting organizations for the purpose of addressing the defects of the Draft Environmental Impact Statement (draft EIS) related to the proposal to restart the L-Reactor. Such a meeting was not arranged by the Department of Energy (DOE).	See the response to comment AB-21 regarding DOE's letter of October 31, 1983.
	THE DRAFT EIS FAILS TO QUALIFY AS A SCIENTIFIC DOCUMENT:	
EM-2	1. Failure to adequately identify specific references with support statements and conclusions in the text.	The EIS listed appropriate references for the subject matter covered.
	2. In the cases when a reference is included in the text, no particular section of the report or the particular pages involved are not identified.	
EM-3	3. Failure to include references which provide the specific and detailed data needed to evaluate the proposal to restart the L-Reactor. The following list of documents	The list of references provided was not needed to support any information given in the EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	includes some of the significant sources of information missing from the Draft EIS. a. Du Pont (E. I. du Pont de Nemours and Company), Control and Treatment of Radioactive Liquid Waste Effluents at the Savannah River Plant, DP-1349, W. R. Jacobsen, W. L. Marter, D. A. Orth, C.P. Ross, 1974 (This relates to leaks to storm sewers and discharges to seepage basins.) b. Tritium Toxicity: Effect of Low-Level HOH Exposure on Developing Female Germ Cells in the Mouse, R. Lowry Dobson and Mary F. Cooper, Radiation Research 58, 91-100, 1974. c. U.S. Geological Survey, Hydrology of the Low-Level Radioactive-Solid-Waste Burial Site and Vicinity Near Barnwell, South Carolina, Open File Report 82-863, James M. Cahill, 1982. (On page 3-68 the Draft EIS lists a report on Chem-Nuclear prepared by the company itself, the newer findings of the U.S. Geological Survey are not included.) d. Dr. Thomas Mancuso, Study of Health Effects of Radiation Exposure to Workers at Hanford Washington Complex of Nuclear Plants, 1978. (Despite reports of bad peer reviews, only one was negative and that by Dr. Sidney Marks, whose work for the AEC gave him a conflict of interest problem.) e. Appendix II, Regional Tritium Dose Model, testimony of August 1, 1974 at the federal hearing on the Allied-General Nuclear Services; reprocessing plant, Docket No. 50-332 (This testimony related to the fact that the transfer of tritium is not monodirectional.) f. Du Pont, Leakage from Waste Tank 16, DP-1358, W. L. Poe, November 1974. (Numerous other reports of accidents, and problems at the Savannah River Plant are missing from the Draft EIS; reference sources.)	
EM-4	4. The use of classified and internal reports to support statements in the Draft EIS, yet these are unavailable to reviewers.	See the response to comment AB-2 regarding availability of classified documents.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EM-5	5. Cases of evidence in referenced reports conflicting with statements in the text. (See page 4-144, Gibbons study of 1974 conflicts with statements on page 4-18).	See the response to comment AB-14 regarding the differences in the statements.
	THE DRAFT EIS FAILS TO FULFILL THE REQUIREMENTS OF THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) FOR EXAMPLE:	
EM-6	1. Failure to provide adequate evidence regarding the benefits of the proposal to restart the L-Reactor.	See the response to comment AB-4 regarding "benefits."
EM-7	2. Failure to provide adequate evidence regarding the costs of restarting the L-Reactor, in terms of environmental and health damages and in terms of detrimental impacts to businesses of the state, including tourism.	There is no evidence to suggest that the restart of L-Reactor will have a detrimental impact to the businesses of the state including tourism. To the contrary, as discussed in Section 4.1.1.1 of the EIS, L-Reactor operation is expected to have annual total local expenditures in materials and services of approximately $3 million and a total payroll and overhead expenditure of about $21 million. These expenditures are expected to create about 50 regional job opportunities and to produce an additional direct and indirect income of another $3 million. The total economic benefit to the SRP region during L-Reactor operation will amount to 400 direct and indirect job opportunities, about $25 million in direct and indirect annual income and payroll, and $3 million in direct annual expenditures on materials and services.
EM-8	3. The lack of adequate evidence related to both Costs and Benefits makes the balancing process of the NEPA law impossible to carry out.	See the response to comment AB-4 regarding balancing of costs and benefits.
EM-9	4. The fact that the Draft EIS is not a qualified scientific document means it is also unfit to serve as the basis of reaching decisions regarding the proposal to restart the L-Reactor.	The EIS was prepared in accordance with NEPA guidelines and CEQ regulations. The EIS was based on extensive published reports and accurately depicts the environmental consequences of the proposed restart of L-Reactor.
EM-10	5. Failure to comply with the NEPA requirement of environmental consideration "to the fullest extent possible" as mandated in Section 102 of the law. This includes the subject of alternatives to the proposed action and alternatives which would reduce the detrimental effects of the proposed restart of the L-Reactor. See our Preliminary Comments regarding production alternatives, safety alternatives and cooling water options.	See the responses to comments AB-4 and AB-5 regarding this EIS and NEPA.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	QUESTIONS AND COMMENTS:	
EM-11	1. Explain the conflict between evidence about the toxic nature of radioactive materials and the DOE's conclusion that an approximate one third increase in the amount of these lethal substances (increase in production, storage, burial and release by intention and accident) at the Savannah River Plant would have no significant effect on the environment and the public's health.	There is no conflict inherent in the conclusion that an increase in the release of radioactive materials by one-third will not significantly affect the environment and public health. A one-third increase in an insignificant quantity results in a quantity which is still insignificant. Section 5.2.7 of the EIS presents health effects from all SRP and nearby nuclear facilities in the tenth year of L-Reactor operation that are estimated to be a total of 0.02 cancer fatality. Expected cancer death rates in a population of 852,000 (within 80 km) plus 317,000 (downstream water consumers) based on 1979 South Carolina and Georgia rates of about 147 per 100,000 population would be about 1720 per year. Thus, Savannah River Plant contributions (0.02 cancer fatality) would not change the projected cancer fatality rate by a detectable amount (1720 to 1720.02 per year).
EM-12	2. List the research consulting firms the DOE considered for preparing the Environmental Assessment? for the Draft EIS?	Both the EA and the EIS are DOE documents; DOE is solely responsible for their preparation and contents. DOE contracted with NUS Corporation as a technical support contractor to provide assistance to DOE/SR in the preparation of documents to comply with the NEPA. DOE followed its contracting and procurement regulations for competitive contracts before selecting NUS. Sixty-nine companies expressed an interest in bidding on the contract in 1980. DOE reviewed the prospectus of each company. The NUS Corporation was selected from among these companies to provide this technical support. The L-Reactor NEPA documents (the EA and EIS) were one task assigned to this contractor.
EM-13	3. Describe the criteria used to judge the knowledge, experience, and objectivity of the research firms considered.	With respect to experience, DOE developed an exclusion criterion that stated "The offeror must have prepared an Environmental Impact Statement (EIS) as defined in Section 102(2)(c) of NEPA for Federal agencies which related to the nuclear fuel cycle and radioactive waste management activities." To narrow the competitive field to those companies with expertise in the nuclear fuel cycle and NEPA experience, DOE required the contractor to have expertise in the following areas: socioeconomics, radiological dose assessments, meteorology, geology, hydrology, ecology, biology, seismology, and engineering (civil, mechanical, nuclear).

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EM-14	4. List the reasons why the DOE selected the same researchers to do the Draft EIS as those who had prepared the Environmental Assessment.	See the responses to comments EM-12 and EM-13. Because NUS Corporation assisted DOE in the preparation of the EA, it was familiar with the L-Reactor project and environmental effects. DOE is responsible for the technical accuracy of the EIS. Also see the response to comment AB-20 regarding the EA and its support documentation.
EM-15	5. The Draft EIS points out that numerous studies have been done on the health effects caused by exposure to radiation. The report, however, lists only a few studies as references. None of the animal research and none of Dr. Alice Stewart's studies are included. Numerous other studies are missing including Dr. Samuel Milham's findings of "too much cancer at Hanford" and Dr. Thomas Mancuso's follow up study on Hanford.	The EIS relies in general upon the reports and recommendations of the most authoritative institutions with respect to radiation-induced health effects, including the Committee on Biological Effects of Ionizing Radiations of the National Academy of Sciences, National Research Council. The studies of Stewart, Milham and Mancuso have been examined and dismissed as lacking in statistical power in the 1980 report of that committee.
EM-16	The 3 health effect references chosen for Section 6 on Studies and monitoring were all done by one person, H. I. Sauer (page 6-13). According to those preparing the Summary, there is a need to "fill in missing time periods and update mortality rates through 1978" (page S-11) in these reports of Dr. Sauer. Unless the Final EIS includes consideration of the evidence contained in numerous health effect studies, the DOE may be accused of manipulating information related to the L-Reactor restart proposal. In a speech at a January 1983 meeting of the Aiken Rotary, Du Pont's Vice Chairman, Richard Heckert stated that "(O)ften scientific fact are ignored," when nuclear issues are being considered. He went on to say that "(S)ometimes unsuppotable scientific arguments are created for the occasion," "In still other cases," he added, "valid data are manipulated to support predetermined political goals rather than to reach valid scientific conclusions." The DOE needs to review its own practices.	The study by H. I. Sauer, which was in progress when the DEIS was prepared, has now been completed and a report is being prepared. The study was reviewed by a panel of epidemiology experts on October 25-26, 1983. This panel, which was convened by the U.S. Public Health Service's Centers for Disease Control at the request of DOE, included epidemiologists from the health departments of the States of Georgia and South Carolina. A report of the panel's review is expected by the end of 1983. In Professor Sauer's study, he concludes that "the hypothesis that there is increased mortality due to the operation of SRP has been shown to be without foundation. The differences between U.S. rates and the rates for counties in South Carolina and Georgia, analyzed either cross-sectionally or as trends over time, do not display any consistent pattern. Though erratic and heterogeneous when organized from the angle of possible SRP induced radiation effects, the data might be better explainable when correlated with other factors of natural, socioeconomic or cultural character."
EM-17	6. There are too many defects in the Draft EIS and in the responses the DOE made to those testifying orally and in writing to address all of them. We, therefore, selected the first ten pages of Dr. Roger Coate's Statement of May 24, 1983 to study. This particular testimony was chosen because of Dr. Coate's knowledge of numerous subjects related to the proposal to restart the L-Reactor.	Responses to the additional comments and answers are provided in the following comments and responses. Due to the format of this appendix a complete copy of the marked copy cannot be provided; however, a complete copy of the attachment is enclosed in the DOE report documenting the comment period on the Draft EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

We added comments related to the information he presented and related to the answers supplied by the DOE. A copy of these comments is attached. These notes demonstrate that more questions were raised by the DOE's responses and that conflicting information was not cleared up. In some cases specific questions or comments were not addressed.

We ask that full consideration be given to our Preliminary Comments, these Final Comments and our notes related to Dr. Roger Coate's testimony.

Sincerely,

Ruth Thomas,
Authorized Representative
Environmentalists, Inc.
1339 Sinkler Road
Columbia, S.C. 29206
Tel. 803-782-3000

Attachment A:
Notes on Dr. Coate's testimony

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	We have prepared notes on Dr. Coate's statement and DOE's response presentations to show that the agency has not adequately addressed issues raised in this testimony either in its comments here or in the Draft Environmental Impact Statement (EIS). (Boxed in areas are E. I.'s notes) Ruth Thomas Environmentalists, Inc. 1339 Sinkler Road Columbia, S.C. 29206 tel. 782-3000 Only through page B-58.	
EM-18	From my review so far of the Draft EIS, it appears that the basic faults pointed out about the EA (nos. 2, 3 and 4) exist in the Draft EIS.	Comments 2, 3, and 4 were addressed in the responses to U-7, U-14, and U-4, respectively, of Dr. Coate's statement.
EM-19	The position that "National Security" also applies to maintaining public well-being of the public from operation of SRP is a view which needs to be stressed by more people. It relates to NEPA, the balancing of costs vs benefits. There is nothing in the NEPA law of 1969 which exempts DOE from full compliance with this federal law.	See the responses to comments AB-4 and AB-5 regarding balancing and disclosure of classified information in this appendix.
EM-20	The Draft EIS as it now exists does not meet the requirements of the NEPA and the EA did not. Did the DOE have lawyers familiar with NEPA as advisors? What legal experience do the NUS Corporation consultants have? (36 of the preparers of the Draft EIS are with NUS Corp.)	See the response to comment AB-4 in this appendix regarding information in this EIS. The EA and the EIS were prepared by NUS under the technical direction of DOE, including the General Counsel from the DOE Savannah River Operations Office and DOE's Office of General Counsel. All these lawyers are familiar with the NEPA. The Office of the General Counsel approved the EA, FONSI, and Draft EIS. NUS Corporation is an engineering and environmental consulting firm with extensive experience in preparing environmental NEPA documents. NUS' legal experience has no bearing on its ability for preparing NEPA documentation.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EM-21	Citizens and citizens' organizations have the right to intervene and be parties to administrative hearings at which cross-examination and testifying under oath are helpful in resolving conflicting information. (Under the NEPA law.)	NEPA requires that the public be allowed to comment during the NEPA process [42USC.4332(2)(c)] and the Agency is required to respond to those comments (32 CFR 651.304). There is no statutory requirement for public hearings. (Como-Falcon Community Coalition Inc. v. Dept. of Labor 609F2d 342 (8th Cir. 1979). If a hearing is held, it is up to the agency to decide on the procedures.
EM-22	The Draft EIS appears to have as its main purpose to minimize the effects of restarting the L-Reactor and to minimize the damages which have already happened.	As discussed in Section 1.2 of the EIS, the purpose of the EIS is to analyze the potential environmental consequences of the proposed restart of L-Reactor in compliance with Section 102(2)(C) of the National Environmental Policy Act of 1969, as amended, and the Energy and Water Development Appropriations Act, 1984. The potential environmental impacts of the proposed restart of L-Reactor are described in the EIS and are based on projections of the effects of expected nonradiological and radiological operational releases on the current environmental baseline. Also see response to comment AT-3 in this appendix regarding the scope and content of this EIS.
EM-23	In the DOE's defense of the EA, chapters 3 and 4, the agency refers to the number of pages as if the quantity of material was the important criteria rather than the presentation of as complete and accurate a record of evidence as possible. (NEPA)	See responses to comments AT-3 and AB-1 in this appendix regarding this EIS and the EA.
EM-24	The alternative discussions of the Draft EIS are defective as noted in EI's Comment Letter.	See the responses to comments AB-5 through AB-19 in this appendix regarding alternatives in this EIS.
EM-25	We did not find the Johnson (1977) report listed in the Draft EIS nor did we find accounts of incidents, accidents, equipment failures, accidental releases. It is unclear what amounts of various radioactive gasses and fallout have been routinely released from reprocessing plants, other plants.	The Johnson (1977) report, in discussing 75 release incidents, was referring to 75 incidents in the solid waste burial ground which resulted in localized release of radioactivity (ERDA 1537, Chapter III, Section 2 (1977)). These involved burial of contaminated equipment, sand blasting to decontaminate equipment, burning organic solvent, and accidental fires. Contamination was confined to the burial ground except for three incidents which resulted in minor contamination outside the burial ground fence. Improved operating procedures have greatly decreased the frequency of abnormal incidents in recent years.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EM-26	The information about accidental tritium releases is incomplete. We could not locate among the references the approximately 200 documents related to tritium releases and referred to the DOE letter of October 4, 1983.	See the response to comment AB-10 in this appendix regarding tritium releases.
EM-27	What have been the routine and accidental releases of iodine from the SRP reactors? The fact that local milk samples have contained ST-90 suggests other fission products were also released. Why wasn't milk checked for radioiodine each year the SRP facilities have operated? at local farms?	The major sources of iodine releases are the Separations Areas. For the 10-year period 1971-1980 the three operating reactors at SRP released a total of 0.077 Ci of iodine-131 to the atmosphere, 2.65 Ci to surface streams, and 0.32 Ci to seepage basins. (Reference: Ashley, C. Zeigler, C.C, and Culp, P.A., "Releases of Radioactivity at the Savannah River Plant 1954 Through 1980," DPSPU 81-25-1, 1982.) There has been no evidence that strontium-90 in locally produced milk is of SRP origin. Sr-90 and other radionuclides in milk (except H-3 and I-131 during specific periods) are attributed to fallout from nuclear weapons tests. In the early days of the nuclear industry, the importance of the iodine--cow milk exposure pathway was not recognized. Routine monitoring of cow milk began at SRP in early 1957.
EM-28	At the Barnwell plant hearings, the iodine-131 predictions were 50 times too low. What has been done to see if SRP predictions are off?	Releases of iodine-131 at SRP are based on actual measurements and thus represent operating experience.
EM-29	Where in the Draft EIS is consideration given to the fact that people in the SRP area were exposed to the high iodine-131 releases in the early years of the SRP as well as later releases in terms of the added radioactive pollution from the L-Reactor being an injury to those already harmed? Particularly, in relation to thyroid damage?	See the response to comment EM-27 in this appendix.
EM-30	The statements about reductions in the number of accidents and leaks conflicts with reports of there being more accidents in 1979-1980 - 108 each. *In 1975 there were 38) Richard Denise of DOE told the Atlantic Constitution that one reason was "personnel turnover."	The DOE keeps records of all events which are outside of the normal operating conditions or deviate from normal operating procedures. Most of these events do not result in accidents or leaks. Any events which have an offsite effect are reported to the public in the annual report series entitled Environmental Monitoring in the Vicinity of the Savannah River Plant.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EM-31	According to Wm. Stratten, reactor expert of Los Alamos, old nuclear plants require more maintenance than when they are new.	The Savannah River Plant has a continuing program to maintain production facilities in a safe operating condition. This includes replacement of equipment when necessary and updating equipment to stay abreast of improved technology.
EM-32	The Draft EIS makes no reference to iodine releases and other recorded releases as far as we can determine. The SRP Operations Office, 1982 does not appear to have been used as a reference by the preparers of the Draft EIS, nor Health Physics reports, nor all of the tritium documents.	Estimates of releases of radioiodine and other radionuclides (Chapters 4 and 5 of the EIS) from L-Reactor and support facilities are generally based on the most recent 3 years of operating experience and thus represent current technology and operating conditions.
EM-33	The report "Radioactive Exposure of the Population by Contaminated Air Emitted from Nuclear Plants in the Federal Republic of Germany" (1975) identifies radioiodine via the pasture-cow-milk pathway as the crucial exposure. Why wasn't this reference used? Were the people in SRP area given potassium iodine pills during the accidental releases of iodine and during the early years when I-133 releases were high?	The pasture-cow-milk pathway is the critical pathway for releases of radioiodine to the environment. This pathway is taken into consideration in calculating the radiological effects of operation of L-Reactor and associated facilities. The offsite doses to the thyroid and other organs via the pasture-cow-milk pathway are given in Appendix B of the EIS.
EM-34	It is our understanding that all tritium, K-85 and Carbon-14 are discharged to the air from reprocessing. If no equipment traps these gases and fallout particles, isn't this dumping?	Tritium, carbon-14, and Kr-85 from reprocessing are released to the atmosphere. At present, there are no practicable methods of removing these radionuclides which are in a dilute form in very large volumes of air. The releases have always been well below standards (i.e., offsite doses have always been well below accepted dose standards).
EM-35	What equipment has been added to SRP facilities? What reports document this? What amount of iodine in radioactive form was released prior to the addition of removal equipment? After? What documents include records of tests on milk for radioiodine?	Since startup of SRP, there has been a continuing program to upgrade equipment and facilities to reduce releases of radioactive and nonradioactive materials to the environment. These "state of the art" improvements are the result of research at SRP and elsewhere. Many of these improvements are described in ERDA-1537 (an EIS reference for Chapter 5). Improvements specifically for SRP reactors are also described in the EIS, Sections 2.2, 4.2, and Appendix J. As described in response to comment EM-27 in this appendix, SRP reactors are a minor source of releases of radioiodine to the environment.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EM-36	Misleading statements are used in the Draft EIS including minimizing amounts released (page B-1 of VOI. 2) as well as minimizing detrimental effects.	The statement that the size of radioactive releases will be small (Page B-1 of the EIS) from operation of L-Reactor and its support facilities was intended to reflect the fact that the radiological impact will be small. See the response to comment EM-11. The word "small" in the first paragraph of Page B-1 has been removed.
EM-37	The presentations on tritium are particularly misleading, and in conflict with reports and studies. ("Sources of Tritium and its Behavior Upon Release to the Environment," D. G. Jacobs, AEC, 1968, "Tritium Toxicity: Effect of Low-Level 3HoH Exposure on Developing Female Germ Cells in the Mouse," R. Lowry Dobson & Mary Cooper, Radiation Research 58, 91-100(1974)-A few examples. Evidence is needed in Draft EIS to support the statements that a majority of tritium released is in the less dangerous form.	Standard dosimetry models used by the Nuclear Regulatory Commission in regulating the commercial nuclear industry were used in EIS dose calculations (see Appendix B of the EIS). The dose models are based on recommendations of the International Commission on Radiological Protection. The EIS does not make the statement that the majority of tritium released by L-Reactor and its support facilities is in the less dangerous molecular form (see Sections 4.1.2.1, 5.1.2.2, and Appendix B of the EIS). Dose calculations were made on the basis that tritium releases are in the more easily assimilatable oxide form.
EM-38	Not enough samples are taken to justify reaching conclusions about accidental releases. Urine samples are only taken of SRP employees, we understand. If the predictions of the pathway are based on incomplete and inaccurate inf., they are not dependable.	Urine samples were analyzed for more than 300 people. This not only included people working at SRP but also members of the plume tracking team, families of SRP personnel living in the plume trajectory, and members of the public in 20 counties of eastern South Carolina and five locations in North Carolina [reference: W. L. Marter, "Environmental Effects of a Tritium Gas Release from the Savannah River Plant on May 2, 1974," DP-1369 (1974)]. Urine samples were also analyzed for on and off plant people during the 1975 tritium release [reference: W. R. Jacobsen, "Environmental Effects of a Tritium Gas Release from the Savannah River Plant on December 31, 1975," DP-1415 (1976)]. Also see the response to comment EM-48 in this appendix.
EM-39	The Draft EIS fails to provide the evidence to support the following statement similar claims.	Of the radionuclides normally released to the environment from SRP operations, only tritium is regularly detectable by routine monitoring procedures. Thus, it is necessary to calculate doses for known exposure pathways and known atmospheric dispersion. The dosimetry model used in the EIS is the same as used by the Nuclear Regulatory Commission for regulating commercial nuclear operations (see Appendix B of the EIS). Dispersion calculations have been confirmed by environmental measurements of tritium.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EM-40	The Draft EIS doesn't explain why residents have not been warned when accident happen which result in more than routine amounts of radiation pollution being released, so they can reduce exposure.	DOE Orders require that DOE-SR notify potentially affected states of incidents at the SRP. It is the State's responsibility, as in the case of commercial nuclear power reactors, to "warn" people in designated zones near the plant in accordance with EPA guidelines. Guidelines for "warning" offsite persons of releases of "more than routine amounts" of radioactivity from SRP have never been approached. Therefore, required protective actions to "reduce exposure" have not been necessary. Though "warnings" have never been required, the DOE and its predecessor agencies, AEC and ERDA, have had memoranda of understanding with the States of South Carolina and Georgia since 1974 to "notify" responsible state agencies of unusual releases of radioactivity or accidents. As indicated in Appendix H of this Final EIS, which has been modified to include the current status of emergency planning activities, much more detailed notification agreements have recently been agreed to with the states and formal emergency planning was completed in March 1984.
EM-41	Draft EIS doesn't explain the contradiction between calculating a tritium cloud pathway and the fact that tritium doesn't necessarily follow wind direction. (Transcript of the Barnwell plant hearings 50-332)	The calculated tritium cloud pathway referred to was for short-term tritium release incidents. Initial direction and speed of travel of the plume was based on meteorological measurements and standard dispersion calculations. The calculations were confirmed by actual measurement of tritium in the environment following the releases.
EM-42	Why weren't the references cited here used in the Draft EIS? Or why weren't the contradictions between DOE's statements and the cited references explained?	See the response to comment EM-37 in this appendix.
EM-43	Draft EIS lacks adequate discussions of redistribution, through such means as by birds, other animals, insects.	Pathway analysis is included in the dosimetry model used (see Appendix B).
EM-44	The draft EIS uses this same approach of "misleading statements 'low-values'"	See response to comment EM-37 in this appendix.
EM-45	Monitoring did not protect the people's health, information wasn't available in time to reduce the inhaling and ingestion of tritium by humans or animals.	No steps were taken to evacuate people in the path of tritium releases to avoid inhalation or ingestion of tritium. It is unlikely that any tritium release from SRP will ever require such action because offsite doses would not warrant the action. Offsite doses were theoretically calculated immediately following the releases and extensive field monitoring was conducted to verify the calculations.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EM-46	Failure to include in the Draft EIS information sources identified here or explain why, or why the AEC reports and other studies disagree. Will the Final EIS correct this and statements which are either unsupported or contrary of evidence in studies, records, transcripts?	See the response to comment EM-2 in this appendix.
EM-47	The conclusion cannot be reached that tritium was carried in a northeastern direction since tritium doesn't follow wind direction. (See testimony of Barnwell plant hearing Docket No. 50-332)	See the response to comment EM-41 in this appendix.
EM-48	Sampling was done along predicted pathway and since the information on which such predictions were based was incomplete and in some regards incorrect the results of the testing are in question. 1,000 samples is too small a number to base conclusions on anyway. 1,000 samples in 11 categories or approximately 90 of each. The Draft EIS also reaches conclusions based on inadequate information and sampling. No control groups are referred to.	The number of environmental samples following the tritium release incident was adequate to determine the area involved (pathway), levels of tritium in the environment, and offsite doses.
EM-49	The Draft EIS lacks evidence to support statements that new equipment and plant operation techniques have been added over the years. Budget information is needed to show how much was spent, when and on what, as well as detailed and documented information describing the changes. Statements about improvements conflict with public statements made by Richard Denise of DOE, when asked about the fact that the number of accidents at the SRP facilities has increased over the years, for example in 1979 and 80 there were 108 each year.	The continuing upgrade program for the SRP reactors, which was inaugurated immediately after reactor startup in 1953, is discussed in Appendix J. About 60 percent of the $204 million spent on preparations for the L-Reactor restart went to modernize the reactor in the same way the operating reactors have been modernized during the L-Reactor standby period. It has been a continuing concern that the facilities be continually upgraded. To this end a five-part restoration program was undertaken for the period 1981-1987. A total of $389 million was budgeted of which about $164 million has been budgeted through 1983. This money is in addition to normal maintenance and new capital projects.
EM-50	In both EA and Draft EIS, preparers apply the "dilution theory" to an atomic age technology. This is inappropriate.	All releases from L-Reactor and its support facilities are monitored and controlled at the release source, i.e., before dilution. Measurements are then also made of the way these releases disperse into the environment.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EM-51	All tritium, K-85 and C-14 are released intentionally. Since these take time to decay to a safe level C-14 the longest 5,750 year half life, they are still a pollution problem.	Although tritium, Kr-85, and C-14 are released to the environment from operation of L-Reactor and its support facilities, offsite doses are small. Also see the response to comment EM-11 in this appendix. The population dose calculations include consideration of a 100-year environmental dose commitment as described in Appendix B.
EM-52	There are not adequate monitoring stations and provisions to determine the locations at which radiation build up has taken place. The Dept. of the Interior points out the limits of monitoring.	The Savannah River Plant has the most comprehensive environmental monitoring plan of any nuclear facility in the United States. There is no basis for the statement that monitoring stations are inadequate. Monitoring stations are at numerous locations so that there is little likelihood that there will be an undetected buildup of radioactivity. See Chapter 6 of the EIS.
EM-53	Agree that understanding of radiation and its harmful effects is substantial. There are animal studies, studies of X-ray patients, those by Gofman, Tampline, of Nuclear workers-Macuso, radium dial painters, Japanese victims, and from these much has been learned. The Draft EIS fails to give adequate attention to this evidence and the evidence related to the effects of radiation damage to the unborn.	The National Academy of Sciences BEIR III Report (reference: "The Effects on Populations of Exposures to Low Levels of Ionizing Radiation: 1980," National Academy of Sciences, 1980) took into account the studies listed in this comment. The NAS Report was used as the basis for calculating the health effects of operation of L-Reactor and associated support facilities. Also see the response to comment EM-15 in this appendix.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF S. JACOB SCHERR

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Mr. M. J. Sires, III
Assistant Manager for Health,
Safety, and Environment
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29801

Dear Mr. Sires:

Comments on the Draft Environmental
Impact Statement on L-Reactor Operation

I am writing on behalf of the Natural Resources Defense Council, Energy Research Foundation, The Georgia Conservancy, Coastal Citizens for Clean Energy, Environmental Policy Institute, S. David Stoney, Justin Stephens McMillan, and Judith Gordon to provide our comments on the Draft Environmental Impact Statement on L-Reactor Operation, Savannah River Plant, Aiken, S.C. (DOE/EIS-0108D) (September 1983) ("the Draft EIS").

The above-named organizations and individuals are plaintiffs in the case of NRDC et al. v. Vaughan, C.A. No. 82-3173 (D.C.C., July 15, 1983) which ordered the Department of Energy ("DOE") to prepare an EIS on the L-Reactor "as soon as practicable." A number of the plaintiffs have already submitted their own comments on the Draft EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EN-1	The Draft EIS appears to be a half-hearted attempt to rationalize and justify a decision already made to start up the L-Reactor as soon as possible without implementation of improved safety or environmental safeguards. The Draft EIS fails to provide a convincing case for the early start up of the L-Reactor, to disclose fully the impacts of its operation, or to provide meaningful consideration to all reasonable alternatives. Our specific comments on the Draft EIS are as follows:	The Draft EIS was prepared based on the substantive comments that were received during the public scoping process, including the comments of NRDC. The purpose of the EIS is to evaluate the environmental consequences of the restart of L-Reactor. This EIS together with other studies on need will be used by the Department to prepare its Record of Decision. The restart of L-Reactor in this final EIS is based on the need for defense nuclear materials as defined in the FY 1984-1989 NWSM. The restart of L-Reactor as soon as practicable is not considered to be an "early" restart.
	A. Need for the L-Reactor	
EN-2	The failure of the Draft EIS to provide an adequate justification (Section 1) for the immediate startup of the L-Reactor has already been discussed at length in the statement of Dr. Thomas B. Cochran submitted at a DOE hearing on the Draft EIS in Beaufort, S.C. on November 3, 1983. A copy of Dr. Cochran's statement is attached. It is important to emphasize once again that the issue of the need for the L-Reactor is linked directly to the question of whether DOE can implement measures to avoid or reduce environmental harm prior to the proposed operation of the L-Reactor. We would like to make the following additional specific comments:	Responses have been developed for the specific comments contained in this statement. Responses to the statement submitted by Dr. Cochran on November 3, 1983, are contained in this appendix under the letter designation "BL." The need for defense nuclear material is discussed in Chapters 1 and 2 in as great a detail as classification regulations will allow. A classified Appendix available to the decisionmaker, contains a discussion of the need and production alternatives and will be considered in the final decisionmaking.
EN-3	1. The Draft EIS discussion of need relies heavily upon the requirements set forth in the Nuclear Weapons Stockpile Memorandum ("NWSM"), in particular on a declassified quote from the FY 1983-1988 NWSM which states that "...DOE shall...(b) restart the L-Reactor at the Savannah River Plant, Aiken, South Carolina, as soon as possible, but no later than October 1983." The Draft EIS should indicate precisely when the FY 1983-1988 NWSM was approved by the President and whether DOE recommended	As indicated in Section 1.1.1 of the EIS, the FY 1983-1988 NWSM was approved by the President on November 18, 1982. The indicated statement was first proposed by DOE on October 19, 1982, as a means of communicating the urgency of restarting L-Reactor. The quantitative analyses of nuclear material supply and demand in the NWSM fully support this statement and the statements in Section 1.1.2 of the EIS indicating that any delays in the implemented and proposed initiatives, including

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	the above-quoted language. We are concerned that it was added following the start of the controversy in August 1982 over the operation of the L-Reactor and may have been viewed as a means of shielding DOE from criticism.	the restart of L-Reactor, will directly affect the needed supply of defense nuclear materials for our nation's nuclear force structure.
EN-4	Since it appears that at least a portion of the FY 1983-1988 NWSM could be declassified and published, DOE should review both this document, the FY 1981-1983 NWSM and the classified Appendix A to the DEIS to determine whether other segregable portions could be released in order to allow a more meaningful evaluation of DOE's justification for the startup of the L-Reactor. In any event, the following questions must be answered publicly:	Information on weapon builds, stockpile, retirements, and on plutonium and tritium supply, demand, production, and stockpile are classified and, by law, cannot be divulged. No portions of the FY 1981-1983 NWSM, FY 1983-1988 NWSM, or 1984-1989 NWSM containing substantive information pertinent to the need and timing for the restart of L-Reactor can be declassified. All substantive unclassified information in Appendix A to the EIS has been included in Chapters 1 and 2.
EN-5	a. Has not DOE's plutonium equivalent production rate exceeded the previously planned (as authorized in the FY 1981-83 NWSM) rate?	The development of each NWSM is based on a detailed analysis of scheduled and planned new weapons systems, scheduled and planned weapons retirements, the current status of material inventory, material supply from retirements, production and processing plans, and capability. This analysis uses data consistent with the current status of legislative actions and administration plans concerning weapons systems and material production. This information, including statements concerning production rates, projected material shortages, or adverse impacts on weapon system deployment, is classified and, by law, cannot be divulged.
	b. Has not the delay in the production of enhanced radiation 155 mm AFAP, the reduction or deferment in the production of ALCM warheads and the reduction of MX warheads lowered the plutonium equivalent requirements set forth in the FY 1983-88 NWSM relative to the needs projected in 1980, at the time the decision was made to restart the L-Reactor?	
	c. The DEIS states that "the increased defense nuclear material requirements and production initiatives...have been reaffirmed in subsequent stockpile memoranda (1-2)." Thus, if the answer to either question a. or b. above is "yes," it follows that any reaffirmation of production initiatives in subsequent NWSM's must reflect a desire or intention by DOE to build a plutonium surplus, perhaps on the order of several tons. Is this the case?	Changes in weapon builds and schedules cannot be considered independently of changes in weapon requirements and the status of defense nuclear material inventories and production and processing capabilities. Each NWSM provides the results of a detailed analysis of all these factors based on the information available when the NWSM was developed; therefore, changes in the status and plans for production and deployment of weapons are fully accounted for from one NWSM to the next. As indicated in Section 1.1.1 of this EIS, the FY 1984-1989 NWSM considers the fact that Congress has delayed or failed to fund certain nuclear weapons systems.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	d. Is not the desire for a stockpile, rather than projected shortages in meeting weapons requirements, the actual basis for DOE's desire to startup the L-Reactor in January 1984? Discuss in detail the national security reasons for such a large stockpile. Is the stockpile simply a means to justify the early startup of the L-Reactor when it is clear from public statements that warhead requirements have been reduced?	Although these changes have affected the required delivery of defense nuclear materials, they do not significantly change short- and intermediate-term requirements that L-Reactor must help satisfy. Therefore, all the implemented and proposed initiatives, including L-Reactor restart, are needed as soon as practicable to meet the increased nuclear material requirements. Also see the response to comment BL-15 regarding the analysis of effects of delayed L-Reactor restart.
	e. If the L-Reactor startup were delayed three years, would the effect be simply to draw down the projected plutonium surplus by some 1.5 MT, or to defer the date when the desired surplus level is obtained?	
	f. How long could L-Reactor startup be deferred and the plutonium foregone made up through alternative production initiatives without slippage of the date the desired surplus is presently projected to be achieved?	
EN-6	g. Is not there sufficient flexibility in the rate of retirement of obsolete weapons to meet future contingencies should the L-Reactor be delayed and additional plutonium be required?	See the response to comment AB-8 regarding the availability of material from retired weapons.
EN-7	2. The Draft EIS fails to mention the results of the review last year of the White House Science Board, chaired by Dr. Sol Buchsbaum, on the need for new tritium/plutonium production. What were the conclusions of this review? Did the review conclude that a New Production Reactor ("NPR") could not be justified on the basis of tritium/plutonium needs at this time, but that the concentration of all production at the Savannah River Plant (SRP) was undesirable from a national security standpoint? What are the implications of this review for the need for the L-Reactor?	Although the DOE is not in receipt of a report containing the results of the review conducted by the White House Office of Science and Technology Policy, the Department understands that the review supported proceeding on a timely basis with the new production reactor (NPR) and that, for reasons of national security, a site other than Savannah River was recommended for the NPR. The Department is not aware of any recommendations arising from this review concerning L-Reactor.
EN-8	3. The EIS should take into account events and findings since the publication of the Draft which have direct bearing on the question of the need for the plutonium to be produced by the L-Reactor. In late October 1983, the Senate cut further	See the response to comment DI-2 regarding the supply of fuel-grade plutonium to CRBR.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	funding for the construction of the Clinch River Breeder Reactor (CRBR) and DOE has now apparently begun to terminate the project. The decision not to build the CRBR will reduce significantly the demand for DOE fuel-grade plutonium, which may then be available for blending or enrichment to weapons grade.	
EN-9	Secondly, scientific studies presented at the Conference on the Long-Term Worldwide Biological Consequences of Nuclear War, October 31 - November 1, 1983, found that even a limited exchange of nuclear weapons or first strike (100 to 1000 MT) may result in severe climatic changes with profound effects on human health, agriculture, and other aspects of the global environment.	The national policy on weapons, their deployment, and the need for increased weapons is beyond the scope of this EIS.
EN-10	4. The EIS should make clearer the fact that NWSM is not a static document, but rather that it is subject to revision and updating. Indeed, the EIS should indicate that the NWSM is now under review and that DOE is free to make recommendations as to changes which might result from this NEPA review of the L-Reactor.	The FY 1984-1989 NWSM approved by the President with the authorization and appropriation of funds by the Congress, serves as the basis for DOE production of weapons and materials. As indicated in Section 1.1.2 of the EIS, any delays in the implementation of the proposed initiatives, including the restart of L-Reactor, will directly affect the needed supply of defense nuclear materials for our nation's nuclear force structure. Also, see the response to comment EN-5.
	B. Thermal Discharges and Cooling Water Alternatives	
	1. Thermal Discharges (Section 4.1.1.4)	
EN-11	Because it is based on incorrect interpretations of law and inadequate information, this section on the predicted effects of the cooling water discharges on the environment, particularly with reference to South Carolina Water Quality Standards, is extremely difficult to assess. The entire discussion is apparently based on the incorrect and outdated interpretation of these Standards previously applied by the U.S. Environmental Protection Agency, reflected in the NPDES permit issued by EPA in October 1976. Under this interpretation, the Standards apply to the Savannah River, but not to Steel Creek or the other tributaries of the Savannah River within the boundaries of SRP.	The discussion in Section 4.1.1.4 of the Draft EIS for direct discharge was based on the draft NPDES permit received from SCDHEC in August 1982 which proposed thermal limitations as described in Section 4.1.1.4 of the Draft EIS, in the Savannah River. Subsequent drafts of the NPDES permit changed the compliance point from the Savannah River to the discharge point in Steel Creek. On December 15, 1983, SCDHEC announced its determination to issue an NPDES permit to the DOE for the Savannah River Plant effective January 1, 1984. Based on this permit and a mutually agreed upon Consent Order, all discharges except the thermal discharge from L-Reactor would be permitted under the terms of

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	The South Carolina Department of Health and Environmental Control (DHEC), which now has NPDES permitting authority, has made it clear that it considers Steel Creek (into which DOE proposes to discharge wastewaters from the L-Reactor) to be part of the "waters of the United States" as defined by the Clean Water Act. Consequently, the water quality standards of the State of South Carolina apply to Steel Creek as well as the Savannah River. DOE was aware of this new interpretation of the law at the time that the Draft EIS was written, yet the analysis of thermal impacts in the Draft EIS is based on the old interpretation of the standards.1/	the NPDES permit. The thermal discharge from the three operating SRP reactors (C, K, and P) would be permitted provided that DOE would: (1) complete a comprehensive study of the thermal effects of all operations at SRP; (2) complete and submit thermal mitigation studies to SCDHEC within 9 months of the signing of the Consent Order; (3) implement the recommended thermal mitigation alternative approved by SCDHEC under a schedule to be established by SCDHEC in a subsequent Order; and (4) submit and actively support funding requests to accomplish any actions resulting from the thermal studies. Section 4.4.2 of the EIS, which discusses cooling-water mitigation alternatives, has been revised based on public comments received on the draft EIS. Specifically, Section 4.4.2 has been revised to provide a detailed discussion of additional combinations of various cooling-water systems. In Section 4.4.2, each of the cooling-water mitigation systems is evaluated for attaining the thermal discharge limits of the State of South Carolina. Section 4.4.2 and a revised Appendix I, Floodplain/Wetland Assessment, discuss the wetland impacts of each of the systems considered. The Department of Energy has been reviewing and evaluating alternative cooling-water systems for L-Reactor. Based on these reviews and evaluations, and consultations with representatives of the State of South Carolina regarding a mutually agreed upon compliance approach, a preferred cooling-water mitigation alternative is identified in this EIS. This preferred cooling-water alternative is to construct a 1000-acre lake before L-Reactor resumes operation, to redesign the reactor outfall, and to operate L-Reactor in a way that assures a balanced biological community in the lake. The Record of Decision prepared by the Department on this EIS will state the cooling-water mitigation measures that will be taken which will allow L-Reactor operation to be in compliance with the conditions of an NPDES permit to be issued by the State of South Carolina.

1/ The "Environmental Information Document, L-Reactor Reactivation, Supplement Number 1, DPST-83-470 (July 1983) prepared by DuPont for DOE states, at 7-5, that:

> SCDHEC thereby considers SRP onsite streams and ponds as Class B waters of the State.

DOE's request for a reclassification of SRP onsite streams was rejected by DHEC prior to the publication of the Draft EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EN-12	By ignoring the current interpretation of the water quality standards, upon which the limits in the draft NPDES permit issued by DHEC months before the Draft EIS was published were based, the Draft EIS has failed to present a relevant or meaningful analysis of the impacts of the cooling water alternative favored by DOE--direct discharge into Steel Creek without any treatment for cooling, or any of the alternatives to this approach.	See the response to comment EN-11.
EN-13	The Draft EIS (at 4-8) notes that the temperature at the end of the effluent canal would at times reach 80°C, but does not note that this greatly exceeds the water quality standard of 32.2°C for Steel Creek, into which the cooling water would be discharged. It also fails to note that the draft NPDES permit issued by the State of South Carolina sets a limit of 32.2°C on the temperature of the cooling water effluent from the L-Reactor, based on the water quality standards.	See the response to comment EN-11.
EN-14	The State set the discharge limit equal to the water quality standard because when the L-Reactor is operating its cooling water discharge would make up over 90% of the flow of Steel Creek. The flows in Steel Creek under natural condtions are given on page 3-22, but should be repeated on page 4-8 so the comparison of the natural flow of around 1 cubic meter/second could be compared with the cooling water flow of 11 m^3/sec.	Section 4.1.1.4 of the EIS has been revised to reflect this comment.
EN-15	The Draft EIS also does not point out that the temperature at the point where Steel Creek enters the swamp--40°C during a typical spring and 45°C in the severe parts of summer--would also exceed the applicable water quality standard of 32.2°C. Table 4-3 also indicates that DOE predicts that during extreme summer conditions the temperature at the mouth of Steel Creek at the Savannah River would be just under 34°C, but fails to mention the fact this still exceeds the water quality standard.	Table 4-3 of the Draft EIS presents the predicted water temperatures of Steel Creek in spring and summer as a result of direct discharge of cooling water from L-Reactor operation, including the temperature data given in this comment. Also see the response to comment EN-11.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EN-16	The Draft EIS states (at 4-10), "Because the water temperature at the confluence of Steel Creek and the Savannah River is estimated to be only slightly higher than that typical of southeastern warm-water streams, no significant impact on riverine vegetation is expected." Yet, Figure 3-7 (at 3-21) indicates that temperatures in the Savannah River in the spring average between 15°C and 20°C. Table 4-3 indicates that typical spring temperatures at the mouth of Steel Creek would be 29°C. In addition, Figure 3-7 (at 3-20) shows that monthly average daily-maximum temperatures at Ellenton Landing on the Savannah River upstream from SRP are around 21°C to 23°C from June through September, while Table 4-3 indicates that the temperature at the mouth of Steel Creek during the most severe 5-day summer conditions would be 34°C. Both of these sets of data indicate that temperatures at the mouth of Steel Creek will frequently be 10°C higher than the background temperature in the Savannah River. Perhaps the Savannah River is not typical of southeastern warm-water streams. If so, this fact should be noted, as should the very substantial difference in temperature between the waters of Steel Creek at its mouth (during L-Reactor operation) and the waters of the Savannah River upstream from SRP.	During the warmer months the average creek-to-river delta-T is about 7.2°C, with both K- and L-Reactors operating. Persistence analyses, indicate that on the average 10 events per year can be expected with delta-Ts equal to or greater than 11.1°C; the length of these events can be expected to average about 2.5 days. Riverine vegetation in the vicinity of the mouth of Steel Creek consists primarily of bottomland hardwood forests; emergent and submergent macrophytes are sparse or absent. It is improbable that temperatures as high as 11° above ambient for short periods of time would impact these flora.
EN-17	The Draft EIS lists the thermal effluent criteria contained in the NPDES permit written by EPA in 1976 (at 4-12). But, as mentioned previously, by the time of the preparation of the Draft EIS, a draft revised NPDES permit had been issued by DHEC. The draft revised permit contained very different thermal limits. Since the far more stringent limits in the permit prepared by DHEC are likely to be the ones applicable to the L-Reactor if it is started up, these should be the focus of the Draft EIS's discussion of thermal discharges, not the limits in the old EPA-written permit. At the very least, the Draft EIS should contain analyses based on the proposed new permit limits as well as those in the EPA-prepared permit.	See the response to comment EN-11.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EN-18	The listing of the thermal effluent criteria used in the old EPA-prepared permits is incomplete. These criteria, actually the water quality standards applicable to the Savannah River if Steel Creek is considered a 7-mile-long discharge ditch, also include a downstream limit on the mixing zone of 100 yards below the mouth of Steel Creek. (There is reference to how the cross-sectional and surface area limitations on the mixing zone apply within 91 meters of the mouth of Steel Creek, but the permit specifies that the length of the mixing zone is 100 yards (91 meters).) The analyses of the effects of the L-Reactor discharge on attainment of water quality standards in the Savannah River is not only deficient because it is based on an outdated interpretation of those standards but also inadequate because it fails to consider an important component of those standards. This is particularly disturbing since the Draft EIS states (at 4-12) that "the thermal plume from Steel Creek (would become) completely mixed with (Savannah) River water aobut 1.5 miles downstream." This indicates that reactivation of the L-Reactor would result in failure to meet even the no longer applicable, less stringent interpretation of state water quality standards applied to the SRP discharges in the past. Data and information presented in the Draft EIS suggest that not only will temperatures outside the downstream boundary of the mixing zone exceed the water quality standard, but also the difference between the temperature at the edge of the mixing zone allowed by the state standards (25% of the cross sectional area of the river) and the background temperature of the river would be greater than the 2.8°C allowed by the standards. (Of course, DHEC has ruled that the definition of water quality standards and mixing zones used in the Draft EIS are not appropriate, but it is useful to observe that the L-Reactor would likely cause violations of even this out-of-date, far less stringent interpretation of the standards.) The following information presented in the Draft EIS supports the conclusion that the "delta-T" standard would be exceeded at the cross-sectional boundary of the mixing zone:	As given in the August 1982 draft NPDES Permit, the compliance monitoring point was to be the mouth of Steel Creek with delta-T calculated for daily average on the monthly bases or daily maximum. Modified reactor operation could be implemented to reduce temperature of cooling water if environmental conditions exist that could indicate potential for exceeding the NPDES permit conditions. The delta-T values (8.3°C and 11.1°C) used in the persistence analysis in the Draft EIS were selected because they represent the most limiting criteria for the creek-to-river delta-Ts prescribed in the 6 August 1982 draft NPDES permit. It is noted that these delta-Ts are determined by subtracting the temperature of the Savannah River measured at Ellenton Landing from the temperature recorded at the mouth of Steel Creek. The revised section 4.4.2 provides data for each of the cooling water mitigation alternatives with respect to attaining a discharge to water body temperature difference of 5°F.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	* Figure 4-4 indicates that to meet the water quality standards in the Savannah River at $_{7}Q_{10}$ flow (159 m^3/sec), with the L-Reactor and the K-Reactor operating, the delta-T between Steel Creek and the Savannah River at the creek's mouth would have to be equal to or less than 7.8°C. With the river flowing at 170m^3/sec, the creek-to-river delta-T would have to be equal to or less than 8.3°C. * Table 4-4 shows that during 1963-1967 a delta-T of 8.3°C or greater at the creek/river boundary occured as many as 122 days/year. The chart gives an average yearly occurrence over this 5 year period of 107 days, but there appears to be a division error, and the average is actually 86 days/year at 8.3° or higher. During this time there were periods of as long as 23 consecutive days with a creek/river delta-T of 8.3° or greater. By considering these two sets of information simultaneously--something not done in the Draft EIS--one can see that delta-T conditions at the mouth of Steel Creek that would cause violations of the state water quality standard of a delta-T at the edge of the mixing zone (25% of the cross sectional area of the river) of 2.8°C or less can be expected to occur as much as one-third of the time during some years and 20% of the time per year on the average. Clearly the Draft EIS's analysis of potential violations of water quality standards in the Savannah River should include a statistical determination of the probability of the Steel Creek/Savannah River delta-T being 8.3°C or greater coincident wtih flows in the Savannah River being 170 m^3/sec or less (violations of the water quality standard are predicted to occur when the creek-to-river delta-T is 8.3°C or more. Such a probability analysis is not included in the Draft EIS.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Although a consideration of the chances of exceedances of violations of the now defunct interpretation of the state's water quality standards is to a large degree a moot point, the above discussion illustrates how inadequate the Draft EIS's discussion of thermal issues is, even if one accepts, for point of discussion, their incorrect, overly lax, definition of what would constitute a violation of state water quality standards. Also, comparison of information presented in Figure 3-6 (at 3-19) and information in Tables 4-4 and 4-5 gives further support to the conclusion that water quality standards violations *could occur with signifcant frequency, even based on the now* rejected DOE/EPA interpretation of these standards. No explanation is ever given as to why the delta-T values of 8.3°C and 11.1°C were used as the basis for calculating the frequency and persistence of temperature differences at the edge of the boundary between Steel Creek and the Savannah River. Absence of such an explanation makes it difficult to interpret the information that is presented, leaving one in the position of raising further questions and seeking additional information, as was done above in these comments.	
EN-19	Since DHEC has made it clear that its water quality standards apply to Steel Creek, the Draft EIS should include a discussion of whether the state water quality standard of a delta-T of 2.8°C or less could be met at any point in Steel Creek, if the proposed cooling water discharge alternative is employed.	See the response to comment EN-18 regarding the analysis of cooling-water mitigation alternatives in Section 4.4.2 of this EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	2. Cooling Water Alternatives (Section 4.4.2)	
EN-20	Overall, this section suffers from the same major flaw as the previously discussed section--failure to acknowledge the State of South Carolina's determination that their water quality standards apply to Steel Creek and the other Savannah River tributaries within the boundaries of the SRP. As a consequence, many of the cooling water alternatives presented in this portion of the Draft EIS are totally irrelevant, because they would involve using Steel Creek as a treatment system for the cooling of the discharges from the L-Reactor. South Carolina's standards are clear in prohibiting the waters of the state for this purpose. This section should be rewritten, excluding all such alternatives and focusing more on alternatives that could meet state water quality standards. The following alternatives clearly would not meet state water quality standards: (1) once-through cooling (the Draft EIS's preferred alternative) This alternative would result in the discharge of cooling water into Steel Creek at a temperature of 79°C, far in excess of the water quality standard of 32.2°C or less; since the cooling water would constitute the vast majority of the flow of Steel Creek when the L-Reactor was operational, the water quality standard and limits on the effluent have to be the same, as reflected in the draft NPDES permit issued by S.C. DHEC. Consequently both the water quality standard and the proposed NPDES permit limit would be violated by this option.	See the response to comment EN-11 regarding cooling-water mitigation alternatives.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	(2) once-through spray canal system This results in discharges into Steel Creek of 75°C during the summer months, exceeding water quality standards and the proposed permit limit by more than a factor or two. (3) once-through impoundments on Steel Creek Both the alternatives presented under this heading are unacceptable and illegal because they involve turning large parts of Steel Creek into cooling reservoirs. Neither the small rubble dam or the single impoundment option are acceptable or worthy of discussion. (4) diversion to Pen Branch This would result in discharges to this stream at temperatures of 70°C, which would clearly cause violations of the 32.2°C maximum temperature water quality standard. (5) 500-acre lake with spray cooling Though the water coming out of the spray cooling system would be at 32°C, this option involves discharging once-through cooling water at a temperature of 75° into an impoundment built on Steel Creek. Once again, Steel Creek would be used as a cooling water facility and water quality standards would be violated most of the time. (6) several small dams plus spray cooling Same problems as the previous option. (7) recirculation through creation of L-Pond This option is unacceptable and illegal because it involves the damming of Steel Creek and use of the resulting reservoir as a cooling pond.	

Comment number	Comments	Responses

(8) recirculation through creation of Kal Pond

Unacceptable and illegal for the same reason as the L-Pond option.

(9) recirculation through creation of High-Level Pond

Unacceptable and illegal because it involves damming Pen Branch to form a cooling pond.

(10) low-head hydropower

Unacceptable and illegal for same reasons as for all the other alternatives that involve impounding natural streams to create ponds to be used to cool water.

Based on the information provided in the Draft EIS, it appears that the following alternatives might meet water quality standards, but more information needs to be presented to make a meaningful assessment possible:

(1) mechanical draft cooling towers with complete recirculation

This would result, according to the Draft EIS, in a discharge to Steel Creek at a maximum of 34°C, much closer to the water quality standard and draft NPDES permit limit of 32.2°C; furthermore, the volume of the discharge would be much less than with any of the previous alternatives, although the Draft EIS fails to present any figures on the expected volumes and frequencies of discharges. This option might meet the water quality standards, at least for much of this option is needed, including how frequently, if ever, water quality standards would be violated.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	(2) mechanical draft cooling towers with partial recirculation The Draft EIS states that cooling water would be discharged into Steel Creek at "near ambient" temperatures, but never gives the exact figures needed to compare this alternative to the others presented; because the amount of wastewater discharged would be much higher most of the time than with cooling towers with complete recirculation, the exact temperature of the discharged cooling water must be known in order to determine if water quality standards would be violated. (3) once-through mechanical draft cooling towers with discharge to the mouth of Steel Creek via a canal/pipeline system Once again, the Draft EIS states that the discharges of cooling water would be discharged at "near ambient" temperatures without specifying the exact temperatures expected; this alternative might result in compliance with water quality standards most or all of the time, but it is impossible to tell based on the information presented in the Draft EIS. The following options presented in the Draft EIS appear to have some potential for meeting water quality standards when combined with other cooling operations such as cooling towers and spray systems; however, further study and additional information are needed in order to perform a meaningful analysis of these options: (1) thermal cogeneration Operating alone, this option would not achieve the 30°C to 40°C temperature decrease needed to meet water quality standards (the Draft EIS says the effluent would be cooled 11°C to 17°C), but perhaps in	

Comment number	Comments	Responses
	combination with cooling towers or spray systems this option, which has the benefit of recovering some of the waste heat energy from the reactor, might prove sufficient. (2) modified reactor operation Though use of this option cannot alone reduce the temperature or flow of the discharge sufficiently to result in achievement of water quality standards, it might if employed in conjunction with other systems; unfortunately, the Draft EIS fails to provide any meaningful data on these kinds of options, but simply states that "evaluation of these combined alternatives is part of the current comprehensive cooling water study being conducted on SRP thermal discharges."	
EN-21	The discussion in the Draft EIS of cooling water alternatives is also flawed as a result of superficiality and incompleteness of the cost and schedule comparison of the various alternatives (4-122). Neither the Draft EIS nor the underlying Environmental Information Document ("EID") prepared by DuPont provide any discussion of how these estimates were derived. Indeed, there are some inconsistencies among the figures provided in the Draft EIS, the EID, and the NUS presentation "Comparison and Evaluation of Alternative Cooling Systems (undated)." Without full information on the assumptions and methods employed to develop these estimates, it is impossible to assess their validity.	The costs and schedules presented in the EIS reflect the latest engineering estimates of required earth and civil work, rerouting services, and equipment requirements (pipes, valves, pumps, etc.). All information on cost and schedule are either taken from the referenced documents or reflect the best judgment of the experts in preparing this EIS.
EN-22	Finally, the Draft EIS provides no data at all on the socioeconomic effects of the adoption of various alternatives. The Final EIS must include an estimate of the number of jobs which would be created and effect upon the local economy of each of the acceptable alternatives.	Section 4.4.2 of this final EIS has been modified to include an estimate of the number of construction personnel required for each alternative. The potential economic effects on the local economy due to implementation are considered to be small in relation to the restart of L-Reactor and current construction programs at the SRP. Due to the relatively short period of construction required both indirect and induced economic impacts are also expected to be small.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	C. Groundwater Impacts The deficiencies in the discussion on groundwater impacts of L-Reactor operation are detailed in the attached analysis by Professor Yaron M. Sternberg of the University of Maryland. Professor Sternberg points out that:	
EN-23	1. The Draft EIS is seriously flawed in the lack of hydrogeological data for the immediate vicinity of the L-Reactor and its reliance, without proper justification, upon data for the F and H areas, which are some 10 km away.	Details on the hydrostratigraphy of L-Area (developed from several source including soil borings and drill logs and geophysical well logs) are presented in the EIS. Specifically this topic is discussed in Section F.2.10 which includes three cross-sections and a depth-to-ground-water map for L-Area and vicinity. The elevation of the ground-water table is mapped in Section 3.4.2.2. Pumping test data for the new Tuscaloosa wells in L-Area was used to assess drawdowns in the Tuscaloosa beneath L-Area (Section 4.1.1.3). L-Area water quality data are described in Section F.5.2. This information, together with our understanding of the hydrogeological conditions of the F- and H-Areas, provided sufficient justification for the assessment of potential L-Reactor impacts on the groundwater.
EN-24	2. The Draft EIS suggests that it is not likely that pollutants in the L-Reactor area would contaminate the Tuscaloosa aquifer because the hydraulic head of this aquifer at this location is higher than that in the Congaree Formation. However, no data is presented on (1) what data was used to locate head reversals between these two areas and (2) what are the future anticipated head differences in view of the continuous decrease of the piezometric head in the Tuscaloosa Formation and increases in pumping rates on and off site. The consequences of possible head reversal in the L-Reactor area must be evaluated.	See the responses to comments AJ-1, AW-1, BT-7, and EL-15. The discussions on the effects of increased pumping on the head differential between the Tuscaloosa and Congaree Aquifers given in Sections 4.1.1.3, 4.1.2, 5.1.1.2, 5.1.1.4, and 5.2.3 have been expanded. Based on Figures F-9 and F-18, Figure F-29 has been revised to depict the head difference between the Tuscaloosa and Congaree Formations. In A- and M-Areas, where the green clay is discontinuous, the cones of depression in wells producing from the Tuscaloosa are not reflected in water levels in the shallow aquifers. This fact and data related to the contamination of the shallow ground water with chlorinated hydrocarbons shows that the basal clay of the Congaree and the upper clay of the Ellenton are effective confining units for the underlying Tuscaloosa sands throughout the SRP, including L-Area. The ground water in the Tuscaloosa and Congaree beneath L-Area flows to the Savannah River. The public risk from the potential migration of contaminants, which might migrate into formations underlying the

Comment number	Comments	Responses
		McBean Formation from the L-Area seepage basin, are considerably reduced by this flow path, the protracted travel time, and dispersion.
EN-25	3. The startup of the L-Reactor would add waste discharges in the F, H, and M areas and thereby contribute to future contamination and aggravation of the already acknowledged groundwater problem at SRP. These areas should not receive additional wastes, and "seepage basins should not be used anywhere at the SRP for disposal of any hazardous material because such activity poses a potential serious health hazard to users of groundwater."	See the responses to comments DA-2 through DA-8.
	D. Safety of the L-Reactor and Alternatives	
EN-26	As discussed at length in the attached statement of Dr. Cochran, the EIS should state that the L-Reactor as presently designed does not meet the same basic safety criteria which are applied to commercial nuclear reactors. Dr. Cochran further points out that the analysis on the Draft EIS of safety improvements is seriously flawed. We would like to add the following comments on L-Reactor safety and alternatives.	L-Reactor does meet the pertinent basic safety criteria that is applied to commercial nuclear reactors. See the responses to comments BL-1 through BL-14.
EN-27	1. The Draft EIS fails to provide the required "worst case" analysis of the possible consequences of a major nuclear accident at the L-Reactor.2/ The Draft EIS examines the consequences of only a 10% meltdown of the reactor's core with the active confinement system operating as designed. It is clear that greater meltdowns and active confinement system	Analysis of a full core meltdown is not required to test compliance with 10 CFR 100. See the responses to comments BL-1 and BL-4. To provide a further perspective on the overall accident risk (defined as consequence times probability) or L-Reactor operation, the EIS contains in Section 4.2.1.6 and Appendix G a preliminary total risk curve that depicts the annual probability of an individual living at the SRP site boundary receiving more than a certain dose from postulated severe accidents. The results shown in this curve were based on the Safety Analysis Report, and include high probability low consequence accidents to low probability high consequence accidents including the hypothetical 100-percent core melts at the upper bound of the consequence spectrum.

2/ EIS's must include "worst case" scenarios where there is a lack of scientific certainty. The Nuclear Regulatory Commission ("NRC") has recognized the technical difficulties in predicting both the probabilities and consequences of nuclear accidents in the wake of the Three Mile Island nuclear accident--an accident which was viewed as "incredible" before it happened.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	failures could physically occur. Since a full core meltdown with active confinement failure is a possibility, no matter how slight, DOE is obliged to present the analysis in its EIS. Also, as noted in the attached statement of Dr. Cochran, an analysis of a full core meltdown is also required to test compliance with 10 CFR 100 standards.	The Department of Energy recognizes uncertainties inherent in the prediction and consequences of extremely low-probability but high-consequence accidents. The worst-case analysis required by NEPA is intended to provide the decisionmaker with information to balance the need for the action against the risk and severity of possible adverse impacts if the action proceeded in the face of uncertainty. The "uncertainty" in this instance, however, is not one that questions the severity of the consequences if this class of accident were to occur, but rather the degree of improbability of its occurrence (i.e., whether once in 10 million years or once in a billion or more years). The detailed analyses of the very-low-probability, 10-percent, core-melt accident, together with available information on the consequences and probabilities of a spectrum of more severa but even less probable accidents included in the EIS are judged to provide the decisionmaker with sufficient information for this purpose.
EN-28	DOE's failure to present data on the consequences of a full core meltdown is rather puzzling since its contractor, NUS Corporation, performed such a computer analysis in August 1983, prior to the issuance of the Draft EIS. The section of the Draft EIS on accident consequences must be totally rewritten to include full consideration of the most severe accidents involving a full core meltdown and failure of the active confinement system.	The NUS analysis of a full core meltdown using the CRAC2 code was done to assure that the consequences predicted were not different in kind from those for the 10-percent core-melt case; that is for example, no prompt fatalities in either the 10-percent or the 100-percent core-melt case. Since that was the case, the health effects predictions are directly scalable (i.e., the 100-percent core-melt consequences are 10 times those of the 10-percent core melt) and the decision was made to include only the results of 10-percent core-melt analysis in the EIS as representative of an accident whose consequences are "not exceeded by those from any accident considered credible" [10 CFR 100.1 (a)].
EN-29	2. The Probabilistic Risk Assessment ("PRA") for the L-Reactor (DPST-83-717) appears to exclude external events, including earthquakes, hurricanes, and tornadoes. The failure to consider such events in the PRA makes the use of the PRA results in the Draft EIS extremely questionable. a. Earthquakes beyond the design basis should be evaluated as an accident initiator using PRA for the L-Reactor since the general area in which the site is situated includes the Charleston area affected by the great 1886 earthquake and falls in a large region subject to earthquakes of about Mercalli Intensity VII (DPSTSA-100-1, Rev. 12/81, at 2-16 and Figure 2-8, at 2-17). The recent	As noted in Section 4.2.2.3 a design-basis earthquake of 20 percent of gravity with a return period of 5000 years has been established for the Savannah River Plant and improvements have been made to the reactors to meet the seismic criteria of the design-basis earthquake. A panel of eight experts in the earthquake sciences, led by George W. Housner, all concurred with 20 percent of gravity ground motion as being a conservative design basis. In a similar study the Tera Corporation (1982; "*Seismic Hazard Analysis for the Savannah River Plant*, South Carolina") concluded that the best estimate of the return period for 20 percent of gravity ground motion was 5800 years, which is in good agreement with the information presented in Section 4.2.2.3.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	publications of Algermission et al., should be consulted for probability statistics for ground acceleration values, as well as the recent USGS and NRC reports (the NRC report was in the form of a SECY paper and a Board Notification) concerning the Charleston earthquake. These reports indicated that such a quake could occur anywhere along the East Coast and the 1886 quake was not associated with any known tectonic features. A probability of exceeding the design basis earthquake of one in 5000 years is too high if such an earthquake could lead to a full core meltdown. b. Hurricanes should be evaluated as an accident initiator since hurricanes affect South Carolina about every seven years and hurricane force winds have been measured at the site during the passage of Hurricane Gracie to the north of SRP in 1959. There were 38 historical hurricanes affecting South Carolina between 1700 and 1971; and there may have been others since 1971 (DPSTSA-100-1, Rev. 12/81, at 2-9 to 2-10). c. Tornadoes should be evaluated as an accident initiator using PRA for the L-Reactor; tornadoes striking a specific point within the SRP site have an estimated recurrence interval of about 1,500 years (DPSTSA-100-1, Rev. 12/81, at 2-10). This recurrence interval is far from trivial in the context of a PRA. In addition, the confinement filter compartments will not withstand a hypothetical design-basis tornado (DPSTSA-100-1, Rev. 12/81, at 3-4).	The responses of reactor structures and equipment to ground accelerations greater than 0.20g have not been explicitly analyzed. Such accelerations cannot be ruled out as possibilities in seismic events with return periods in excess of 5000 years. However, the 0.20g is not a threshold beyond which extensive failures of industrial facilities designed to conservative engineering codes and standards, as are SRP reactor systems, with no explicit seismic design consideration, indicates such facilities can be expected to survive accelerations well in excess of 0.20g without experiencing important failures or significant damage. This is, in particular, true of welded piping systems, which have proven to be nearly invunerable to ground accelerations up to 0.5g and beyond. As noted in Section 4.2.2.4, the SRP reactor blast resistant design criteria offers protection to tornadoes and hurricanes. The reactor building itself can withstand a tornado-induced pressure drop that is twice the pressure drop associated with a tornado which has a 2.61×10^{-6} probability of occurrence (Section 4.2.2.4). Attachments to the reactor building such as the 61-meter-tall stack and the confinement system filter compartments are not as resistant to tornadoes. However, damage to such attachments will not cause a reactor accident. Damage to such attachments immediately following an independently caused reactor accident would increase offsite dose effects; however, the probability of independent occurrence of an accident followed by a severe tornado or hurricane is so low that it need not be considered. Also see response to comment BL-12 concerning NRC's position regarding PRA analysis of accident sequences initiated by events more severe than the design bases for natural phenomena.
EN-30	3. The Safety Analysis Report ("SAR") for the SRP reactors discusses the presence of a heavy water plant four miles from one of the reactors (unspecified) from which a "massive release" of hydrogen sulfide gas could occur, and also discusses a chlorine source 100 meters from an SRP reactor (again, unspecified). The SAR argues, however, that safe shutdown could be attained from a remote control station located more than 10 miles away. The EIS should clarify how the remote control station operates and the criteria used to activate it.	Recent changes in plant operation have essentially eliminated hazards in L-Area from hydrogen sulfide and chlorine as noted in Section 4.2.2.1 of the EIS. Section 2.2.2.7 has been revised to provide additional information regarding remote control station operation and activation.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EN-31	4. The SAR quotes an existing probability for SCRAM failure together with failure of backup shutdown system of 6 x 10E-5, but mentions a planned project to reduce the probability of failure of the primary scram systems from 1:1,000 to less than 1:1,000,000 (DPSTSA-100-1, Rev. 12/81, at 4-59). The EIS should specify what the improvements to the scram system consist of and whether they have been implemented.	The proposed project to further reduce the probabilities associated with failure of the primary scram system would increase the redundancy and independence of the scram system at both the channel and system level. It is not necessary that the EIS address this project which would increase the overall system reliability because the analyses conducted in the EIS are based on the probabilities of the systems as currently installed.
	5. The discussion of the CRAC2 analysis of accident consequences in the Draft EIS (4-56) fails to disclose many important underlying assumptions, including the following:	
EN-32	a. The CRAC2 analysis cites zero early fatalities and zero people with whole body and thyroid doses greater than 25 rem and 300 rem respectively. This is due to the failure to consider the consequences to people on site. *The EIS should take into consideration the SRP work force* including the consequences under a delayed or no evacuation scenario. Even with evacuation, some of the SRP workers will be required to remain onsite for security reasons.	The CRAC 2 analysis treats on-site personnel as a transient population similar to schools, shopping centers, and factories. This treatment of on-site personnel is consistent with similar CRAC analysis performed in the Reactor Safety Study and *consequence assessments of light-water reactors which only consider* resident populations.
EN-33	b. The CRAC2 analysis does not report results for the 100% core melt case though, as noted above, DOE's contractor performed such an analysis.	The 100-percent core-melt accident is not considered credible. However, even if a 100-percent core-melt accident is assumed the conclusions given in the EIS are valid. These conclusions are that there will be no early fatalities, no cases where the thyroid dose exceeds 300 rem and no cases where the whole body dose exceeds 25 rem. The mean population whole body dose would be 10 times that given in the EIS for the 10-percent core melt, that is, 7.7×10^{-2} person-rem per reactor year (for the population within 80 km of the reactor site). This whole body dose is negligible in comparison to the effects of natural background radiation of 8×10^{4} person-rem per year for this population.
EN-34	c. The conditional probabilities presented, e.g. in Figure 4-11, are wrong becuase they consider only meteorology and do not consider the probability of confinement system failure and other common cause failure scenarios.	See the responses to comments BL-9 and BL-12.

Comment number	Comments	Responses
EN-35	d. The CRAC2 model utilized by the DOE assumes the $LD_{50/60}$ (lethal dose to 50% of the exposed population within 60 days) is 510 rads. This assumption is overly optimistic. This assumes the victims receive "supportive treatment," which includes barrier nursing, copious use of antibiotics, massive transfusions, reverse isolation, and other special sterile procedures. It is far from clear that this can be provided for all those in need in the event of a severe accident at SRP. How, for example, will the victims of the highest exposures be identified when there will be many others who may be suffering symptoms of radiation sickness (such as prodromal vomiting) from lesser exposures. There is considerable controversy over the use of the 510 rads $LD_{50/60}$. The Risk Assessment Review Group (NUREG)/CR-0040, "Risk Assessment Review Group Report to the U.S. Nuclear Regulatory Commission," Harold W. Lewis, Chairman, September 1978) concluded that scientific opinion supports a range from 400-600 rads. This range could cause a factor of two change either way in the number of early fatalities. Moreover, the Risk Assessment Review Group concluded with regard to supportive treatment that "the ability to carry out such intervention has not only not been demonstrated, but isn't even well planned at this time (NUREG/CR-0040, at 19). Changing the $LD_{50/60}$ from 510 rads for "supportive treatment" to the level of "minimal treatment," i.e., 340 rads, could increase the number of fatalities on the SRP site by a factor of two to four (WASH-1400, Appendix VI, at 13-50; NUREG-0340, at 26-28). Other groups have used more realistic dose-response relationships which are closer to the "minimal treatment" curve used in WASH-1400. The California underground siting study used an $LD_{50/60}$ for minimal treatment of 286 rads and for supportive treatment of 429 rads (Subcommittee on Energy and the Environment, House Committee on Interior and	In CRAC 2 analyses, most early fatalities are predicted to be caused by irradiation of the bone marrow. For this reason, the LD 50/60 doses established in the Reactor Safety Study are based on bone marrow exposures. The CRAC 2 results for the L-Reactor indicate a peak bone marrow dose for a 10-percent core-melt accident is 78.4 rem and this occurs at a distance of 0.5 mile from the plant. At a distance of 5 miles, the peak dose drops to 11.5 rem. Therefore, even under an extremely conservative assumption of 100 rads, the number of early fatalities among the general public would remain unchanged at a value of zero. The general question of whether the Reactor Safety Study (RSS) methods for calculating health effects (both early and latent) should be revised was considered in the PRA Procedures Guide (NUREG/CR-2300, January 1983). After extensive peer review of a draft report, the authors of the section of the Procedures Guide that deals with Environmental Transport and Consequence Modeling came to the follow conclusions:[1] "As this chapter was being written and reviewed, it became apparent that the topics of dosimetry and dose-response relationships generate considerable scientific controversy. After detailed discussion, the authors have decided to make the following recommendations. First, the state-of-the-art has not yet "solidified" to the extent that it is possible to recommend unequivocally a replacement for the RSS methods. Hence, the RSS remains the best comprehensive treatment of dosimetry and dose-response relationships in the context of consequence modeling, and its methods remain acceptable. Second, because considerable work has been done since the publication of the RSS, those who wish to try to update the methods are encouraged to do so. However, those who vary from the RSS values should use sources that have been subjected to a peer review, such as [1]Section 9.3.5.3 of NUREG/CR-2300.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Insular Affairs, "Reactor Safety Study Review," Serial No. 96-3, 1979, at 366, attachment to letter dated 21 February 1979, from Bryce W. Johnson, Peter R. Davis, and Long Lee to Hon. Morris Udall, at D-7. In addition, the "Accident Evaluation Code" (AEC) used to calculate health effects in CRBRP-1 utilizes an $LD_{50/60}$ of 350 rems (SAI-978-78-PA, Z. T. Mendoza and R. L. Ritzman, "Final Report on Comparative Calculations for the AEC and CRAC Risk Assessment Codes," Science Applications, Inc., December 1978, at 3-6 and 3-8).	the BEIR III report (1980), the UNSCEAR (1977) report, and ICRP Publication 26 (1977). Finally, studies intended to update the RSS methods are in progress: the NRC is funding work on age- and sex-specific dose-conversion factors at the Oak Ridge National Laboratory, and work on health-effects modeling is under way at Harvard University's School of Public Health. When their results have been published, a comprehensive updating of the RSS methods in codes like CRAC2 will be in order." Since the Procedures Guide was written, the Harvard School of Public Health has published "A Critical Review of the Reactor Safety Study Radiological Health Effects Model" by Douglas W. Cooper et al., NUREG/CR-3185, March 1983. This report list many aspects of health effects modeling that need to be investigated. These investigations are under way at the Harvard School of Public Health and are being funded as part of the Nuclear Regulatory Commission's MELCOR project, which has as one of its aims the updating of the CRAC2 consequence modeling code. Meanwhile, the conclusion of the Procedures Guide, that "the RSS remains the best comprehensive treatment of dosimetry and dose-response relationships in the context of consequence modeling and its methods remain acceptable" still stands.
EN-36	e. The CRAC2 code contains several "hidden" assumptions regarding the cancer risk estimator for latent cancers, including an assumption that the cancer risk at low dose is a function of dose rate. The net effect of these assumptions appears to be to reduce the estimate of latent cancer fatalities (exclusive of thyroid cancers) by a factor of about 5 or more compared to the opinion of NRDC and a number of experts, including Radford, Morgan, Gofman, Stewart, Mancuso, Kneale, and Tamplin. Furthermore, DOE should report cancer incidence, rather than cancer fatalities. The cancer incidence risk is 1.5 to 2 times the fatality risk. The old WASH-1400 cancer risk values which DOE relies upon are no longer valid in light of BEIR III as modified by consideration of the recent finding regarding dosimetry at Nagasaki and the latest ABCC mortality data.	The assumption that the cancer risk at low doses is a function of dose rate is also explained in the PRA Procedures Guide, (pp. 9-53 and 9-54): "The estimates of latent cancer calculated by the CRAC code are based on the BEIR I report with leukemia and bone-cancer values modified to reflect new data that became available between 1972 and 1975. The RSS developed three estimates of risk. The upper-bound estimate used the linear, no-threshold estimators from the BEIR I report (1972). The central estimate incorporated a dose-effectiveness factor for exposures delivered at low dose rates. The lower-bound estimate took into account the large uncertainty in estimating effects from low doses and low dose rates and assumed a threshold of 10 or 25 rem for latent-cancer fatalities. The central-estimate approach is consistent with the BEIR III report (NAS-NRC), 1980), which used a linear-quadratic model to calculate risk estimators for

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		latent-cancer fatalities. In addition, the BEIR III report published ranges that indicate some of the uncertainty associated with these factors. The upper and the lower bounds of the ranges were obtained with the linear model and the pure quadratic model, respectively. The risk estimates, based on the linear-quadratic model, of BEIR III (1980) are approximately 2 times lower than the BEIR I (1972) estimates based on the linear model." In summary, the authors of the EIS believe that the central estimate is consistent with a reasonable concern of expert opinion and should therefore be used in point estimate calculations of the public risk of latent-cancer fatality.
EN-37	f. As noted above, the CRAC2 accident consequence calculations ignore any possible common cause failure of the confinement systems and the ECCS, e.g., due to external events. Certainly both of these systems are dependent upon offsite and onsite power supplies, and both will fail if all power is lost.	The intent of this calculation was to show the consequences of a beyond design basis accident. No attempt was made to do a PRA that would consider the common-cause failures described.
EN-38	6. The discussion of the Draft EIS of alternative safety systems for the L-Reactor (Sec. 4.4.1.6) appears to be premised upon a fundamental misunderstanding of reactor safety philosophy. The EIS erroneously implies that the cost/benefit methodology used in the NRC regulations 10 CFR Appendix I for limiting radiation releases under normal operations is equally appropriate for defining safety requirements for mitigating severe nuclear reactor accidents. However, the NRC regulations do not suggest in any way that such requirements (see 10 CFR 100) can be waived if an analysis "demonstrates" that the containment system has an unfavorable cost/benefit ratio.3/ While	In any application of technology, whether nuclear or not, cost/benefit methodology has always been a factor either implicitly or explicitly. This is particularly true in considering modifications to existing equipment or facilities and is recognized by Federal legislation in a number of areas. For example, air pollution control requirements are different for "new sources" than for existing plants; old automobiles are not required to be modified to meet current emission standards; existing power plants have not been generally required to backfit cooling towers, although new plants at similar locations do employ them. Thus, the feasibility and cost of incorporating a variety of enhancements on a new reactor, which are greatly different than for existing reactors, are justifiable considerations. The identification of the EPA and NRC valuations of person-rem was for the purpose of providing a perspective which DOE regards as important but not determinative in deciding upon the need for and nature of safety system augmentation for the existing reactors. However, in view of the high degree of

3/ DOE must surely recognize the fallacy of this approach since conceptual designs for a New Production Reactor ("NPR") appear to include a passive containment building. See Memorandum from D. E. Hostetler to P. L. Roggenkamp, "Alternatives to L-Reactor Startup: New Production Reactor: Savannah River Laboratory (DPST-83-643, June 29, 1983). In addition to a containment building, the NPR would have a number of other "enhancements" over current SRP reactor design, including cooling towers and D_2O detritiation. A schematic of the NPR at SRP, is attached.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	the NRC has used cost/benefit analysis in its safety goal development program (NUREG-0880 Rev. 1), it has not chosen to use such analysis to replace the current design basis requirements in 10 CFR 100 for containment/confinement systems.4/ *In sum, this section of the EIS must be totally recast to examine which confinement/containment system alternative meets 10 CFR 100, using the appropriate methodology (95% meteorology and a source term of 100% noble gases, 50% of the halogens and 1% of the solid fission products and plutonium inventory). Only then should the EIS apply cost/benefit analyses to determine which alternative of those that meet 10 CFR 100 is preferred.*	isolation provided by the SRP site (compared to any nuclear power plant site), the engineered safety features of the existing reactors are considered to be entirely in philosophic accord with the spirit of 10 CFR 100.10(d) which suggests that sites may be found acceptable if the site features are complemented "by appropriate and adequate compensating engineering safeguards."
	E. Miscellaneous Comments	
EN-39	The Draft EIS mentions (at 3-31) the criteria which were used over 30 years ago to choose the site for the Savannah River Plant. This is somewhat misleading since it implies without any documentation that these exact same conditions exist today. However, as an example, it is now clear that there are competing uses for "the large cooling water supply" and the SRP's outdated reliance on the Savannah River methods for cooling purposes is a matter of substantial concern.	The siting criteria, which were used to select SRP from among 100 potential locations, are identified as a matter of record. These statements do not imply that conditions have remained unchanged. For example, placing R-Reactor and the Heavy Water Production Facility in standby status and construction of Par Pond have greatly reduced SRP's surface-water requirements. Also, see the responses to comments AB-13 and EN-11.
EN-40	Most of the maps in the Draft EIS (see Figures 3.1, 3.2, 3.4, 5.1) do not make clear, through differences in shading, that there are private lands (i.e., Little Hell's Landing and the Creek Plantation Swamp) which are bounded on three sides by SRP and on the fourth by the Savannah River. The reader may be left with the mistaken impression that DOE has control over this entire area. These maps should be accordingly revised.	Maps depicted in Figures 3.2 and 5.1 clearly indicate the boundary of the Savannah River Plant. Potential impacts on offsite areas such as Little Hell's Landing and Creek Plantation Swamp are specifically described in appropriate sections of the EIS in terms of being privately owned or located offsite (e.g., Section 3.7.2.1--Radiocesium).

4/ Even if DOE were correct in its interpretation of NRC safety requirements, its analysis of safety system alternatives is in error. See attached statement of Dr. Cochran at 14-15.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Conclusion	
EN-41	For the reasons set forth above, we believe that the Draft EIS does not provide an adequate basis under the National Environmental Policy Act for decisionmakers to determine whether, and if so, under what conditions to proceed with the operation of the L-Reactor. In order for DOE to meet its responsibilities under NEPA and given the grave deficiencies in the Draft EIS, we would strongly urge that a new substantially revised draft environmental impact statement be issued for further public review and comment. Only if such action is taken, can DOE decisionmakers, the Congress, and the public be able to assess the effects of L-Reactor operation and availability of alternatives which would avoid or reduce environmental harm. If you have any questions with regard to these comments, please don't hesitate to contact me. Sincerely yours, S. Jacob Scherr Counsel for Natural Resources Defense Council, Energy Research Foundation, The Georgia Conservancy, S. David Stoney, Jr., Judith E. Gordon, Justin Stephens McMillan, Coastal Citizens for Clean Energy, Environmental Policy (Note: Dr. Cochran's Statement of November 3, 1983 is contained in this appendix as statement "BL")	DOE believes that sufficient information is available in the EIS for the public and decisionmakers to assess the environmental impacts of L-Reactor operation. Changes to the Draft EIS were made in this Final EIS and these changes are clearly marked to allow the reviewers to differentiate between the draft EIS and final EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Comments on the Draft Environmental Impact Statement L-Reactor Operation Savannah River Plant Prepared for Energy Research Foundation Columbia, S.C. by Yaron M. Sternberg, Ph.D. November 14, 1983	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	My name is Yaron M. Sternberg, Ph.D., and I am a professor of Civil Engineering at the University of Maryland, College Park, Maryland. My area of expertise is groundwater hydrology with emphasis on migration of contaminants in groundwater. My professional experience includes a number of hydrogeological investigations of solid waste and hazardous waste sites as well as remedial action feasibility studies.	
EN-42	The following comments on the Draft Environmental Impact Statement (EIS) on L-Reactor Operation, Savannah River Plant (SRP) are restricted to groundwater issues and are based on a review of the Draft EIS as well as a number of other publications referenced in the Draft EIS. The primary goal of the review was to assess the evaluation in the Draft EIS of the impact on groundwater quality as a result of the proposed startup of the L-Reactor. Groundwater contamination has already been detected in a number of areas within the SRP boundaries. In particular, serious groundwater quality degradation has occurred in the vicinity of the M-area settling basin and the old TNX basin. Reportedly, groundwater monitoring, mathematical modeling, and pilot operations for remedial action have been conducted in suspected contaminated areas. The Draft EIS contains only limited information on the status of the corrective action taken to protect and/or restore the groundwater quality at SRP.	The SRP ground-water concerns, including M-Area and old TNX basin, will be the subject of a separate NEPA process as noted in Section 6.1.6 of this final EIS. See also the response to comment AJ-1.
EN-43	A serious flaw in the Draft EIS is the lack of hydrogeological data for the immediate vicinity of the L-Reactor. In contrast, the F and H areas have been the subjects of intensive hydrogeological studies. The stratigraphy of the aquifers present at those locations as well as the piezometric head data in the various geological units are available. Areas F and H are approximately 10 km north of the L-Reactor area. The Draft EIS suggests that the geological and hydrogeological conditions at the L-Reactor site are similar to those in the F and H areas. However, there are no data to substantiate this claim. The closest piezometer screened in the Tuscaloosa formation is about 7.5 km east of the L-Reactor (P54) and apparently there are no piezometers in the Congaree formation. Water table contours in the vicinity of the L-Reactor area, given in Figure F-24, are based on a 1973 report; apparently, more recent data	See the response to comment EN-23.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	are not available. The conclusion that can be drawn based on the data presented is that only sparse data are available for the L-Reactor area. The Final EIS must include sufficient data to delineate in detail the geology and, the groundwater regime at the site and should explain variations, if any, between previous and present groundwater conditions.	
EN-44	The Draft EIS relies to a large extent on data presented by Siple (1967). In particular, seepage velocities computed for each of the major stratigraphic units are based on limited hydraulic conductivity and gradients data, and assumed effective porosities. The velocity values are used to compute radioactive decay rates, and travel time of groundwater to discharge points in surface streams. Groundwater velocities are rarely constant in time or space and it is not uncommon to observe velocities in the field that are an order of magnitude higher than computed values. The report does not indicate whether the estimated velocities have been verified in areas where a large amount of data is available, i.e., F, H, and M. In order to evaluate the actual velocities under field conditions, tracer studies should be conducted in the vicinity of L-Reactor area and the results compared with the computed values.	The ground-water travel times from F- and H-Area seepage basins to Four Mile Creek were calculated from measured flow rate values presented in the draft report "Technical Summary of Groundwater Quality Protection Program at Savannah River Plant; Volume 1 - Site Geohydrology, and Solid and Hazardous Waste" (DPST-83-829). A conservative travel time of 4.4 years was assumed for tritium transport from the L-Reactor seepage basin to Steel Creek. As the L-Reactor seepage basin will not receive continuous, large volume discharges of low pH wastewater (as is the case for F- and H-Area basins), a travel time of at least 4 times this value is actually expected from the L-Area seepage basin to Steel Creek. Sections 4.1.2.2 and F.2.10 have been revised to reflect this information.
EN-45	The Draft EIS suggests that it is unlikely for pollutants in the L-Reactor area to contaminate the Tuscaloosa aquifer because the hydraulic head of this aquifer at this location is higher than that in the Congaree Formation. The location of areas where there is a head reversal between the above two formations is given in Figure F-29. The map suggests that the head in the Congaree is higher than that in the Tuscaloosa only around the M-area and in the vicinity of Par Pond. The report states that "the map is constructed by subtracting two piezometric maps for which data are somewhat sparse." However, no information is given in the Draft EIS on (1) what data was used in developing the above figure, and (2) what is the future anticipated head difference in view of the continuous decrease of piezometric head in the Tuscaloosa formation, and future increases in pumping rates. In recent years water use for irrigation has increased rapidly near SRP. Most of the increase has occurred in Allendale and Barnwell Counties from wells in	Information on development of the Tuscaloosa-Congaree head difference map is presented in Appendix F and DPST-83-829. Also see the response to comment EN-24 on head differential. Groundwater flow directions in the Congaree and Tuscaloosa Formations have been plotted on the maps identifying the major offsite groundwater users. These maps show that the flow in these formations will be under the SRP to the Savannah River and will not reach offsite users in Barnwell and Allendale Counties. Also see the responses to comments AJ-1, DA-4, DA-5, and DA-8 regarding groundwater contamination and the barriers aforded by key clay units to the downward migration of contaminants.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	the Tuscaloosa Formation. If this trend, coupled with anticipated increase in groundwater use at the SRP facility, continues, the present head difference of about 12 feet at the L-Reactor area may decrease and likely be reversed. The consequences of possible piezometric head reversal must be addressed in the Final EIS.	
EN-46	A numerical model to assess the impact of groundwater withdrawals from the Tuscaloosa aquifer on water levels in the aquifer was proposed by Marine and Routt (1974). The sensitivity of the model depended on the accuracy of the piezometric head. Based on an accuracy of 3 and 5 feet head difference between nodes, the estimated flux was about 65 cfs (105 m^3/min) and 30 cfs (48 m^3/min), respectively. An error greater than 5 feet was considered to be not probable. Groundwater usage from the Tuscaloosa aquifer at SRP is projected to be 35.7 m^3/min based on present (1982) rate of 24.3 m^3/min plus 11.4 m^3/min due to the increased use at L-Reactor. The total withdrawal rate from the Tuscaloosa aquifer is estimated at 70 m^3/min, excluding any increases from municipalities, industries, or other heavy users in the area. If the actual flux is 105 m^3/min, then present discharges amount to 70% of the estimated flux. However, if the flux is less than 100 m^3/min, which is quite likely based on the above model, then piezometric levels in the Tuscaloosa aquifer will continue to decline. The fact that levels have been declining suggests that the estimated flux of 100 m^3/min may not be accurate. Because the Tuscaloosa aquifer is an important source of water, a detailed investigation of this formation is essential particularly in view of the fact that in one area this aquifer has already been contaminated.	See the response to comment FK-14.
EN-47	Because of the importance of groundwater as a source of freshwater, information is needed on both the relative impact of the various activities (planned and accidental) in order to make a complete and accurate environmental assessment. The present state-of-the-art of mathematical modeling has this capability but requires accurate and detailed data base. Such a data base for the L-Reactor area is lacking and, therefore, only qualitative analysis or a highly simplistic quantitative	The EIS provides extensive discussion of potential impacts to the ground waters beneath the SRP from operation of L-Reactor including potential impacts from a cooling lake that could be used to mitigate direct thermal discharges. Analysis is based on empirical models developed from SRP study data. The predicted impacts are very small, thus there is no need for more sophisticated modeling analyses in L-Area. In addition, alternatives to the use of the L-Reactor seepage basin are presented in Section 4.4.3. As noted in response to comment EN-24, the impacts to public health and safety would be very small from L-Reactor seepage basin contaminants that might migrate to ground waters in units beneath the McBean Formation.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	one can be performed. Mathematical models such as FEMWATER and FEMWASTE, developed at Oak Ridge National Laboratories, should be employed to assess localized head reversal at pumping centers, horizontal and vertical potential migration patters, and to provide an accurate picture on the groundwater flow regime in the vicintiy of L-Reactor area.	
EN-48	The L-Reactor oil and chemical basin reportedly received in excess of 1×10^6 gallons of waste water through 1979. The chemical composition of the waste discharged to the basin is not stated and must be disclosed in the Final EIS. Although the Draft EIS states that present and future contamination of the shallow groundwater between the L-Reactor area seepage basin and Steel Creek is expected (tritium and strontium 90) no monitoring data is available; monitoring wells have only recently been installed. A detailed quantitative analysis of the present contamination in the vicinity of the L-Reactor area should be addressed in the Final EIS. Such an analysis should include water quality, contaminant plume delineation, migration rates, proposed preventative and remedial action, etc.	See the response to comment DA-11.
EN-49	The Draft EIS states that during operation of the L-Reactor, radioactive materials will be discharged to a seepage basin and "these discharges will cause contamination of the uppermost layer of the water table aquifer (Barnwell Formation)." The Draft EIS concludes that the "subsurface contamination migration is controlled by the rate and direction of groundwater flow, the adsorptive capabilities of the sediments and hydrodynamic dispersion. The sediments of the SRP exhibit greater horizontal than vertical hydraulic conductivities, enhancing lateral movement. Thus radioactive contaminants entering the water table are expected to flow to a point of outcrop on Steel Creek." The above statements are qualitative in nature and are not substantiated anywhere within the Draft EIS. Expecting the groundwater to flow from one point to another in a given time is indicative of the present serious uncertainty in the data base. All of the above statements should be substantiated by developing an extensive data base and conducting simulation studies using a verifiable mathematical model.	A detailed ground-water table elevation map for the L-Area is presented in the EIS (Section 3.4.2.1). This establishes the direction of flow and gradient along the flow path (490 meters long) from the seepage basin to Steel Creek within the Hawthorn and Barnwell Formations. Based on the ground-water elevation map, the contaminant plume will follow the water table surface. The F- and H-Area seepage basin and SRP Burial Ground plumes provide existing physical models for the L-Reactor seepage basin plume (see Du Pont, 1983; DPST-83-829 for additional details). The SRP has discharged contaminated wastewater to seepage basins in the central part of the plantsite, including L-Area basins, since the mid-1950s. The movement of radioactive materials with ground water has been studied, monitored, and modeled extensively to determine movement pattern/rate. To date, no contamination of the Tuscaloosa Aquifer in this area has occurred.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EN-50	Large volumes of liquids containing nonradioactive hazardous materials and low levls of radioactive waste have been discharged to the F and H seepage basin since 1954 and 1955, respectively. The groundwater is contaminated to a reported depth of 20 meters throughout most of the distance between the basins and the seepline springs. The contamination consists of radioactive elements, mercury, and nitrate. The Draft EIS provides little monitoring data and no information is given on whether remedial action is proposed and, if so, what is the status of the investigation. Serious contamination has been detected in the vicinity of M-area and significant concentrations of organics have been detected in soils at a depth of about 200 feet. (1000 ppb of Trichloroethylene at the Silverton Road waste site.) The volatile organics in the groundwater in the vicinity of the M-area settling basin are estimated at 27,000 kg with additional 24,000 kg residing in the unsaturated soil. It should be pointed out that these estimates, given in the Draft EIS, are preliminary, and the total weight may be significantly larger. Based on the above documented contamination, it is obvious that adding waste to the F, H, and M-areas as a result of the startup of the L-Reactor would contribute to further contamination and aggravation of the problem. The above areas should not receive any additional waste loads. Instead, remedial measures should be taken to restore the quality of the groundwater. Furthermore, seepage basins should not be used anywhere at the SRP for the disposal of any hazardous material because such activity poses a potential serious health hazard to users of the groundwater.	See Sections F.5 and F.6, Du Pont (1983; DPST-83-829) and the response to comment DA-2. Section F.5 provides ground-water monitoring data. Also see the response to to comment DA-2 on incremental analyses of L-Reactor support facilities impacts, the response to comment DA-3 on separate NEPA review for the SRP ground-water protection program, and the responses to comments DA-6 through DA-8 regarding hazardous material disposal at SRP.
EN-51	It should be noted that the issue of nonaqueous phase liquids (NAPLS) is not discussed in the Draft EIS. Most halogenated organic compounds such as trichloethylene are denser than water and will sink to deeper units. The direction of movement of such NAPLS does not necessarily coincide with that of the native groundwater. The presence of NAPLS and their effect on the groundwater supply should be addressed in the Final EIS.	Sections 5.1.1.2, and F.5.4 have been expanded to discuss chlorinated hydrocarbon contamination in M-Area, protection of public health, and planned remedial actions.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EN-52	In conclusion, the Draft EIS fails to properly address the groundwater issue, i.e., what is the potential for a serious health hazard to groundwater users. The EIS addresses the hydrogeology of the L-Reactor area from a rather simplistic quantitative point of view. This treatment is a result of a significant lack of data on the geology and groundwater hydrology at the L-Reactor area. An explicit data base for this area should be collected and used as an input to a mathematical model to be used for predicting the probable outcome of various planned and accidental activities. Such state-of-the-art models are commonly used in siting of hazardous waste facilities and should be employed in the preparation of the Final EIS on L-Reactor operation.	See the responses to comments AJ-1, EN-23, EN-47, and EN-49.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

SAVANNAH RIVER LABORATORY
TECHNICAL DIVISION

DPST-83-643

DISTRIBUTION

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D. R. JOHNSON
I. M. MACAFEE
F. J. MCCROSSON
W. R. MCDONELL
G. F. O'NEILL
SRL RECORDS (14)

MEMORANDUM

JUNE 29, 1983

TO: P. L. ROGGENKAMP

FROM: D. E. HOSTETLER

ALTERNATIVES TO L STARTUP: NEW PRODUCTION REACTOR

INTRODUCTION

An alternative to renewed operation of L-Reactor for increased production of nuclear materials would be the construction and operation of a New Production Reactor (NPR).

This report describes a conceptual design for a low temperature heavy water reactor with no electricity generation (LTHWR-NE) to be built as a new production reactor at the Savannah River Plant (SRP). The reactor design is based on the proven SRP reactor design with enhancements and state-of-the-art equipment. Aluminum cladding temperatures would be the same as with current operations.

The power and productivity of the new reactor would be greater than L-Reactor by about 30%. However, the estimated time from authorization to startup is 10 years. Thus an NPR could not contribute to material production until late 1993 at the earliest.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

SUMMARY

A preliminary conceptual design for a low-temperature heavy water reactor with no electricity generation is described which is patterned closely after the current SRP reactor design; however, several enhancements have been included. These include:

- o Full containment systems
- o D_2O detritiation systems
- o ECCS recirculation system
- o Cooling water recirculation (cooling towers)
- o Improved cooling for assemblies during discharge
- o Modernized control rooms

The reactor is designed to operate at 3150 MWt. The reactor contains 696 fuel assemblies which could be either of the type designed for tritium production or for plutonium production. The reactor would also be capable of producing a variety of different isotopes, a feature which has been proven by the current SRP reactors.

I. FACILITY DESCRIPTION

A. Site

An NPR would be located on an unused parcel of land of approximately 100 acres probably in the vicinity of Par Pond. The site would be cleared to provide space for the reactor, and administrative building, cooling towers along with cleared areas inside and outside fences to provide for adequate security surveillance. A site layout is shown in Figure 1.

B. Schedule

Construction of an NPR at SRP would require preliminary studies and analyses as well as final project design and construction.

Comment number	Comments	Responses

The estimated time from project authorization to startup is nearly 10 years. Thus, if the project were authorized at the beginning of FY 1984, startup would be no earlier than FY 1993. The probable project schedule and milestones are shown in Figure 2. The project steps are listed below with comments on selected items.

(1) Technical Data Summary (TDS)
The TDS would provide the data necessary for the complete specification of the reactor system with particular emphasis on systems which would be different from existing SRP reactors.

(2) Environmental Impact Statement

The sump is placed below the reactor to catch the core in the unlikely event of a core meltdown.

The following descriptions of systems and components are preliminary because they represent minimum safety requirements. Additional redundancy may be expected in some systems in the final design.

G.1 Containment Building

The primary function of the containment building is to provide an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment. This building is a seismic Category I reinforced-concrete rectangular underground structure with a hemispherical dome. Figure 3 is a side view of the containment building and the above ground building which surrounds the containment dome. Figure 4 shows the side view of the containment building which includes the disassembly basin and C&D equipment and area. Above ground level, only the cylindrical shell and dome covering this shell is considered a part of the containment building. The majority of the containment building is below ground level.

Comment number	Comments	Responses

FIGURE 1. Schematic of Proposed LTHWR-NE with Cooling Towers

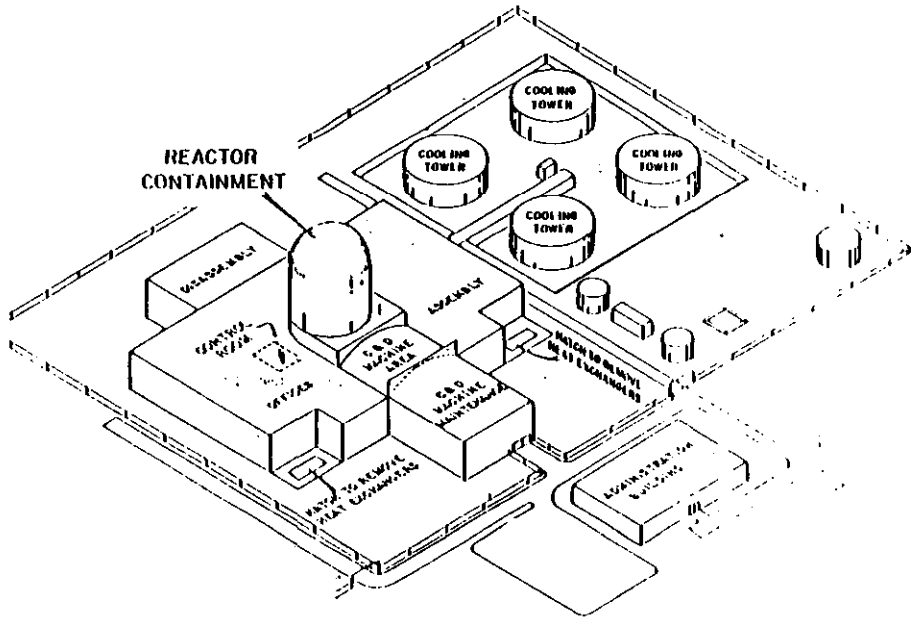


Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	The -20 ft and -40 ft levels are shown to scale in Figure 8 and 9. The arrangement of the primary loop heat exchangers and reactor tank is similar to the P-Reactor layout. The primary loop heat exchangers can be replaced by moving them onto the railways on either side of the -20 ft level and sliding them to the lower end of the railways. A sealed opening is provided at this point. The openings are shown in Figure 1 at the two corners of the containment building. In Figures 8 and 9, the ECCS systems and main circulating pump motors are placed such that a concrete shield is between them and the reactor. The shielding is such that personnel would be able to work in these areas during actual reactor operation. In Figures 8 and 9, P indicates a pump and PM a pump motor. The upright cylindrical portion of the containment has an outside diameter of 80 feet, measures 150 ft from ground level, and has a minimum wall thickness of 3-ft. The dome portion is a hemispherical-shaped head having an inside height of 37-ft and a 3-ft thickness of reinforced concrete. The interior surface of the containment structure is lined with 1/4-in. stainless steel plates. A calculation of the containment pressure following a LOCA indicates a conservative peak value of approximately 23 psia (8 psig). Assumptions used in calculating this pressure were: o The containment spray system is inoperable. o No heat is transferred to the containment structure or containment heat removal system. o The free volume of the containment building is 1198 x 10^6 cubic feet. o The temperature of the coolant is at 90°C.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	The estimate of the peak containment pressure is significantly less than those calculated for typical LWR's (about 50 psig). Because the design pressure is relatively low for a containment building, design of the reinforced concrete structure does not require unusual methods to provide resistance. The flat portion of the ground level roof in Figure 3 will be supported on girders and columns of reasonable sizes such that sufficiently large spans (up to 50 ft) can be designed without difficulty. Conventional methods of anchoring the reinforcing steels of the high rise tower are applicable, since the uplift force due to internal pressure is less than 20% of the weight of the tower. The auxiliary building on top of the containment has the structural effects of supporting the tower as bracings and the flat containment roof as trusses. The thickness of the containment enclosure is limited by requirements of biological shielding and tornado missile protection rather than the overpressure due to accidental steam generation. G.2 Containment Spray System (CSS) The CSS is designed to preserve the integrity of the containment building by removing thermal energy from the containment in the event of a LOCA and remove iodine from the containment atmosphere if core damage occurs. This system comprises two redundant trains (or subsystems), each of 100% capacity. Each train consists of a spray pump (4000-gpm capacity), a 360-degree spray head located in the containment building at the +60-ft level, spray heads in the -20 ft and -40 ft levels, and a heat exchanger (shared with the SDCS), and associated piping and valves. Each train draws independently from a demineralized water tank containing 200,000 gallons of borated light water. In addition, a sodium hydroxide storage tank containing 9000 gallons of 20% NaOH solution and two independent mixing systems are provided for iodine removal. The NaOH solution mixes with 10% of the containment spray flow in an eductor located in a side stream from the pump discharge, and the mixture is injected into the pump suction. The spray eductor mixes the solution and meters for proper pH control.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF WILLIAM A. LOCHSTET, PH.D.

The Pennsylvania State University
104 Davey Laboratory
University Park, Pennsylvania 16802

College of Science
Department of Physics

11 November 1983

Mr. M. J. Sires, III
Assistant Manager for Health,
Safety and Environment
U.S. Department of Energy
Savannah River Operations Off.
P.O. Box A
Aiken, S.C., 29801

Dear Mr. Sires:

Enclosed are my comments on the Draft Environmental Impact Statement on L-Reactor Operation at Savannah River Plant, DOE/EIS-0108D. Please note that the opinions and calculations presented do not necessarily reflect the position of the Pennsylvania State University.

I will be looking forward to the Final Environmental Impact Statement. Would you also please send me a copy of that Final EIS when it is available.

Sincerely,

Wm. A. Lochstet, Ph.D.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Some Environmental Consequences of L Reactor Operation by William A. Lochstet, Ph.D. The Pennsylvania State University* November 1983	
EO-1	The Department of Energy (DOE) has prepared a Draft Environmental Impact Statement on the resumption of operation of the L-Reactor at the Savannah River Plant, DOE/EIS-0108D (Ref. 1). The L Reactor operated from 1954 until 1968 for the purpose of producing special nuclear materials (plutonium) for nuclear weapons (Ref. 1, P. 2-7). Thus, the design of this reactor is over 30 years old, and does not reflect the learning that has been achieved since. In particular, water is pumped into the reactor vessel at the top and out thru connections at the bottom. In the case of the break of an exit pipe, the cooling water would simply run out. Modern reactors deflect the exiting water to connections near the top.	The design of the L-Reactor, as that of all other SRP reactors, has been upgraded since initial startup in 1954 and currently reflects the lessons learned during the long period of SRP reactor operation as noted on p. 4-42 of the draft EIS and in Appendix J. In case of a pipe break, the ECS is designed to provide adequate core cooling, no matter where the break occurs, i.e., also in the case of an exit pipe rupture.
EO-2	The power of the L reactor is quoted as 650 to 2915 MW (T), with a typical operation at 2350 MW(T) (Ref. 1, PP.G-11, 2-14). This is similar to the rate of heat production in modern commercial reactors. For example, the heat production rate at Three Mile Island unit 2 had a maximum rate of 2772 MW. If the L reactor were to operate continuously for one year at its "typical" rate of 2350 MW, it would fission 1300 lb (600 kg) of uranium - 235 (U-235). Since natural uranium usually contains 0.71% of the isotope U-235, it will be necessary to obtain at least 85 metric tons (long tons) of uranium metal to fuel this reactor for one year. Since the average uranium mill operates at 96% efficiency, at least 88 metric tons of uranium will have to be mined. The uranium mill will leave 4%, or 3.5 metric tons of the uranium in the mill tails which are discarded. These tails will also contain 1.5 kg of thorium-230.	The environmental effects of uranium fuel requirements for light-water power reactors (including those effects postulated by Pohl) have been examined extensively in a number of public proceedings conducted by the NRC. In each instance, the hearing board has reaffirmed that radon releases associated with such requirements are "...a minute fraction of the radon that is released into the atmosphere from other sources...." and that the "... incremental health risk to the population stemming from the fuel cycle emissions (if indeed there is any) is vanishingly small...." (USNRC, Atomic Licensing & Appeal Board, ALAB-701, November 19, 1982). The uranium fuel requirements for L-Reactor are significantly less than those of a nominal light-water power reactor.

*Affiliation for identification purposes only.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	In 1976 Pohl pointed out that the thorium decays to radium-226, which in turn decays to radon-222, which is a health hazard (Ref. 2). The uranium-238 in the mill tailings decays thru several steps to radon-222 and should be considered, as was noted by the NRC in GESMO (Ref. 3). The total decay of this 3.5 metric tons of U-238 and 1.5 kg of thorium-230 will yield 5.1×10^{11} curies of radon-222. Because radon-222 has a half life of only 3.8 days, some radon-222 atoms decay before escaping from the tailings pile into the atmosphere. At present some recent mill tailings piles have two feet of dirt covering. In this case, the EPA estimate (Ref. 4) is that about 1/20 of the radon produced escapes to the air. Thus, only about 2.5×10^{10} curies of radon escape to the air. The population at risk is taken to be the United States, stabilized at its present number and distribution. This is similar to recent estimates taken by the NRC (Ref. 5). Further, the NRC has suggested that a release of 4,800 curies of radon-222 from a western mine site, would result in 0.023 excess deaths in the present population. This provides a ratio of 4.8×10^{-6} deaths per curie released (Ref. 6). Applying this factor to the 2.5×10^{10} curies of radon released, results in 121,000 deaths. It should be recognized that these deaths occur over a long time, governed by the 4.5 billion year half life of U-238. This is also a minimum estimate, due to the need for greater amounts of uranium than are indicated here. This estimate also assumes that the U.S. population is not decimated by a nuclear war. In this case, the impact of L reactor operation would be quite different.	
EO-3	To consider nuclear war, it is necessary to estimate the contribution of L reactor production to that war. For the moment, assume that the breeding ratio of the L reactor is 1.0. Then, in each year of operation, 1300 lb (600 kg) of plutonium will be produced. Since each nuclear bomb contains about 10 kg of plutonium (Ref. 7, P. 182) this means 60 warheads for each year of production. Since typical targets in a nuclear war have populations of 50,000 or more, consider an	The national policy on nuclear weapons, their deployment, and the need for increased weapons is beyond the scope of this EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	average population of 100,000. Thus, one year's production of the L reactor would destroy 60 communities and six million people. This reactor would enable the death of six million civilians for each year of operation. That is the same as the number of people killed within Germany (i.e. Jews) during WW II. This holocaust was treated harshly at the Nuremberg trials of war criminals after that war. The principle established there, is that each person is responsible for their own actions, and it is not enough to claim that one is simply following orders. This principle of international law should be applied here.	
EO-4	The National Environmental Policy Act of 1969 (NEPA) requires a comparison of the costs and benefits of a federal project. In this case, it has been shown that the costs of one year of operation is 121,000 deaths. Ten year's operation would result in over a million deaths. This is to be compared with the benefits. The benefits are six million deaths for each year of operation, or sixty million (60,000,000) deaths for ten years of operation. 60,000,000 deaths is not a benefit. There is no benefit. NEPA requires no operation of the L reactor. The decision to restart the L reactor in January 1984 is contrary to NEPA. It is necessary to perform a cost/benefit assessment fully and in good faith as required by the court in Calvert Cliffs Coordinating Committee v. USAEC 449 F. 2nd 1109 (D.C. Circ., 1971): > We conclude, then that Section 102 of NEPA mandates a particular sort of careful and informed decision-making process and creates judicially enforcable duties.... But if the decision was reached procedurally without individualized consideration and balancing of environmental factors--conducted fully and in good faith--it is the responsibility of the courts to reverse. Thus the decision of DOE must satisfy NEPA rather than the FY 1983-1988 Nuclear Weapons Stockpile Memorandum of the president (Ref. 1., P. S-2).	See the responses to comments AB-4 and AB-5 regarding the discussion of costs vs. benefits and the discussion of need in this EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EO-5	It is suggested that restart of the L reactor with its present cooling method would result in the discharge of water at 70°C (158°F) to 80°C (176°F), at the reactor outfall. It is further suggested that this water would enter the swamp at 40°C (104°F) to 45°C (112°F) (Ref. 1, P. 4-8). This would be a clear violation of the Clean Water Act. Such operation must not be considered, even temporarily.	See the responses to comments AA-1 and AB-13 regarding cooling-water mitigation alternatives.
EO-6	Section 8.2 lists irretrievable commitments of resources for L reactor operation. The discussion does not indicate the uses of these resources. In particular, energy is used to enrich the fuel uranium (Ref. 1, P. G-11), and the electricity used in the enrichment process should be included as a committed resource.	NRC has presented the annual electrical energy requirements for enrichment of the fuel for a nominal 1000 Mwe LWR [10 CFR 51.20(e) - Table S-3] as 323,000 Mw-hrs. As indicated in the response to comment EO-2, the enrichment requirements for L-Reactor would be less.
EO-7	Prior to the accident at Three Mile Island in 1979 the NRC considered accidents with 100% fuel failure as being too improbable to consider. DOE should, must, consider 100% fuel failure accidents in this case. In particular, it is unlikely that a large fuel failure accident would be contained. The emergency cooling system can supply water at 53,000 liters per minute (Ref. 1, P. G-42). However, the building sumps are pumped into tanks with 2.1 million liter total capacity (2,100,000 liter) (Ref. 1, P. G-43). These tanks will fill up in 40 minutes. After that time water would flow to a 190,000,000 liter excavated basin (Ref. 1, P. G-43). Such flow would release very large quantities of radioactivity to the environment. That may have been considered acceptable as reactor safety when the plant was designed in the early days, but is clearly unacceptable today. In particular, the letter of Arthur H. Dexter which appears in the Draft (Ref. 1, PP K-74 to K-79) provides a very direct discussion of accidents which must be addressed. It is not (after TMI) credible to merely say that an accident with 100% failure is too low in probability. The 100% fuel failure accident must be contained. It did happen at one large reactor in 1979 and may happen again, although by an entirely different initiation scenario. Since the events that led to the TMI accident are so well known, it is clear that that exact sequence will be properly handled when it happens. Further, as DOE indicates, the L reactor design is rather different, so that exact sequence is meaningless at the L reactor.	See the responses to comments BL-2, BL-3, and BL-4 regarding analysis of accidents involving 100 percent fuel-melting. As noted in Section G.5.6 of the EIS, no fuel melting is expected in any probable loss-of-coolant accident. In the unlikely event of fuel melting, only minimal quantities of fission products and other contamination would be expected to be carried to the 190-million-liter earthen basin for the reasons discussed in Section G.5.6. Several sections of the EIS were specifically written to address Mr. Dexter's comments. See also the responses to additional comments made by Mr. Dexter in comment letter CW in this appendix. See the response to comment BF-7 regarding design differences that make SRP reactors less susceptible to accidents resulting from inadequate cooling (TMI type of accident) than commercial power reactors.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EO-8	This draft EIS is deficient in many aspects. There is no discussion of the operations required to supply fuel to the reactor. In particular, it is shown here that the mining of uranium for one year's fuel supply will lead to at least 121,000 deaths. There is no consideration of the environmental impact of the product (plutonium), or of its possible use in warfare. The proposed method of once-thru reactor cooling does not protect the environment. And, finally, the discussion of loss of coolant accident is totally inadequate. This Draft does not satisfy NEPA. Further, the proposed action to restart the L reactor does not satisfy NEPA and other requirements, including the Clean Water Act. I hope that these issues are addressed in a substantive way in the Final EIS, and in the Secretary's decision on restart.	See the responses to comments EO-1 through EO-7.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

References

1 Draft Environmental Impact Statement, L-Reactor Operation, Savannah River Plant, Aiken, S.C.; DOE/EIS-0108D, Draft, DOE, September 1983.

2 R. O. Pohl, "Health Effects of Radon-222 from Uranium Mining," Search, 7 (5), 345-350 (August 1976).

3 "Final Generic Environmental Statement on the Use of Recycled Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors," GESMO, NUREG-0002, NRC (August 1976).

4 "Environmental Analysis of the Uranium Fuel Cycle, Part I - Fuel Supply," EPA-520/9-73-003-B, EPA (October 1973).

5 Draft Environmental Statement Related to the Operation of the Shearon Harris Nuclear Power Plant, Units 1 and 2; NUREG-0972, Draft, NRC, April 1983, Page C-3.

6 Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives; NUREG-0332, Draft, NRC (September 1977).

7 "Nuclear Energy - Its Physics and Social Challenge;" David Rittenhouse Inglis, Addison-Wesley, 1973.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF JOHN H. MACLEAN November 11, 1983 Mr. M. J. Sires, III Department of Energy Savannah River Operations Office P.O. Box A Aiken, S.C. 29801 Re: L-Reactor Dear Mr. Sires: There are several points in the draft EIS that should be clarified: 1. On page 2-2 of Volume 1 of the draft EIS it is stated that although theoretically weapon materials, i.e., Plutonium 238 could be produced directly from existing spent fuel from commercial light-water reactors, this is not a practical alternative as the Atomic Energy Act prohibits the use of fuel produced in commercial reactors for the production of weapons.	
EP-1	This statement is misleading. The production of weapons materials from commercial reactors is not theoretically possible - it is possible. Second, commercial spent fuel is just a nicer name for nuclear waste composed in part of plutonium 238 and 240. The L-Reactor will not produce any electricity. *It's only purpose is to produce nuclear waste composed of* this same plutonium 238 and 240. This waste will then be chemically separated so that the 238 becomes concentrated with a low percentage of 240 remaining. Technically, the only difference between the two wastes - those produced by commercial reactors and those produced by L-Reactor is that the L-Reactor waste will have a lower amount of 240 prior to chemical separation.	See the response to comment BY-2 regarding the use of spent fuel as a source of plutonium.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Commercial waste is readily available. At the moment, no one in government or business has a solution to the problem of permanent disposition of this waste. At the moment, the waste is being buried on the plant site of commercial nuclear reactors. Since they are not designed for this, their lack of land space will force some of them to shut down in the not too distant future. A limited part of the waste is going to Barnwell where the uranium is chemically separated from the plutonium and is re-used. This existing Barnwell operation is almost identical to that contemplated at L-Reactor with the only real difference that legal title to L-Reactor nuclear waste is in the name of the Department of Energy while the other is in the name of Georgia Power, Duke Power, etc. Using commercial waste would mean that the plutonium 238 could be produced without any delay due to problems with containment domes, cooling towers, cesium in drinking water or destruction of 1000 acres of marshland since no re-start of L-Reactor would be necessary. Using commercial waste would mean that commercial reactors would not have to bury their waste on site and possibly have to close down as space runs out. Instead, it can be shipped to Savannah River Plant or Barnwell for separation. The bottom line is that it will save everyone money by using commercial waste. It will save the power user as commercial reactors will have a longer life. It will save the government money by not having to pay for restart construction, possibly cooling tower or containment dome. Certainly it will save money as far as holding public hearings and writing environmental studies ad nauseam. The only people who might lose money is DuPont. Finally, it will save the people of Beaufort, Port Wentworth, Savannah and Augusta their peace of mind and maybe their health. Your response that the law forbids it cannot go unanswered however. At page S-1 of volume I of the Draft EIS you quote President Reagan to wit: "As a matter of policy, national security requirements, not arbitrary constraints on nuclear availability...shall be the limiting factor in the nuclear force structure."	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Running throughout the EIS is the theme that there can be no delay as to start up of the L-Reactor for our national security is at stake. If this is true, I can see no opposition from President Reagan (not from Congress considering their vote on the military budget) for an amendment to the Atomic Energy Act allowing commercial waste to be reprocessed so as to separate out plutonium 238. If our national security was at stake in 1980 surely it was worth a try to amend the Act, since if successful, no delay in upgrading our weapons would have occurred. As it is, the DOE's proposal to restart L-Reactor has resulted in a delay of weapons upgrading from 1980 to 1984 - the projected starting date of the L-Reactor. Please comment on the above as well as what efforts have been made to allow commercial waste to be used in weapons material production.	
EP-2	2. Another point that needs classification is the number of cancer deaths and genetic defects that will result because of the L-Reactor. At one point in the EIS it is mentioned that there will be 4 per thousand cancer deaths per year and 7 per thousand genetic defects. (page 5-17) At other places these figures are mentioned as excess deaths. If the figures are really based on per thousand population you can't be asking 400 Savannahians to die a year and 700 babies to have defects because of the L-Reactor? You must mean the percentages are based on existing cancer deaths and defects. You need to clarify in the final EIS exactly how many cancer deaths and defects can be expected in the population from Augusta to the coast. Also explain the different figures on pages 5-17 and 5-19 for these.	See the response to comment CT-1.
EP-3	3. Your main reason for not building a cooling tower is that it will delay L-Reactor startup, i.e., national security considerations. You do not deny that a cooling tower will mean lower amounts of water being pulled from the Savannah River, or that Steel Creek will be less affected with the consequence that the cesium in the bed will not be flushed out into the Savannah River. I can find no reason for the cooling tower not being built. You state in the EIS that it could be built in 18 months and then simply cut into the L-Reactor system. Thus,	See the responses to comments AA-1 and AB-13 regarding cooling-water mitigation alternatives. NUS Corporation did not "recommend" cooling towers as a preferred alternative. The preliminary presentation to DOE-SR prepared by NUS and as acknowledged by NUS used engineering and environmental factors that were treated with equal weight. The fact that cooling towers ranked higher was an output of the rating system employed and was not a sufficient basis for a

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	you could have no delay in the startup and 18 months from now you could simply cut it in. This would protect Beaufort and Port Wentworth's drinking water. The 39 million cost is negligible considering the cost of startup and the protection a cooling tower would give. Furthermore, your own consultants (NUS) recommended it.	recommendation. Since the NUS presentation additional alternative cooling-water systems have been analyzed. Also see the response to comment AA-1 regarding cooling-water alternatives.
EP-4	4. You have not adequately explained how the cesium got into Steel Creek. Obviously there have been leaks from the primary coolant to the secondary coolant to Steel Creek. Why not have a third loop in the cooling system and have monitors in the secondary and third cooling loops to detect leaks? A cooling tower would also help in this regard as it could serve as a last resort holding tank before Steel Creek in case of a major leak.	Discussions on the cesium-137 releases from P- and L-Areas to Steel Creek are provided in Sections 3.7.2.1 and D.1.1. As contained in these sections, these discharges resulted from leaking reactor fuel elements with cladding failures that exposed the underlying fuel to the spent fuel storage and disassembly basin water, and not from leaks between primary and secondary cooling-water systems.
EP-5	5. Nowhere in your EIS do you explain what has been done to the L-Reactor. As I understand it, the pipes were rusting and pigeons were nesting in the reactor. Certainly there had to be metal fatigue from the 12 years of operation. Please explain what parts of the L-Reactor were refurbished or replaced for startup, as it bears on the safety aspect of the system.	See the response to comment CF-3 regarding the scope of L-Area restoration and safety improvements, and the response to comment CU-3 concerning metal fatigue and effects of neutron radiation upon the reactor tank.
EP-6	6. Nowhere in the EIS do you explain why plutonium from the old bombs and missiles you seek to replace cannot be reused rather than making new plutonium. This needs to be addressed.	See the response to comment BL-19 regarding use of material from retired weapons. Additional information on this subject has been included in Section 1.1 of this EIS.
EP-7	7. Prior to the refurbishing of the L-Reactor, the monitors for alpha and other radiation were TLD's which are inadequate as they take a cumulative measurement, not an instantaneous one. Furthermore, they were located on the perimeter, not in the stock area. From now on you are going to use gamma spectrometers which are more accurate. However, are not your figures in the EIS for radiation dosage based on the inaccurate TLD measurements of past years and thus, unreliable?	The TLD's referred to are used in the environmental radiological monitoring program. This program is designed to monitor concentrations of radioactivity in the environment (air, water, soil, vegetation, and animals) outside SRP facilities and associated gamma radiation levels, and will be continued to be used in this manner. The results of the monitoring program are reported annually, as in the 1982 annual report, DPSPU 83-30-1, entitled Environmental Monitoring in the Vicinity of the Savannah River Plant. The environmental radiological monitoring program is different from the radioactive effluent monitoring program. The latter is designed to characterize and quantify airborne and liquid radioactive releases from SRP facilities. The radioactive

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		effluent monitoring program is described in Section G.3.1.5 of the EIS. Included in this program are continuous in-stack monitors for gaseous radioactive releases, using gamma spectrometry and for tritium using ion chambers. Particulate releases that would include alpha emitters are monitored based on the analysis of periodic filter samples drawn from the stack. The radioactive effluent monitoring program planned for L-Reactor is similar to that used for all SRP reactors in the past. The estimated releases reported in the EIS are based on actual reactor experience in the past at SRP using reliable measurements.
EP-8	8. Your EIS states in essence that security at the SRP is adequate. The enclosed article from the Georgia Gazette of November 3, 1983 says otherwise. Is Representative John Dingell correct that the DOE's own report of January 1983 concluded that safeguards were "a shambles?" Why does the EIS say otherwise?	DOE is in compliance with the agency's orders regarding safeguards and security. This topic is discussed briefly in the EIS to inform the reader that appropriate measures are being followed.
EP-9	9. The final EIS should contain the list of radiation doses considered safe by the NRC in 10 CFR 20. Although the EIS virtually drowns the reader in figures, they are meaningless without a guide as to how many rems are considered safe. You should put the NRC's tables in the EIS and also state how DOE differs from those and why you are following DOE's safety standards, not NRC's. Also, a definitional section would be very helpful for the public to understand rad, rem, curie, etc. As it stands now the EIS is unreadable as it consists of mostly chart after chart with little explanation. You should gear the final EIS to layman's level even if it takes a dozen volumes to do it. I enclose copies of 10 CFR 20 which I think should be included.	The DOE radiation protection guides (DOE Order 5480.1A, Chapter 11) are comparable to the NRC dose limits contained in 10 CFR 20 for a production facility. Also see the responses to comments BF-6 through BF-8 regarding radiation protection standards and differences between SRP and commercial light-water reactors. Volume 1 of this EIS contains a glossary of technical terms used in this EIS. The summary, located in the front of this EIS, has been revised in an attempt to provide a more readable summation for the lay reader.
EP-10	10. Nowhere in the EIS does it mention what result the L-Reactor will have on the industries down river. Many industries such as Savannah Foods and Union Camp use this water in production. If cesium radiation is a concern to the	The same detection of liquid radioactive releases to the Savannah River assumed for evaluating downstream drinking water concentrations would apply to water used for industrial purposes downstream. Since the resulting concentrations of

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	communities drinking from the Savannah River is it not also a concern of industry. What effects will the radiation have on industrial water use?	radionuclides are well below EPA drinking water standards and associated radiation doses are low, L-Reactor startup and operation will not affect the suitability of the water for industrial use.
EP-11	11. Doesn't thermal discharges contemplated because of the L-Reactor exceed limits for class B streams currently set by the S.C. Department of Health and Environmental Control? How are you going to get around this in order to get a permit?	See the response to comment AA-1 regarding issuance of an NPDES permit for thermal discharge.
EP-12	12. Doesn't the effects of a meltdown at L-Reactor exceed those permitted by NRC in 10 CFR 100? Why not comply with NRC's figures even though you are not required? Also, doesn't the cumulative radiation dose following startup exceed by a factor of 2 NRC standards? Again, why not comply?	See the responses to comments BL-2 and BL-11 for L-Reactor's ability to meet dose criteria of 10 CFR 100. See the responses to comments BF-6 through BF-8 regarding the comparability of DOE and NRC radiation protection standards.
EP-13	13. The final EIS should explain in its "Accidents which have happened" section how the SRP released 479,000 curies of tritium into the atmosphere in 1974, the largest of any nuclear facility in history. How did it happen and what prevents it from happening again?	See the responses to comments AB-10 and BA-4 regarding tritium releases.
EP-14	14. Please give details in the final EIS of where you will be drawing your operators from and the experience and training they will have. The TMI accident was compounded by operator error because of inadequate training. L-Reactor cannot afford that.	The program to staff and train sufficient operating personnel was initiated in 1980 along with the program to refurbish the reactor. All supervisors and operators that will be responsible for operating L-Reactor will have been fully trained and certified in accordance with SRP's formal training program. All will have on-the-job operating experience obtained at the operating SRP reactors along with special training on the minor differences between L-Reactor and the other three SRP reactors.
EP-15	15. Would you consider making available a guided public tour through the L-Reactor on specific dates as the concerns of those at the hearings might be calmed by actually viewing the safety systems?	Tours of the SRP facilities (including L-Reactor) are restricted due to security requirements. DOE, will provide lectures to interested persons, groups, and organizations on request.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EP-16	16. Finally, the real problem, with the startup of the L-Reactor is that the L-Reactor is not the problem. Instead, it is the millions of gallons for high and low level radioactive waste that are stored in the ground. You should just move it to some salt mine in Nevada and get it away from population centers and the Tuscaloosa acquifer. It doesn't matter how careful you are, danger exists of a leak and subsequent poisoning of the aquifer. The result will be to turn coastal Georgia and South Carolina into a desert. Already toxic chemicals from the M-area seepage basin have contaminated the aquifer (Vol. III, page D-83, EIS) and wells have been closed in towns near SRP (Sav. Morning News, 5/8/83). Very truly yours, John H. Maclean JHM/ah cc: Sen. Mack Mattingly	As discussed in Section 5.1.2.8 of the EIS, operation of L-Reactor will produce 380-760 cubic meters of concentrated high-level waste each year. The Defense Waste Processing Facility, now under construction is scheduled to commence processing this waste into borosilicate glass beginning in 1989-90 for eventual disposal in a Federal geologic repository. No liquid low-level waste is expected to result from L-Reactor operation. No wells have been closed in any towns near SRP due to contamination from SRP, nor has there been any evidence of such contamination. See the response to comment AJ-1 regarding ground-water contamination.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF JOHN M. CROOM

QUANTITATIVE APPLICATIONS
Environmental and Statistical Sciences
1000 Montreal Rd. 55A
Clarkston, Ga. 30021

November 14, 1983

Mr. M. J. Sires, III
Health, Safety and Environment (DOE)
Savannah River Operations Office
PO Box A
Aiken SC 29801

Dear Mr. Sires:

I am pleased to submit these comments prepared for Energy Research Foundation on the DEIS for L-Reactor, Savannah River Plant. These comments are in addition to my comments on Appendix D submitted directly by Energy Research Foundation. These comments pertain to impacts to fish populations and focus on portions of Volume 1: Sections 3 and 5.

I have a Ph. D. in biology and have worked in radiation ecology, population modeling and environmental impact assessment as a consultant for the last seven years. I have served as a technical witness before EPA and FERC and have considerable experience in preparation and review of environmental impact statements. I hope that my comments are of use to you in preparation of the EIS for L-Reactor operation.

Sincerely,

John M. Croom

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Comments to DEIS L-Reactor	
EQ-1	Population impacts to Savannah River fish species includes those killed directly (entrainment and impingement) and population reduction resulting from habitat destruction and concomitant reduction in biological energy input (allochthonous detritus). The DEIS does not estimate total impact as it fails to take into account habitat destruction and impingement, and the effects each has on the size of fish populations in the Savannah River. Only entrainment is estimated as a percentage impact on upper Savannah River fish species (19% for C-, K- and L-Reactors inclusive).	The cumulative impact of impingement on Savannah River fishes due to L-Reactor operation is described in Section 5.2.5.3 of the EIS. The impact of direct discharge on the fishes of Steel Creek and swamp are discussed in Section 4.4.2 and 5.2.5.1. The determination of the total size of the fish population in the Savannah River is beyond the intended scope of the extensive fishery studies being conducted by both the DOE and the Georgia Department of Natural Resources. However, Section 6.1.3 of the EIS describes the 2-year comprehensive cooling-water study which will assess the entrainment, impingement, and thermal impacts of SRP operations on river fish populations from Augusta downstream to the area of salt water intrusion (River Mile 40). The State of South Carolina, the State of Georgia, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers are participating in this study.
EQ-2	Currently, approximately 1400 acres of SRP wetlands are thermally impacted as a result of once through cooling; operation of L-Reactor as proposed will increase this to a total of approximately 2100 acres or 10% of all SRP wetlands with access to the Savannah River. SRP wetlands are essentially the uppermost wetlands of the Savannah River as (1) Hartwell Reservoir is only approximately 40 km upstream from which little organic matter is contributed to the Savannah River, and (2) the 40 km of the Savannah River above SRP has little wetlands because it is in the piedmont (most wetlands occur in the coastal plain). Wetlands serve as primary processors of allochthonous detritus and breeding, nursery and feeding areas for native and migratory fish species of the Savannah River. Destruction of wetlands must be taken into account in the EIS as an impact to Savannah River fish populations; in the DEIS, wetland destruction is not related to fish populations.	The impacts of wetland losses as related to river fish populations due to the operation of L-Reactor are described in Chapters 4 and 5 and Appendices C and I of the EIS. Also see the responses to comments DR-1 through DR-3 regarding wetlands and fishery impacts.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EQ-3	Total fish population impact of L-Reactor operation must include all impacts associated with water withdrawal from the Savannah River; the DEIS only addresses entrainment in a way that results in a quantitative estimate of population impact. The DEIS provides an estimate of total fish (by species) expected to be impinged at L-Reactor and a total for all reactors but fails to relate total impingement to fish population impact. Fish surveys during 1982 and 1983 included unit-area electro-fishing and hoop net collection. Hoop net collections could have been used for a mark/recapture program but, if it was not done, it is too late now. Population estimates of fish species can be obtained by scaling up the numbers of each species collected in unit-area electro-fishing. While such population estimates may be inaccurate due to collection method, the estimate could be used to estimate impingement impact and would be better than nothing. If extrapolation from electro-fishing collections is considered imprudent because of method shortcomings, impingement impact can be estimated as a ratio of impingement/entrainment from studies in similar rivers or southeastern US cooling reservoirs. It is essential that fish population impact be assessed as "total expected population reduction" from all causes. Adding impingement and habitat destruction to the 19% entrainment impact may result in a total population reduction as high as 30%. Such an impact would be dangerous to the viability of upper Savannah River fish populations. Impacts less than this possible impact have resulted in decisions to obviate the impact through construction of cooling towers or other alternatives to once-through cooling.	A mark-recapture program was included in the adult fish surveys for both 1982 and 1983 using hoop nets and electrofishing. However, sufficient numbers of recaptures were not achieved to provide a statistically valid estimate of the adult fish population. Furthermore, in an open system such as the Savannah River, mark-recapture techniques for estimating fish populations are extremely difficult because they are often biased, inconclusive, and unrepresentative. Therefore, it was not possible to evaluate impingement impact on the total fish population in the Savannah River. Fish impingement at the SRP, however, is very low, rarely exceeding 1-2 pounds per day. Also see the responses to comments AA-1, AB-13, and EQ-1 (above).

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Department of the Army Savannah District Corps of Engineers P.O. Box 889 Savannah, Georgia 31402 November 14, 1983 Reply to Attention of: Planning Division Mr. M. J. Sires, III Assistant Manager for Health, Safety and the Environment Savannah River Operations Office P.O. Box A Aiken, South Carolina 29801 Dear Mr. Sires: Reference is made to letter from Mr. Richard P. Denise of your office dated September 23, 1983, which was sent to the Office of Chief of Engineers, Washington, D.C. The Savannah District, U.S. Army Corps of Engineers, has reviewed the Draft Environmental Impact Statement (EIS), "L-Reactor Operation, Savannah River Plant, Aiken, South Carolina." The restart of the L-Reactor will not affect any structures or operations within the authority of the Savannah District. The Charleston District is responsible for any permit actions associated with the restart of the L-Reactor. We have no additional comments to make at this time; however, we would like to receive a copy of the Final EIS when it becomes available. Thank you for the opportunity to comment. Sincerely, Charles E. Dominy Colonel, Corps of Engineers Commander	Comments noted.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF ROBERT ALVAREZ Environmental Policy Institute 317 Pennsylvania Ave., S.E. Washington, D.C. 20003 November 14, 1983	
	Mr. M. J. SiresSavannah River Plant Department of Energy PO Box A Aiken, South Carolina	
	Dear Mr. Sires:	
	On behalf of the Environmental Policy Institute, a Co-Plaintiff on the L-Reactor lawsuit, I wish to make the following comments relative to the Draft Environmental Impact Statement (EIS) on the L-Reactor start-up at SRP:	
	For the past three years, EPI has been seeking and analyzing environmental radiation mointoring and release data, collected by the E. I. du Pont de Nemours and Co. for the federal government, from pre-plant operations (1951) to the present.	
ES-1	After reviewing the draft EIS for the L-Reactor start-up, we find that the DOE has failed to address the cumulative dose to the public from SRP operations since the 1950's. The draft EIS appears to only address the recent operating history of SRP.	See the response to comment AB-17 regarding documentation of prior radioactive releases and doses.
	EXTERNAL GAMMA RADIATION	
ES-2	Measurements of environmental gamma radiation taken by Du Pont for the federal government covering the period 1956-59 (the first half of SRP's operating history) have been analyzed by EPI. After adjusting for improved monitoring techniques and shielding from buildings the collective gamma dose to residents in the vicinity of SRP during this period ranges from 170,000 to 280,000 person-rems. Without adjusting for shielding, the collective dose is 420,000 person-rems.	External gamma dose measurements made in the SRP site vicinity do not distinguish between sources, but include contributions from all sources. However, the most significant contributor to these external gamma dose rates is natural background radiation consisting of cosmic radiation and terrestrial radiation as discussed in Section 3.7.1.2. The contribution of radioactive releases from SRP facilities to the external gamma dose rates is less than 0.1 percent. Doses due to fallout reported in

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	There are three possible explanations for these doses: (a) Releases from SRP facilities; (b) fallout from atmospheric nuclear weapons explosions or; (c) a combination of the two. The evidence, however, suggests that SRP is the principal source of these doses. Integrated external "excess" doses measured around SRP do not agree with weapons test fallout measurements taken at comparable locations leaving more than 85% of the gamma dose around SRP unexplained.(1) Moreover, less than 0.02% of the theoretical annual production of short-lived noble gases in five SRP reactors could have caused this exposure.(2)	the literature are not directly measurable in terms of gamma dose rates. Radioactivity associated with fallout is measured in terms of concentrations in air, water, soil, and vegetation. Doses associated with fallout are then calculated by considering exposure of individuals by the inhalation, ingestion, and external exposure pathways. Most of the doses associated with fallout determined in this manner are due to inhalation and ingestion of radioactive fallout particulates, and not external exposure.
	HEALTH EFFECTS	
ES-3	The health effects from gamma doses measured in the vicinity of SRP can be estimated on the basis of dose-risk relationships established by various scientists and committees. The numbers vary substantially. Underscoring the wide range of uncertainty relative to radiation risk estimates are major contradictions discovered recently in dosimetric (3), cancer incidence(4), and non-cancer data (5) on the Japanese atomic bomb survivors. These contradictions have effectively rendered all BEIR, UNSCEAR, and ICRP risk estimates to be tenuous at best. Moreover, direct observations of humans exposed chronically to low-dose ionizing radiation show higher risks by at least a factor of ten and have raised serious doubts about extrapolating mutational effects from groups who have received tissue destructive-high-doses. Thus it is more appropriate to approach health effects in the context of SRP by examining the range of risks. In this regard, the BEIR II Committee in its 1972 report expresses a value of 360×10^{-6} cancers per rem.(6) The 1980 BEIR III report because of a failure to reach consensus does not give a uniform recommendations.(7) K. Z. Morgan derives from the Hanford Survey of Mancuso, Stewart and Kneale a dose-risk relation of 7000×10^{6} cancers per rem.(8)	The understanding of the biological effects of ionizing radiation is quite substantial. The subject has received intense review by the National Academy of Sciences and continues to receive intense review. The NAS Committee on the Biological Effect of Ionizing Radiation (BEIR) in the BEIR III report revised donwward their earlier assessment of health effects for a given exposure level of radiation in the BEIR II report. From statistical analyses there is no correlation of actual cancer death rates with radiation for regions of the U.S. (Denver, western mountain states) in which the background radiation levels are well in excess of the average radiation exposure in the U.S. Also see the responses to comments AB-12, AB-17, and AV-8 regarding the BEIR III report and the effects of SRP releases.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
ES-4	Under this range of risk coefficients, the lower population dose estimate (170,000 person-rems) is expected to yield 61 to 1000 additional cancer deaths. For the higher population dose estimate (280,000 person-rems), the respective range would be between 100 and 2000 additional fatal cancers. By not adjusting for shielding from buildings (420,000 person-rems) the expected range is 151 to 2940 excess fatal cancers. By contrast, the du Pont Co., based on a recent draft report on crude mortality rates in the vicinity of SRP (9) suggests the average annual collective dose from SRP from environmental exposures to be 225 person-rems; and from fallout to be 2070 person-rems. However, these estimates are not reconciled with Du Pont's own environmental gamma measurements, particularly those taken during the first half of SRP's operating history.	See the responses to comments ES-2 and ES-3.
	OTHER EXPOSURE PATHWAYS	
ES-5	An estimate of the radiation dose due to other radionuclides and exposure pathways, over the entire operating period, is hardly possible because of insufficient information and missing monitoring data in the 1950s. Moreover, continuous milk sampling did not begin at SRP until 1962. However, during the first years of SRP's operations emissions of radioiodine, tritium, and non-volatile beta emitters were substantially higher than they are today. This led to significant contamination of food products from tritium, strontium-90, cesium-137, and radioiodine. (10). This concludes my comments. Sincerely, Robert Alvarez Director, Nuclear Weapons and Power Project	See the response to comment AB-17 regarding documentation of prior SRP releases and effects.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

ENDNOTES:

1. Bernd Franke and Robert Alvarez, "Analysis of External Gamma Radiation Monitoring Around the Savannah River Plant," November 1983, Environmental Policy Institute, Washington, D.C. 20003.

2. Ibid.

3. Eliot Marshall, "New A-Bomb Studies Alter Radiation Estimates," Science, May 1981.

4. Edward Radford, Science, August 7, 1981.

5. Alice M. Stewart, "Delayed Effects of A-Bomb Radiation," British Journal of Epidemiology and Community Health, June 1982. A. M. Stewart, "Non-Cancer Effects of A-Bomb Radiation," Brit. J. Epid., in press.

6. Committee on the Biological Effects of Ionizing Radiation (BEIR); The Effects of Low Levels of Ionizing Radiations, Washington, D.C., National Academy of Sciences (1972).

7. Committee on the Biological Effects of Ionizing Radiation (BEIR); The Effects on Populations from Exposure to Ionizing Radiations," 1980, National Academy Press, Washington, D.C. (1980).

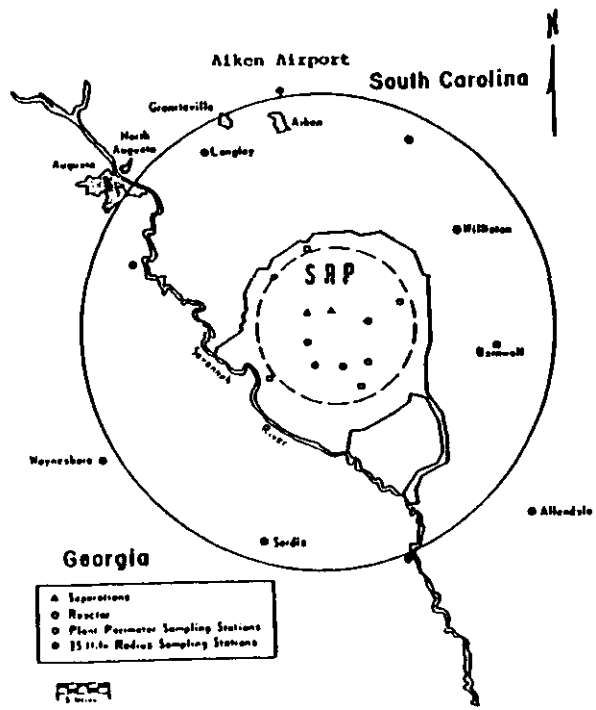
8. Karl Z. Morgan, "Risk of Cancer from Low Levels of Exposure to Ionizing Radiation," Bulletin of Atomic Scientists, September 1978.

9. Herb Sauer et al., "The Risk of Death in Counties near the Savannah River Plant," (Draft) 19, October 1983, prepared for the E. I. du Pont de Nemours Co. (see Table 3.3).

10. Ulrike Dettmer and Bernd Franke, "Analysis of Radiological Monitoring in the Vicinity of the Savannah River Plant, 1955-79, Progress Report," Prepared for the Environmental Policy Institute, Washington, D.C.

Comment number	Comments	Responses

Figure 1. Radiation Background Monitoring Locations



Comment number	Comments	Responses

Table 1. List of Locations for External Gamma Radiation Measurements at the Savannah River Plant

REACTOR AREA	SEPARATION AREA
R-Reactor	F-inside
P-Reactor	F-outside (1-mi)
L-Reactor	H-inside
K-Reactor	H-outside (1-mi)
C-Reactor	

PLANT PERIMETER	25 MILE RADIUS
Allendale Gate	Aiken Airport
A-14	Aiken State Park
Barnwell Gate	Allendale
D-area (=400 area)	Augusta
Dark Horse	Barnwell
Dunbarton Fire T.	Bushfield
East Talatha	Highway 301
Green Pond Church	Langley
Highway 21/167	Lees
Jackson	Olar
Military Recr.Site	Perkins
Pattersons Hill	Sardis
Talatha Gate	South Richmond
TC-area	Springfield
West Jackson	Waynesboro
Windsor Road	Williston
Williston Gate	
300/700-area	

100 MILE RADIUS
Columbia
Greenville
Macon
Savannah

Comment number	Comments	Responses

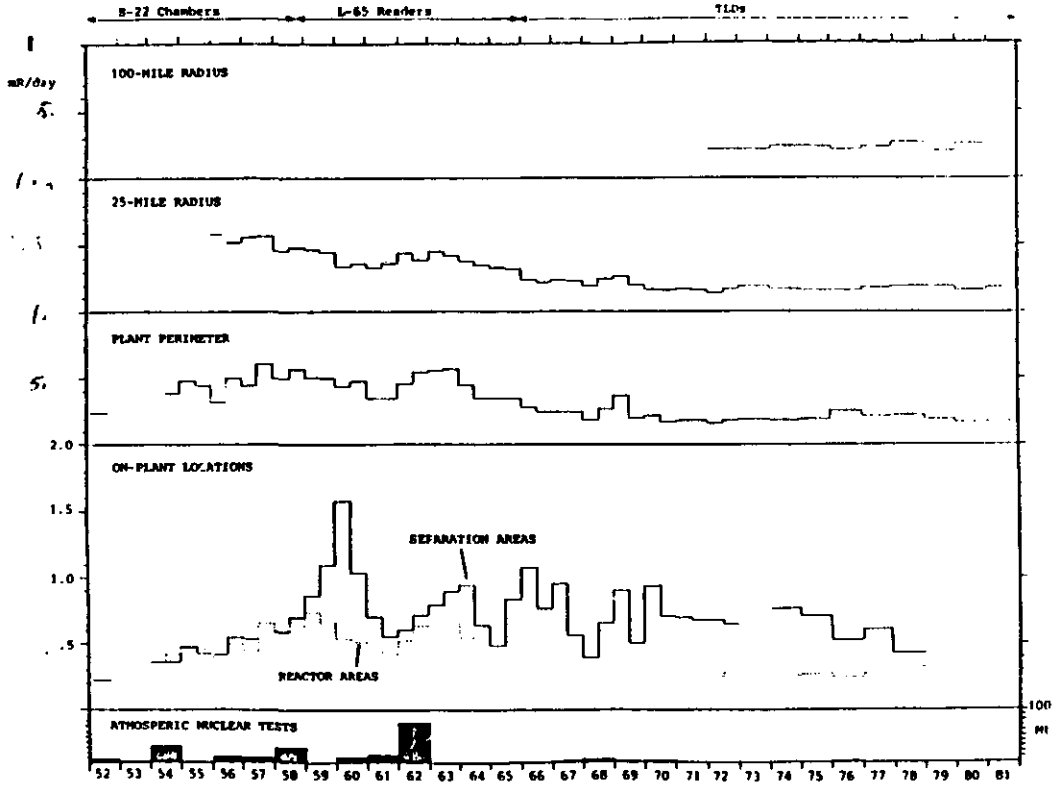
Table 2. Environmental Gamma-Radiation Levels at the SRP Area

Period	Reactor Areas	Separation Areas	Plant Perimeter	25-mile Radius	100-mile Radius	References
Feb-Sept 52	0.22	0.22	0.24	--	--	6
Jan-Jun 53	--	--	--	--	--	-
Jul-Dec 53	--	--	--	--	--	-
Jan-Jun 54	0.37	0.37	--	--	--	7
Jul-Dec 54	0.42	0.37	0.39	--	--	8
Jan-Jun 55	0.48	0.47	0.48	--	--	9
Jul-Dec 55	0.46	0.43	0.45	--	--	10
Jan-Jun 56	0.40	0.42	0.37	--	--	11
Jul-Dec 56	0.50	0.55	0.50	0.52	--	12
Jan-Jun 57	0.45	0.54	0.45	0.56	--	13
Jul-Dec 57	0.66	0.66	0.61	0.57	--	14
Jan-Jul 58	0.60	0.59	0.50	0.46	--	15
Jul-Dec 58	0.64	0.71	0.57	0.48	--	16
Jan-Jun 59	0.74	0.87	0.51	0.47	--	17
Jul-Dec 59	0.66	1.10	0.50	0.45	--	18
Jan-Jun 60	0.54	1.58	0.44	0.34	--	19
Jul-Dec 60	0.52	0.94	0.48	0.36	--	20
Jan-Jun 61	0.49	0.71	0.35	0.33	--	21
Jul-Dec 61	0.43	0.56	0.35	0.36	--	22
Jan-Jun 62	0.53	0.61	0.46	0.44	--	23
Jul-Dec 62	0.64	0.72	0.55	0.38	--	24
Jan-Jun 63	0.66	0.80	0.56	0.45	--	25
Jul-Dec 63	0.69	0.90	0.57	0.42	--	25
Jan-Jun 64	0.55	0.95	0.45	0.38	--	26,39
Jul-Dec 64	--	0.64	0.35	0.35	--	39
Jan-Jun 65	--	0.49	0.35	0.33	--	40
Jul-Dec 65	--	0.84	0.35	0.32	--	40
Jan-Jul 66	--	1.08	0.28	0.24	--	41
Jul-Dec 66	--	0.77	0.25	0.22	--	41
Jan-Jun 67	--	0.96	0.25	0.24	--	42
Jul-Dec 67	--	0.57	0.25	0.23	--	42
Jan-Jun 68	--	0.60	0.19	0.19	--	43
Jul-Dec 68	--	0.66	0.27	0.25	--	43
Jan-Jun 69	--	0.91	0.37	0.27	--	44
Jul-Dec 69	--	0.51	0.20	0.20	--	44
Jan-Jun 70	--	0.94	0.22	0.17	--	45
Jul-Dec 70	--	0.71	0.17	0.16	--	45,38
Jan-Jun 71	--	0.70	0.18	0.17	--	46
Jul-Dec 71	--	0.68	0.18	0.16	--	46
Jan-Jun 72	0.25	0.68	0.16	0.14	0.21	47
Jul-Dec 72	0.28	0.65	0.18	0.17	0.21	47
Jan-Dec 73	--	--	0.19	0.19	0.21	38
Jan-Dec 74	0.26	0.77	0.18	0.17	0.23	48
Jan-Dec 75	0.27	0.71	0.19	0.16	0.23	50
Jan-Dec 76	0.25	0.53	0.25	0.16	0.21	52
Jan-Dec 77	0.27	0.61	0.21	0.18	0.23	53
Jan-Dec 78	0.32	0.43	0.22	0.19	0.26	54
Jan-Dec 79	--	--	0.19	0.19	0.20	64
Jan-Dec 80	--	--	0.16	0.16	0.25	65
Jan-Dec 81	--	--	0.17	0.18	0.23	66

Table M-2. DOE responses to comments on Draft EIS (continued)

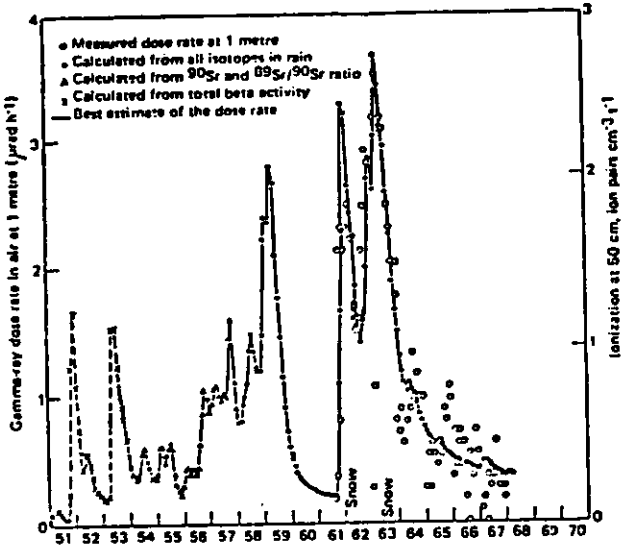
Comment number	Comments	Responses

Figure 2. Summary of Gamma-Radiation Measurements at the Savannah River Plant 1952 - 1981.



Comment number	Comments	Responses

Figure 3. Gamma-radiation from Deposited Fall-out at Grove, UK from 1951 to 1968; from /72/



Comment number	Comments	Responses

Table 3. External Infinite Gamma-Doses (mrad) Extrapolated from Gummed Film SR-90 Fallout Data /74/

Period	Atlanta, Georgia	Cap Hatteras, N.C.
pre- 1954	3.7	4.8
1954	4.1	3.4
1955	13.2	7.4
1956	8.0	5.5
1957	13.4	11.4
1958	11.9	6.8
1959	13.7	13.1
total	68.0	52.0

Comment number	Comments	Responses

Table 4. Noble Gas Releases by SRP Operation

Year	^{41}Ar	^{85m}Kr	^{85}Kr	^{87}Kr	^{88}Kr	^{133m}Xe	^{133}Xe	^{135m}Xe	^{135}Xe	Ref.
1971	1.4+5*	3.1+3	6.4+5	--	1.7+3	1.1+3	2.5+4	2.9+3	2.1-1	2.7+1	46
1972	1.7+5	7.3+3	6.0+5	2.5+3	4.2+3	2.9+2	3.9+4	1.1+4	2.1-1	2.7+0	2
1973	1.0+5	6.5+3	7.7+5	2.0+3	7.4+3	5.1+2	2.2+1	9.4+3	2.1-1	1.9+0	58/49
1974	1.1+5	1.3+3	5.0+5	6.6+2	1.4+3	1.4+2	5.5+3	2.2+3	1.7-1	1.9+0	59
1975	6.5+4	3.7+2	5.2+5	1.2+3	8.6+2	5.8+0	1.1+3	7.3+2	1.4-1	1.2-1	60
1976	8.4+4	3.8+2	7.4+5	4.2+2	5.1+2	6.3+2	2.5+1	7.3+2	1.5-1	1.6-1	61
1977	6.5+4	8.4+2	4.4+5	6.0+2	6.7+2	1.2+1	2.1+3	1.5+3	1.4-1	6.1-2	62
1978	5.3+4	8.9+2	5.3+5	5.6+2	8.4+2	7.1+0	2.2+3	1.7+3	1.3-1	6.5-2	63
1979	5.3+4	1.8+3	4.8+5	1.5+3	2.3+3	9.1+0	5.1+3	4.5+3	1.3-1	8.1-2	64
1980	7.0+4	3.2+3	5.8+5	2.8+3	4.0+3	1.9-1	7.8+3	6.4+3	1.6-1	2.0-2	65
1981	6.2+4	1.3+3	8.4+5	8.7+3	1.5+3	6.1+0	3.9+3	2.5+3	1.6-1	4.7-2	66

Remarks: Data on noble gas releases before 1971 is unavailable

* see 1.4×10^5

Comment number	Comments	Responses

Table 5. Potential Radiation Doses due to Short-Lived Noble Gases Produced at SRP Reactors

Nuclide	Production rate [1] per year (Ci)	person-rem per Ci released [2]	theoretical [3] population dose for 100% release (person-rem)
Kr-87	4.5×10^{11}	1.1×10^{-4}	5.0×10^{7}
Kr-88	4.3×10^{11}	4.0×10^{-4}	1.7×10^{8}
Xe-133	2.1×10^{10}	4.2×10^{-5}	8.8×10^{5}
Xe-135	3.6×10^{10}	8.7×10^{-5}	3.1×10^{6}
Total			2.2×10^{8}

[1] 5 reactors with 2.150 MWth and 75% capacity each data from /81/

[2] data from /64/

[3] without radioactive decay

Comment number	Comments	Responses

Table 6. Major Sources of Population Exposure

Table 6: FROM: Sauer et al., "The Risk of Death in Counties Near the Savannah River Plant" (Draft) October 1983. Prepared for E.I. du Pont de Nemours and Co.

Major Sources of Population Exposure

Source of Exposure	Dose to Average Individual, mrem/yr[a]	Population Dose, man-rem/yr: 50 Mile Radius	Population Dose, man-rem/yr: Beaufort and Jasper Counties
Natural Background			
Cosmic Radiation	31.5[b]		
External Terrestrial Gamma	33.0[b]		
Internal Terrestrial	28.0		
Total	92.5	41625	5550
Medical			
Diagnostic X-rays	77.3[c]		
Radiopharmaceuticals	13.6[c]		
Medical and Dental Personnel	0.36[c]		
Total	91.3	41085	5476
Weapons Test Fallout	4.6	2070	276
Consumer and Industrial Products	4.5	2025	270
Air Travel	0.5[c]	225	30
Nuclear Facilities(other than SRP)	0.2[c](0.0)	90	
Savannah River Plant			
Environmental Radioactivity	0.5(0.7)	225	42
Occupational Exposure	4.0[c](0.0)	1800	-
Total	4.5(0.7)	2025	42
TOTAL	198.1(194.1)	89145	11646

a. Values shown generally apply to both the 50-mile radius and the Beaufort-Jasper population groups. Where different, Beaufort-Jasper dose rates are shown in parentheses.
b. Includes a 10% reduction for cosmic radiation and a 40% reduction for terrestrial radiation to account for shielding by buildings and the body.
c. Prorated over the population.

Comment number	Comments	Responses

Table 7. Potential Natural and Radiation-Induced Fatal Cancers within a 50-Mile Radius of SRP

Average Annual Fatal Cancers per Year	Lower Risk(a)	Higher Risk (b)
Natural Occurance (c)	594	594
Radiation-Induced		
Fallout and/or SRP 170,000 person-rems (d)	4.5	88
Fallout and/or SRP 280,000 person-rems (d)	7.5	145
Percentage of Natural Occurance		
SRP and/or fallout 170,000 person-rems	0.7%	15%
SRP and/or Fallout 280,000 person-rems	1%	24%

(a) Based on the BEIR I probability of 360 x 10^{-6} cancers per rem.

(b) Based on the Hanford Survey of Mancuso, Stewart and Kneale as interpreted by Morgan in the Bulletin of Atomic Scientists, Sep. 1978 (7000x10^{-6} cancers per rem).

(c) Based on 1959-78 average annual cancer death rates for South Carolina and Georgia estimated by Sauer et al. for E.I. du Pont de Nemours Co., Oct. 19, 1983, (Draft).

(d) Based on environmental measurements collected by SRP.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF CAROLINE O'ROURKE

433-A Howle Ave.
Charleston, SC 29412
November 13, 1983

Mr. Melvin Sires
U.S. Dept. of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29801

Dear Mr. Sires:

ET-1 I am opposed to the opening of the L-Reactor of the Savannah River Plant for several reasons. Generally, the reopening would result in an increase of high level nuclear waste in the area, particularly into underground aquifers. Also, there likely would be run-off of radioactive cesium into the Savannah River. Lastly, when the extremely hot water from the reactor operation is discharged into the river, there would be localized die-off of endemic flora and fauna.

See the response to comment BA-5 regarding high-level radioactive waste, the responses to comments AA-2 and BT-2 regarding radiocesium, and the response to comment AB-13 regarding information contained in this EIS regarding cooling-water mitigation alternatives.

Please take these comments into consideration.

Sincerely yours,

Caroline O'Rourke

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF D.M. McEACHIN, JR.

House of Representatives
State of South Carolina
314-A Blatt Building
Columbia, S.C. 29211
November 14, 1983

D.M. McEachin, Jr.
District No. 63-Florence County
Drawer 150
Florence, S.C. 29503

Committee:
Ways and Means

Mr. Melvin J. Sires, III
U.S. Department of Energy
Savannah River Operations Office
Post Office Box A
Aiken, South Carolina 29801

ATTN: EJS for L-Reactor

Dear Mr. Sires:

As a boy growing up in South Carolina, I would hear accounts of how the air and water were polluted in the North. I was also told how fortunate I was to live in South Carolina. I realize that South Carolina industrialization has engendered wastes that are toxic to the environment. The consternation over the destruction to our environment has been slow coming in South Carolina but it has arrived.

The consequences to the environment of the start-up of the L-Reactor is like a fireball in the night to many South Carolinians of all walks of life.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EU-1	I implore you to comply with federal and South Carolina environmental standards applicable to commercial reactor sites. Good citizenship requires that all steps be taken to avoid damage to the environment before start-up.	Chapter 7 of the EIS presents the Federal and state environmental protection regulations that are applicable to the restart of L-Reactor. The restart of L-Reactor will comply with all of these regulations. For example, the proposed restart of L-Reactor will be in compliance with an NPDES permit issued by the State of South Carolina, and the restart of L-Reactor will be in compliance with DOE radiation protection standards that are comparable to those of the Nuclear Regulatory Commission (10 CRF 20) for a production facility (i.e., 500 millirem to the whole body in anyone calendar year). With respect to engineered safety features such as a containment dome, the need for specific engineered safety features is based upon limiting potential radiological consequences. The potential radiological consequences are related to the design and operation of the specific type of reactor being considered; for example, the Fort St. Vrain reactor, which is a gas-cooled commercial reactor in Colorado, has no containment dome and was licensed for operation by the NRC.
	With kind regards, I am, Yours very truly, D.M. McEachin, Jr.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	COMMENTS ON APPENDIX D OF THE DEPARTMENT OF ENERGY'S DRAFT ENVIRONMENTAL IMPACT STATEMENT: L-REACTOR OPERATION AT THE SAVANNAH RIVER PLANT By JOHN M. CROOM QUANTITATIVE APPLICATIONS Environmental and Statistical Sciences 1000 Montreal Road, 55A Clarkston, Georgia 30021 November 9, 1983 Prepared for: Energy Research Foundation 2530 Devine Street Columbia, SC 29205	
	1. P. D-4, Section D.2.1.1, first full paragraph:	
EV-1	(a) Listing of mechanisms of association between Cs-137 and sediments implies ranking of importance. Data are available from Fig. D-2: Graphs A, B, and C to test the correlation between cation exchange capacity (CEC) in C and %'s clay and organic material in A and B respectively. Analyze with regression or correlation (as per their inherent assumptions) and present proportions of CEC sum of squares attributable to clay and OM.	There was no intent to imply any ranking to the importance of the mechanisms of association between cesium-137 and the sediments of Steel Creek.
EV-2	(b) Reference to Kiser (1979) and Prout (1958) concerning "affinity of Cs-137 for... and suspended solids" is contradictory to last two sentences in paragraph two of page 3-66 and the last two sentences in the first paragraph on P. D-21. Which is correct?	The Kiser (1979) and Prout (1958) studies are not contradictory with the last two sentences in paragraph 2 of page 3-66 of the Draft EIS. The Kiser and Prout studies were considered to show the affinity (K_d) of cesium -137 had for the sediments or suspended solids. The sentences in questions refer to transport modes (dissolved versus suspended). At low suspended solids concentrations, the dissolved fraction will carry more cesium-137 than the suspended solid. This is not contradictory to the K_d concept.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	2. P. D-6, Table D-2:	
EV-3	Sum of "Percentage of total Cs-137 inventory in interval" equals 99, not 100. Is difference due to rounding?	The difference is due to rounding.
	3. P. D-8, Table D-3 and references to it on P. D-8, first full paragraph:	
EV-4	(a) Units of radioactivity concentration appear to be incorrect. How do changes affect subsequent impact estimates and conclusions?	Units presented in Table D-3 (D-8) are indeed incorrect and should be microcuries per square meter. This is an undetected typographical error and does not affect subsequent estimates of impact. Transport estimates were derived independently of inventory estimates.
EV-5	(b) In column "Total Curies" provide error estimates so that readers can evaluate precision of presented distribution.	Inventory estimates were made using three different techniques based on stratified random sampling, aerial gamma spectroscopy, and a "weighted" analysis of radiocesium contents (microcuries per square meter) of individual soil cores. Error estimates could be calculated only for the stratified random sampling estimate: 56.89 ± 8.86 Ci (± 95 percent confidence limit). This estimate provided the lowest estimate (mean) of the radiocesium inventory. The highest inventory estimate was derived from the "weighted" soil core analysis (67.09 Ci). This highest estimate was used as the inventory in Steel Creek. Greater detail on these analyses is presented in Smith et al., 1982, Chapter VI).
	4. P. D-6, last sentence and its continuation on P. D-8 with reference to Table D-6:	
EV-6	Statement is true for only 4 of 7 comparisons; the average difference is less than 7. How does this change in the Co/Cs ratio affect subsequent sections involving Co inventories and concentrations based on Co/Cs ratios?	The statement in question has been revised in the EIS to reflect the mean factor of 15.15, which is based on the mean Co-60/Cs-137 ratio. The seventh point is an outlier and therefore was not included in the calculations. As noted in Section 4.1.2.4, Co-60 contributes very little to the dose to the hypothetically maximally exposed individual. Cobalt-60 contributes less than 1.0 percent to this dose even though the calculated transport ratio (Co-60/Cs-137) for the first year is about 0.06. Thus, small errors in estimating the concentration of Co-60 released to the Savannah River will have minute effects on the calculated dose.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	5. P. D-8, Table D-6:	
EV-7	How was outlier in footnote b. identified? Include method reference and parameters for outlier identification and justify testing for outlier occurrence.	Although the ratio (Co-60/Cs-137) of 0.6 could be identified statistically as an outlier, it is unlikely that such a high ratio could exist at the present time in the Steel Creek swamp system. A high ratio is unlikely on the basis of the radioactively decayed release data which provides a ratio of about 0.015. In addition, the isopleths of exposure rate for Co-60 and Cs-137 do not support a high concentration ratio (Boyns and Smith, 1982; EGG Report 1183-1816, "An Aerial Radiological Survey of the Savannah River Plant and Surrounding Area, Aiken, South Carolina").
EV-8	Value 0.119 is incorrect. What are triple hyphens in columns 5 and 7?	Table D-6 of the EIS has been corrected to reflect the correct value, 0.112 versus 0.119. The hyphens are used to indicate the radioactivity was below the limit of detection.
	6. P. D-8, first full paragraph, lines 8-12.	
EV-9	Provide statistics supporting these statements including level of confidence.	Throughout the Steel Creek system (corridor and delta), 45 percent of the variation in gamma exposure rates [1 m (mR/hr)] was explained using multiple regression techniques (error df = 79). Surface-soil radiocesium content [0.1 m^3 (1 m^2 area x 0.1 m depth)] alone explained 36.9 percent of the variation. Woody plant species leaf Cs-137 concentrations and subsurface-soil texture were also significant ($p<0.10$) variables in the regression but explained relatively little of the variation (<3%) in exposure rates. When regressions were performed using data from individual stream sections, however, $\underline{r}^2$ values ranged from 0.35 to 0.82.
	7. P. D-11, Table D-4:	
EV-10	(a) Provide data for sediment densities so that "Total Curies" in Table D-3 can be verified.	Soil bulk density values were extremely heterogeneous throughout Steel Creek. Average surface soil (0-10 cm) bulk densities (g-dry/cm^3) ranged from 1.43 to 0.48 at different sampling locations along the stream floodplain while subsurface (10-20 cm) soil bulk density averaged from 2.01 to 0.57 at different locations.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EV-11	(b) Footnotes a. and c. appear contradictory, i.e., N versus "composite"; provide explanation.	Rather than a composite sample, the table was derived from data for all samples collected at the 12 locations. Footnote "a" has been reworded to reflect this.
	8. P. D-11, Tables D-4 and D-5:	
EV-12	Footnotes b. in both tables ask the reader to accept that visual inspection can objectively and numerically with precision, distinguish between particles sized 0.05-0.002 mm (silt) and less than 0.002 mm (clay). I do not accept "visual inspection" as a precise method. Provide quality control data to standardize differences between observers and demonstrate observer accuracy and precision.	While visual classification of soils is not a substitute for grain-size analyses, visual classifications do provide a valid means for characterizing the soils of the Steel Creek corridor. Visual classifications are often performed in the field by soil scientists and engineers. Standard grain-size analyses are being performed and the results are being evaluated in relation to cesium concentrations.
	9. P. D-12, Table D-7:	
EV-13	Number of observations do not total to 1851.	Table D-7 in the Draft EIS contained two typographical errors. The number of observations at location 10 is 60 rather than 10 and the number of observations at location 110 is 138 rather than 135. These changes have been made in the EIS.
	10. P. D-13, Section D.2.1.2, second and last sentences:	
EV-14	The second sentence states "no significant change" whereas the last sentence shows a 52% decline between 1974 and 1977, which I regard as significant. What is the purpose of the apologia in this paragraph?	The "no significant change" refers to cesium-137 concentrations in the sediments observed in 1976 and 1977; these concentrations averaged 34.1 ± 50.3 picocuries per gram in 1976 and 39.9 ± 57.4 picocuries per gram in 1977. Based on these data, the sediment sampling interval in Creek Plantation Swamp was changed to once every five years, and the use of TLDs on a yearly basis. There is a change of 52 percent in the 1974 and 1977 data.
	11. P. D-13, Section D.2.1.3, first two sentences:	
EV-15	These two sentences are contradictory. Which is correct?	The two sentences are not contradictory; the first is a general statement most applicable to the main channel and the second sentence provides exceptions to the general statement.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	12. P. 15, Table D-8:	
EV-16	What is meant by hyphens in data columns?	The hyphens mean no analyses were performed; this table has been revised to include more recent monitoring data.
	13. P. D-15, Table D-9:	
EV-17	Only the last two numbers in Column 3 (Cs-137) and the next to last number in column 4 (K-40) are significantly different ($p = 0.05$) from zero. Comparisons of these data in Section D.2.1.4 are misleading because of zero inclusion in confidence interval and should be corrected.	The data in Table D-9 of the Draft EIS were provided to characterize the concentrations of cesium-137 and potassium-40 in sediments at the two water treatment plants. These concentrations are at or near the limit of detection. The comparisons are not misleading for the reader has access to Table D-9.
	14. P. D-16, Section D.2.2, first full paragraph on P. D-16 and referenced Table D-10:	
EV-18	(a) What types of vegetation (leaves, branches, etc.), and what species are included in these samples?	The vegetation along the Steel Creek corridor included emergent type vegetation that grow in the shallow inundated portion of the creek. This vegetation included cattails, knot weed, duck weed, etc.
EV-19	(b) These data are amenable to analysis of variance which would provide confidence to conclusions drawn from this analysis. As presented now, I cannot accept that 1973 is statistically less than 1972 as stated and likewise 1972 from 1971; there appears to be sufficient within year variation so that between year differences may be difficult to demonstrate.	Statements made in Section D.2.2 concerning Table D-10 of the Draft EIS do not require judgments about absolute differences between years, just general trends. It is noted however that the slope of the time trend for sample point 9 is not statistically different from zero. From 1970-1973 all sample points except 9 and 4 show decreasing concentrations with time; after 1970 the concentrations decrease with time at sample point 4. As noted in the text, all sample points from 1973-1976 exhibit concentrations that do not change appreciably with time. However, the 1977 sample points all have cesium-137 concentrations that are greater than their corresponding 1975 and 1976 sampling points, with the exception that sample point 6 in 1976 had a higher concentration than in 1977. Many of the 1977 concentration data are greater than their corresponding 1975 points by a factor of 2 or more.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EV-20	(c) At minimum, error terms should be included with "Averages" to allow reader to decide if stated between year differences are accurate.	This suggestion has been adopted in the EIS.
EV-21	(d) Arithmetic calculations of "Averages" should be verified; four out of five checked were incorrect.	The arithmetic calculations have been checked and errors corrected in the EIS.
EV-22	(e) Smith et al. (1981) data for 1981 should be included in Table D-10 as it appears to be available; likewise for 1980 data if it is available.	Data compiled by Smith et al. (1982) are not comparable on a one-by-one basis with the data presented in Table D-10 because their locations are not identical and their methodologies differ from that used to develop Table D-10. However, results of their studies have been summarized in Appendix D of this Final EIS.
	15. P. D-16, Section D.2.2, second full paragraph on P. D-16:	
EV-23	This paragraph should be rewritten to clarify what is being compared; "generally less" must be suported by statistics or defined.	The text of Section D.2.2 has been revised to reflect the concern expressed by this comment.
	16. P. D-16, Section D.2.2, third and fourth full paragraphs on P. D-16:	
EV-24	(a) What tissues (or whole body?) are being discussed for deer and hogs?	Muscle tissue (edible portions) of hogs and deer were measured for cesium-137 concentrations.
EV-25	(b) Provide error estimates where concentrations are means to allow reader to decide if differences exist.	Information from a recent study on the cesium-137 concentrations in deer from SRP and the South Carolina Coastal Plain is presented in Section D.2.2 of the EIS.
	17. P. D-18, Section D.2.2, first paragraph on P. D-18 and referenced Table D-12:	
EV-26	(a) Justify selection of the "fish flesh bioaccumulation factor" of 3000. Arithmetic weighted average ± standard deviation of data in D-12 is 2746 ± 1833; perhaps a factor of 4579 (mean + standard deviation) would be more conservative in the sense that a factor considerably above average is used in computing potential human health impact.	The EPA notes in comment DA-21 that the use of 3000 for the bioaccumulation in the EIS dose assessments probably overestimates the cesium-137 in fish; they indicate that values of 40 to 1300 for freshwater fish are generally used in dose assessments. The NRC computer code LADTAP-II uses a default cesium-137 bioaccumulation factor of 2000. The choice of 3000 for use in this EIS is reasonably conservative because it is (1) more than twice that considered adequate by EPA; (2) 1.5 times that normally used in safety analyses; (3) nearly 1.5 times the mean of 527 specimens (2019) obtained from Steel Creek below Road A.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EV-27	(b) What human doses would result from model runs with the bioaccumulation factor of fish equal to 4579?	If the bioaccumulation factor for freshwater fish were 4579, the dose to the hypothetical maximally exposed individual would be 5.3 millirem during the first year after resumed operation, using the same assumptions used to calculate this dose with a 3000 bioaccumulation factor. The use of a bioaccumulation factor above 3000 is unwarranted.
EV-28	(c) Exponential transformation (cited in Table D-12, footnote d.) is applied because of distributional properties of data and not simply because they "vary widely." Support the use of exponential transformation or use arithmetic calculation.	The geometric mean should be used when the bioaccumulation data are lognormal. As the distribution of the data is unknown the arithmetic mean is provided.
	18. Table D-11:	
EV-29	Provide estimates of error associated with mean concentrations to allow reader decision of differences between means.	Standard error data are presented in Table 1 of Ribble and Smith (1983). To convert cesium-137 concentrations in dry weight to concentrations in wet weight, divide by 5.
	19. P. D-18 and D-21, Section D.2.3.1, first two paragraphs:	
EV-30	Provide 1982 data comparable to "November and December" 1981 data with associated error estimates.	No data measurements were made in November and December 1982. The mean cesium-137 concentration in the seven water samples from Steel Creek was 5.31 ± 1.81 (2 standard errors) picocuries per liter.
	20. P. D-21, Section D.2.3.1, first full paragraph on P. D-21:	
EV-31	Since this ratioing estimate of Co-60 concentrations is used several times in Appendix D, a brief description along with error estimates would be very helpful to the reader and would strengthen confidence in estimates of Co-60 concentrations.	Of the approximately 250 samples analyzed in the Spring 1982 cesium-137 transport study, Co-60 was detected in only 4 suspended solids samples and was below the limit of detection (0.2 picocurie per liter) in all of the soluble fractions. Therefore the procedure followed by Hayes and Watts (1983; DPST-83-673) was used to estimate the concentration of Co-60. It is noted that Co-60 contributes very little to the dose to the hypothetically maximally exposed individual, less than 1.0 percent (Section 4.1.2.4). Thus, small errors in estimating the concentration of Co-60 released to the Savannah River will have minute effects on the calculated dose.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	21. P. D-23, Section D.2.3.3, first and fourth full paragraphs on P. D-23 and Table D-14:	
EV-32	(a) Demonstrate and provide supporting statistics that 0.033 pCi/l is higher than 0.028 pCi/l.	There is no statistical difference between 0.033 and 0.028 pCi/l.
EV-33	(b) Recent measurements of finished water at Beaufort-Jasper (0.028 pCi/l of Cs-137) and Cherokee Hill (0.033 pCi/l of Cs-137) demonstrate a much smaller reduction in finished water concentrations of Cs-137 than originally estimated by 1965 studies. The latest Steel Creek Cs-137 concentration available in the DEIS is for 1981 (5.30 pCi/l) which results in a predicted Cs-137 concentration of 0.04 pCi/l at Highway 301 (See Table D-17). From 0.04 pCi/l at Highway 301, finished water at Beaufort-Jasper and Cherokee Hill contain 0.028 pCi/l of Cs-137 (a reduction of 30% rather than 79.3% as in Table D-14) and 0.033 pCi/l of Cs-137 (a reduction of 18% rather than 97.5% as in Table D-14), respectively. Please respond to this interpretation of data presented in Section D.2.2.3.	The cesium-137 measurements made during Spring 1983 at the two water treatment plants were part of the initial phases of a monitoring program that has been established prior to the restart of L-Reactor. This program, which uses specialized sampling and analytic techniques, will be extended to monitor the finished water from these plants following the restart of L-Reactor as well as Savannah River water at several locations (Section 6.2.4). The analysis proposed by the commentor is flawed because it is not based on synchronous measurements at the locations needed to establish the appropriate reduction factors. The 0.04 picocurie value used in Table D-17 of the DEIS represents the average conditions at the Highway 301 bridge for the 1979 to 1982 period (see footnote "b" of the table). No special measurements were made at the 301 bridge during the period of the special finished water monitoring study. On the other hand, the reduction factors calculated by Hayes and Boni (1983) and presented in the Table D-14 of the DEIS are based on synchronous measurements at the different locations. The ongoing measurements at the Beaufort-Jasper and Cherokee Hill water-treatment plants are being supplemented by measurements upriver and downriver from SRP and by measurements of the raw water being treated by these plants. When these measurements are completed, a thorough evaluation of the river-related reduction factors and treatment plant removal factor will be made.
	22. P. D-24, Table D-14:	
EV-34	Are all of these data from 1965 sampling and if so were they taken in the same time period?	As noted in Hayes and Boni (1983; DPST-82-1077), all data were obtained 10-17 December 1965.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	23. P. D-26, Section D.3.5:	
EV-35	Does the estimate of 0.4 Ci of Cs-137 in vegetation include roots or is it above-ground vegetation?	The transport during the first year attributable to biotic transport is based on a surficial biomass inventory of 304 grams per square meter. Based on Tables D-3 and D-10 of the Draft EIS and the biomass estimate of 304 grams per square meter, the transport estimate is about 0.13 curie, some 3 times less than the 0.4 curie used in the total transport estimate of 4.4 ± 2.2 curies during the first year.
	24. P. D-26, Section D.3.6:	
EV-36	Are these estimates of volume and travel time consistent with the hypothesis in the third full paragraph on P. D-32 where a four day "lag" was proposed to link highest flow in March 1982 with highest concentrations per liter of Cs-137; explain and clarify?	Yes, the information provided in Section D-3.6 is based on current flow conditions which do not normally reach the creek floodplain except during periods of high runoff. It is noted that the concentration of cesium-137 in the creekbed sediments are typically much less than in the sediments of the creek floodplain.
	25. P. D-27, Section D.3.8:	
EV-37	Which of these estimates of Co-60 inventory is considered best?	No preference is assigned to either inventory estimate. These estimates are meant to characterize the environment. Calculations of cobalt-60 resulting from the restart of L-Reactor were made independent of any inventory of cobalt-60 in Steel Creek.
	26. P. D-29, Section D.4.1, first paragraph on P. D-29 and referenced Figure D-10:	
EV-38	Why was change in flow not considered in modeling Cs-137 leaching from sediments? Flow and temperature must interact otherwise Section D.4.3 has no purpose in face of an $r^2 = .88$ (square of the correlation coefficient). Elaborate on how experiment was structured including monitoring of effluent temperature and flow in Steel Creek.	There is nothing to show that more leaching (higher Cs-137 concentrations) would occur from higher water flow rates. The rather flat profiles of the floodplain would indicate that higher flows would decrease the Cs-137 concentrations in water because of an increase in the water volume to floodplain area ratio. In the absence of data on continued high water-temperature flow in Steel Creek, it was assumed that the Cs-137 concentration would follow the measured concentrations at the Cypress Bridge location. Laboratory studies on Cs-137 extraction by hot water would indicate that about 5 percent could be extracted. The laboratory conditions of vigorous stirring of sediment would not be duplicated in the Steel Creek environment.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		The calculations were based on environmental monitoring data on Cs-137 concentrations (weekly composites) at Cypress Bridge. The outlet temperatures from SRP reactors (during operation) are relatively constant (typically about 70°C) and flows were measured by a USGS gauging station at Cypress Bridge. [Also see the description of June 1976 study of hot water flows from P-Reactor (Du Pont, 1982; DPST-81-241)]. The correlation coefficient of 0.94 (r^2 = 0.88) was developed for equation fit to the data developed from the June 1976 studies (Figure D-10 of the Draft EIS).
	27. P. D-29, Section D.4.1, second sentence of second paragraph and associated, although not referenced, Table D-15:	
EV-39	Regression analysis of data in Table 15 probably would not support a slope significantly different from zero as purported in the text sentence.	The desorbed fraction as given in Table D-15 of the Draft EIS, is a combination of the dissolved fraction and the amount left in suspension after centrifugation for one-hour. The dissolved fraction represented 49.9 percent at 70°C; 30.8 percent at 52°C; 16.7 percent at 43°C and 3.8 percent at 22°C of the total, desorbed activity. These data showed that the higher temperature extracted more dissolved Cs-137 than the lower temperatures.
	28. P. D-29, Section D.4.1, third paragraph (one sentence):	
EV-40	What are "these analyses"? There has been nothing presented to indicate how the desorption estimate of 1.7 Ci of Cs-137 was calculated. Desorption is a critical issue and must be substantiated.	The Cs-137 concentration data at Cypress Bridge were fit with an exponential representation of the data, integrated and a full flow of 1.1 x 10^6 m^3/day was used to estimate the 1.7 Ci/year (Du Pont 1982; DPST--81-241): Total Ci = 1.7 $[e^{-0.026563t_1} - e^{-0.026563t_2}]$ where t = days.
	29. P. D-31, *Section D.4.3.1, first paragraph, line 8:*	
EV-41	How was the "20-percent-per-year decrease" estimated? On P. D-35, first paragraph, line 6 of Section D.4.4, it is stated that "a 20 percent reduction in transport is assumed." Support this assumption.	The assumed reduction in transport in the third and subsequent years of 20-percent decrease per year is based on engineering judgment.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	30. P. D-32, Section D.4.3.1, full paragraphs 1, 2, 3, and 4, Table D-16, and Figure D-11:	
EV-42	(a) Collection of data at Cypress Bridge (flow) and at the mouth of Steel Creek (Cs-137/l) appear to obviate calculation of Cs-137 transport because nothing is known about flow rates in Pen Branch which joins Steel Creek between its mouth and Cypress Bridge. In the presented analysis, Pen Branch is assumed to flow at a constant 12.7 m^3/sec (greater than ten times the flow in Steel Creek). In late winter-early spring, there is heavy rainfall in the piedmont-coastal plain of South Carolina resulting in large fluctuations of creek flows. It is not surprising that there is no significant correlation between the Cs-137 transport (mCi/day) and flow (m^3/day) since fluctuating dilution by Pen Branch cannot be factored out of the variation between transport and flow in Table D-16 and Figure D-11.	K-Area discharges cooling water to Pen Branch at a rate of about 11 m^3/sec during operation of the reactor, and at about about 2.5 m^3/sec when the reactor is not operating. These discharges dominate any natural flow that may be present in Pen Branch (estimated to be 1.7 m^3/sec). The flow from K-Area is relatively constant (12.7 m^3/sec) most of the year and combines with Steel Creek flow in the swamp below the Steel Creek delta (see Figure D-1). Pen Branch is not expected to contribute to the remobilization of cesium-137 in the Steel Creek system.
EV-43	(b) How is similarity between March 21-28, 1982 and resumed L-Reactor operation shown in Figure D-11 and Table D-16? Flow during March 21-28, 1982 is not significantly different ($p = 0.05$) from the previous 8-day perod (March 13-20, 1982).	The flow during the period of March 21-28, 1982, is not significantly different from the that of the previous week. The concentration of Cs-137 is relatively constant (within counting error) over the period shown in Table D-16. However, the March 21-28, 1982, data resulted in a higher estimate of Cs-137 transport which was used in the final estimation.
EV-44	(c) The third and fourth full paragraphs on P. D-32 are not supportable in light of comments 31a and 31b above. Also, present the hydraulic model of Steel Creek that demonstrates that flow rate and rate of erosion are linearly related as purported in the calculation of Cs-137 transport in the fourth full paragraph on P. D-32.	There is no data to date on suspended solids concentration in onsite streams to indicate other than a simple linear hypothesis would be applicable. The lower part of the streams are a depositing rather than an eroding environment (Ruby et al., 1981). The cesium-137 released to Steel Creek was transported and deposited under flow conditions that are expected to be similar to those when L-Reactor operation isresumed, about 11 cubic meters per second. Steel Creek has received thermal discharges up to 22 cubic meters per second (1961-1963) and thermal discharges of about 11 cubic meters persecond until L-Reactor was placed in standby status in 1968 (Section 3.4.1.2).

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	31. P. D-36, Table D-17, Footnotes a and b:	
EV-45	Provide all reduction factors and flow rates in one table. I could not find values for flow at (1) Steel Creek mouth, and (2) Savannah River at 1.5 river miles below Steel Creek. Also, I could not determine factor relating current inventory transported values between Steel Creek mouth and Savannah River at 1.5 miles below Steel Creek.	As noted in Section 3.4, the flow in Steel Creek at Cypress Bridge is about 1.5 cubic meters per second. The direct discharge of L-Reactor cooling water to Steel Creek will increase this flow by about 11 cubic meters per second (Section 4.1.1.2). Thus, the total flow across the delta (with L-Reactor up) will be about 12.5 cubic meters per second. Contributors of flow from the swamp and Pen Branch enter Steel Creek below the delta and are not expected to contribute to the remobilization of cesium-137 and cobalt-60 in the Steel Creek system. The physiography of the Savannah River 1.5 river miles downstream from the creek mouth greatly promotes mixing of the river water (Section 4.1.1.4). The decrease in concentration of cesium-137 between the mouth of Steel Creek and the Savannah River, 1.5 river miles downstream from the mouth, is based on changes in the flow regime in Steel Creek (3.95×10^{11} liters per year) and that of the river (9.31×10^{12} liters per year). Between SRP and the Highway 301 bridge, the flow of the Savannah River increases on the average by at least 6 percent. The decrease in cesium-317 concentrations in the Savannah River between the Highway 301 and 17 bridges is based on the DEIS Table D-14 (Hayes and Boni, 1983; DPST-82-1077).
	32. Appendix D and Figure D-9: Comment on the relative error of impact estimates and probable direction of the error.	
EV-46	Where error estimates were presented for data in the data chain culminating in impact estimates, relative error was calculated as the standard deviation divided by its mean; this statistic is the coefficient of variation. For seven sets of data in the impact estimate data chain, the average unweighted coefficient of variation was 36.3%. Assuming that impact estimates are from a normally distributed population, the 95% confidence interval (±) about any specific estimate of impact would be plus or minus 60% of the value ascribed to the impact estimate. For example, if an impact estimate equaled 10, the 95% confidence interval (±) would be from 4 to 16. That is, one can expect, by chance, that the estimate of impact will be a value less than 4 or	Inventory estimates for cesium-317 and cobalt-60 remaining in Steel Creek and the offsite Creek Plantation swamp are presented in Section D.3. This information is used in the environmental characterization provided in Section 3.7.2. The transport calculations were made independently of the inventory estimates. The magnitude of the inventory did not enter in the transport calculations.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	greater than 16 five times out of one-hundred. In the portion of the L-Reactor radiological impact estimate presented in Appendix D, the direction of the impact estimate error will probably be to the plus side. This judgment is based on the fact that 55 of the 198 curies of Cs-137 (28%) located in the Savannah River watershed below L-Reactor cannot be accounted for so that estimates of curies of Cs-137 located in areas of the watershed are most probably biased low. If more than 198 curies could be accounted for, the judgment would be that the estimates were biased high. In conclusion, whatever the impact estimate (e.g., Cs-137 concentration of Cs-137 inventory), the actual value is probably greater than the estimated value.	
	33. PP. D-27 through D-37, Section D.4: Comment on Section D-4 "Remobilization of Radiocesium and Radiocobalt" wherein an alternative model is presented.	
EV-47	Critical parameters of the model in Section D.4 are (1) radionuclide desorption by hot water from sediments and (2) radionuclide-in-sediments movement by erosion-transport by dramatically increased water flow in Steel Creek. Parameter estimates presented in Section D.4.4 were demonstrated to be based on insufficient data (Comments 27 and 28 [desorption] and Comment 31 [erosion-transport]) and are therefore questionable. There are no additional data presented from which alternative parameter estimates can be made, so a logical model is the sole basis from which radionuclide-sediment remobilization may be estimated. It is given that hot water and higher flow are expected to remobilize radiocesium and radiocobalt in Steel Creek and move them into the Savannah River. It is intuitive that remobilization in the first year will be greater than 0% but less than 100% of the	To support an estimate of 29 Ci discharged to the Savannah River the first year of L-Reactor operation would require the transport of large amounts of sediment. Greater than 95 percent of the Cs-137 in the Steel Creek system is located in the sediments in floodplain. The average concentration of Cs-137 in these sediments is estimated to be less than 125 pCi/g in the upper 10 cm of sediment. The amount of sediment containing this Cs-137 concentration would be greater than ($57.9 \text{ Ci} \times 1 \times 10^{12} \text{ pCi/g} / 125 \text{ pCi/g}$) 4.6×10^{11} g. If 29 curies of Cs-137 were to be remobilized during the first year after restart, greater than 2.2×10^{11} g would have to be moved at suspended sediment levels of more than 550 mg/l across Steel Creek delta. These suspended sediments would have to be sustained for a year. Suspended sediment concentration data do not support a sustained suspended solids concentration of 550 mg/l or short duration suspended loads of higher magnitude in South Carolina Coastal Plain streams.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	radionuclide inventories in Steel Creek sediments. *The least biased estimate of radionuclide remobilization* in the first year is the midpoint of the range of possibilities, in this case 50%. Remobilization in subsequent years can be shown by the same argument to again be 50% of what remains. That is, 29 curies of Cs-137 (50% of the 57.9 curies in Steel Creek sediments) are remobilized in the first year of L-Reactor reoperation, leaving 29 curies still in Steel Creek sediments. In the second year, 14.5 curies of Cs-137 (50% of the remaining 29 curies) are remobilized leaving 14.5 curies. Each subsequent year, 50% of radiocesium (and radiocobalt) are transported from Steel Creek to the Savannah River. Assuming that Cs-137 in vegetation (0.4 curie [Section D.4.2.1) is transported to the Savannah River in the first year (as assumed in Section D.4.2) the total first year input would be 29.4 curies of Cs-137. The second year input would be 14.5 curies and in the tenth year only 0.1 curie would be transported from Steel Creek to the Savannah River; cumulative Cs-137 transport (including Cs-137 in vegetation in the first year) will have been 58.2 curies. Impacts on finished water at Beaufort-Jasper and Cherokee Hill are greater due not only to an alternative model but also to reestimation of reduction factors between Highway 301 and the two-water treatment facilities (refer to comment 22b). Reestimated reduction factors for *Beaufort-Jasper and Cherokee Hill* are 18% and 30% respectively. Impacts to water quality (natural and finished water) due to the alternative model and reestimation of reduction factors associated with water treatment facilities are provided in a revised Table D-17 from the DEIS. Table format and assumptions in footnotes are unchanged; only Cs-137 inventories and concentrations are different. The resulting impacts in the first year of L-Reactor reoperation to finished water at Beaufort-Jasper and Cherokee Hill are 203 and 36 times greater under this analysis than under the analysis presented in the DEIS for L-Reactor.	Appendix D has been updated to include results of radiocesium *monitoring in Steel Creek during the 18 week period from April* through August, 1983. Thse results support the sediment-water transport estimate of 2.3 $\pm$ 1.8 curies per year during the first two years; they do not support the contention that transport should be 29 ci during the first year.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	What are resulting doses to humans from revised water quality impacts presented above and in Comment 18.	
EV-48	To summarize, analysis of data employed in the draft Environmental Impact Statement for L-Reactor (SRP) (Sect. D-4) to estimate parameters demonstrates that (1) data are insufficient to support parameter calculations, or (2) alternative calculations resulting in much higher impact estimates are as defensible as impact estimates presented in the DEIS. As a result, I have no confidence in DEIS conclusions concerning movement of radionuclides now in Steel Creek into the Savannah River. Apparently data do not exist from which radionuclide movement can be estimated. In the absence of such information with which impacts to human health can be estimated, cooling water from L-Reactor should not be discharged into Steel Creek.	Appendix D contains a thorough characterization of cesium-137 and cobalt-60 in the affected environment. The appendix also provides a rational approach for calculating the transport of cesium-137 and cobalt-60 from Steel Creek, in the Savannah River and to downstream water users. These transport estimates are independent of the inventories in Steel Creek. Remobilization and transport from Steel Creek are calculated from a data base developed from (1) cooling-water flow tests of the L-Area equipment at ambient water temperatures and discharges from L-Reactor outfall at rates up to 56 percent of the anticipated discharge when L-Reactor is operating; (2) laboratory desorption test; (3) transport during a hot-water diversion from P-Reactor at discharges up to 20 percent of the anticipated L-Reactor discharge; and (4) conservative estimates of Cs-137 transport in vegetation expected to be killed by the L-Reactor cooling-water flow. Transport calculations in the Savannah River and water-treatment plants are based on synchronous measurements at several river locations and of the finished water from the treatment plants. The approach used by the commentor to estimate a transport of 29 curies of cesium-137 during the first year has been shown to be invalid on the basis of suspended solid transport considerations.

Comment number	Comments	Responses

Revised Table 4-15. Alternative Model (Comments 32 and 33)

Estimates of cesium-137 remobilization from Steel Creek compared with current transport values[a]

Location	River Mile	Inventory transported (Ci/yr)				Concentration in water (pCi/l)			
		Current values	After restart 1st year	After restart 2nd year	After restart 10th year	Current values	After restart 1st year	After restart 2nd year	After restart 10th year
Steel Creek mouth	141.6	0.2[illegible]	29.0	14.5	0.1	5.3	73.6	36.8	0.03
Savannah River at 1.5 river miles below Steel Creek	140.1	0.41[b]	29.0	14.5	0.1	0.04[b]	3.10	1.55	<0.01
Hwy. 301 bridge	118.7	0.39[b]	28.3	14.2	0.1	0.04[b]	2.90	1.45	<0.01
Hwy. 17 bridge	21.4	0.20[b]	14.8	7.4	0.1	0.02[b]	1.52	0.76	<0.01
WATER-TREATMENT PLANTS									
Finished water									
Beaufort-Jasper	39.2	--	--	--	--	0.028	2.03	1.02	<0.01
Cherokee Hill	29.0	--	--	--	--	0.033	2.93	1.20	<0.01
EPA interim primary drinking-water standard	--	--	--	--	--	200	200	200	200

[a]Based on mean transportation estimates made by Hayes (1983) and Hayes and Watts (1983) and data presented in Table D-14, and average flow rates in the Savannah River at locations indicated. Estimates of concentration *and transport for the first, second, and tenth years represent only the contribution resulting from the remobilization* of cesium-137 and cobalt-60 in Steel Creek by the resumed operation of L-Reactor. No alteration of existing water-treatment-plant systems were assumed.

[b]1979-1982 average concentration measured at the Hwy. 301 bridge was 0.04 picocurie per liter; other values derived using appropriate flow rates and reduction factors.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF LEGAL ENVIRONMENTAL ASSISTANCE FOUNDATION (LEAF) 1102 Healey Building, 57 Forsyth St., Atlanta, GA 30303 (404/688-3299) November 14, 1983 The Legal Environmental Assistance Foundation (LEAF) appreciates this opportunity to comment on the Draft Environmental Impact Statement of the proposed restart of the L-Reactor at the Savannah River Plant. NEED	
EW-1	The most glaring error of the DEIS is its failure to convincingly state the need for a vast and immediate increase in nuclear weapons materials production, particularly in light of the U.S. public's overwhelming endorsement of the nuclear weapons freeze movement.[1] DOE provides us with no evidence that the partial production option combining accelerated use of the Mark-15 at the SRP reactors and production of less-than-6-percent plutonium at the N-Reactor will not adequately meet U.S. nuclear weapons material needs. Nowhere do we find evidence that U.S. national security will be threatened by the delay of the L-Reactor operation until such crucial mitigations as cooling towers and reactor domes can be constructed.[2] Thus, DOE has failed to show the need for the resumption of L-Reactor in January 1984.	The approval of the Nuclear Weapons Stockpile Memoranda by the President and the subsequent authorization and appropriation of funds by the Congress constitute the DOE mandate to produce specific types and quantities of nuclear materials and weapons. The national policy on the deployment of nuclear weapons and the increased need for weapons is beyond the scope of this EIS. Section 2.1.2.4 of this Final EIS has been modified to state that none of these options or combinations of options can provide the needed defense nuclear materials required, nor can they fully compensate for the loss of the material that could be produced by L-Reactor. Also see the response to comment AB-2. National security concerns and the policy on nuclear weapons deployment is beyond the scope of this EIS.
	GROUNDWATER CONTAMINATION	
EW-2	The DEIS inadequately addresses the nature and extent of groundwater contamination which would result from increased affluent and waste discharges.	The EIS provides extensive discussions on the ground-water regime at SRP (Section 3.4.2 and Appendix F) and of potential impacts to the ground waters beneath the SRP from operation of L-Reactor and its support facilities (Sections 4.1.1.3, 4.1.2.2, 4.4.3, 5.1.1.2, and 5.1.1.4). Also see the responses to comment AJ-1, DA-2, and DA-4 regarding ground water.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EW-3	The DEIS concedes that contamination of the superficial Barnwell aquifer has occurred from seepage basins at M-Area. This contamination would be exacerbated by the use of seepage basins for L-Reactor waste water. The DEIS then assumes that no contamination will occur in the lower aquifers because of the impermeable clay layers that separate the aquifers. An assumption is not adequate; the FEIS must consider data from monitoring wells in these aquifers. The State of South Carolina has already documented groundwater contamination of the Tuscaloosa which is the lowest lying aquifer. The DEIS must address these findings and provide its own data on this problem. The seepage basin method is no longer considered to offer adequate groundwater protection and such a method may violate RCRA requirements. Detritiation is being considered for implementation at the entire SRP and should therefore be implemented as part of the restart of the L-Reactor.	Information on ground-water contamination in M-Area is provided in Sections 5.1.1.2, 5.1.1.4, and F.5.4 of the EIS. Alternatives to the use of seepage basins are discussed in Section 4.4.3. Use of other seepage basins on SRP is being evaluated on a sitewide basis (Section F.6). Also see the responses to comments DA-2 and DA-4 regarding ground water. Documentation concerning groundwater contamination at SRP was compiled by DOE and Du Pont and promptly reported to the State and EPA. The detection of chlorinated hydrocarbons in two Tuscaloosa producing wells was publicly announced by DOE on April 8, 1983.
EW-4	The impact of additional groundwater withdrawals is also inadequately addressed. The DEIS data relies on current use; the impact of additional withdrawals on aquifer pressure must be considered. Any excessive withdrawal from an aquifer can result in head reversal allowing contamination of a lower lying aquifer from a more superficial one. The impact of withdrawals for increased population and anticipated increased irrigation use must be discussed. This is especially important because the area surrounding the SRP is not in a capacity use area, therefore not subject to state control of new or additional groundwater withdrawals.	The impacts associated with additional ground-water withdrawal from the operation L-Reactor and its support facilities are discussed in Sections 4.1.1.3, 5.1.1.2, and 5.1.1.4. Also see the responses to comments AW-1 and BT-7 regarding additional ground-water withdrawal.
	AIR QUALITY	
EW-5	The DEIS inadequately discusses the impact on air quality of the use of a coal-fired generator for the L-Reactor. The DEIS notes a 15% increase in emissions and states that no violations will occur, but there is no information as to whether or not the SRP is in a non-attainment area or one subject to prevention of significant deterioration. Even assuming it is an attainment area, the DEIS must address the increment that these emissions will use.	The impact on air quality of the use of a coal-fired generator for the L-Reactor is discussed in Sections 4.1.1.6, and 5.1.1.3 of the EIS. The operation of the L-Reactor will not violate any ambient air quality standards. As noted in Chapter 7, the authority for the regulation of air emissions has been delegated by EPA to SCDHEC. SCDHEC issues operating permits and performs PSD reviews. As stated in Section 7.7 of the EIS, since all L-Reactor support facilities for steam supply and electric power generation will comply with existing permits, no new SCDHEC operating permits will be required. SRP is in an attainment area.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	ENDANGERED AND THREATENED SPECIES	
	The startup of the L-Reactor would also have potentially adverse effects on the area's endangered and threatened species.	
	Most of these adverse effects are traceable to 1) the thermal discharges released into the Steel Creek area[3] and 2) the increased water levels brought about by the release of cold water into the area, which is mentioned in the Environmental Assessment as being standard operating procedure for the reactor while it is on standby status. (The Environmental Assessment referred to here and in the draft EIS is the original assessment. A more current assessment is due around the first of December, and it is imperative that the questions presented herein be addressed in that assessment.)	
	Of primary concern are the wood storks from the Birdsville Rookery in Millen, Georgia, which use the Steel Creek area as a feeding ground. Several questions regarding the effect of the reactor on this wood stork colony have been left unanswered in both the draft EIS and the Environmental Assessment. Among these questions which must be addressed are:	
EW-6	1) How important a feeding ground is this particular area? If it is vitally important (for instance, if the storks travel longer distances to the SRP site than they do to alternative feeding grounds), it may be a critical habitat for the birds which are currently on the federal list of threatened species and under consideration for endangered status under the Endangered Species Act of 1973.	See the responses to comments AD-1 and AD-4 regarding the wood stork.
EW-7	2) Are there other areas which could serve as reasonable alternative feeding sites? (These areas must be available on a long-term basis, as opposed to being small temporary wetlands which would dry up after a short time.)	Other foraging sites on the SRP include those of Beaver Dam Creek, Four Mile Creek, and portions of the Savannah River Swamp.
EW-8	3) What is the average number of wood storks seen feeding at the SRP site in comparison to the number seen at off-plant sites? A significant difference could be another indication of the value of the SRP site to the local wood stork population.	See the responses to comments AD-1 and AD-2 regarding use of SRP and off-plant sites.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EW-9	4) How would the startup of the L-Reactor affect the fish population in the area, and thus the stork's attraction to Steel Creek? It is pointed out in the Patterson Associates report (commissioned by the Beaufort/Jasper Water Authority) that fish eggs and fish larvae cannot survive temperatures higher than 80 degrees Centigrade. A diminution in the fish population in the area would make it less attractive not only for the storks, but for a number of other birds and mammals, as well as the endangered American alligator, that feed in the area.	The restart of the L-Reactor with direct discharge would eliminate foraging habitat of the wood stork because water temperatures would be too high to support fish, the major food. This impact, including those to other species such as the American alligator, reptiles, birds, and mammals, is discussed in Section 4.1.1.4 of the EIS.
EW-10	5) What is the number of wood storks using SRP wetlands on any single day, and how does that compare to the number using other off-plant sites? The draft EIS (page C-38) shows 147 individuals using SRP wetlands on July 14. This is over 60 percent of the entire population of breeding adults.	The number of wood storks that were observed on the SRP in 1982 and 1983 is presented in Table C-7, Appendix C of the EIS.
EW-11	6) Are there other areas which could serve as reasonable alternative feeding sites? (These areas must be available on a long-term basis, as opposesd to being small temporary wetlands which would dry up in a short time.)	See the response to comment EW-7.
EW-12	7) What is the fledgling success rate of this colony in contrast to published fledgling rates for Florida populations? If the Birdsville colony is able to produce young at a higher than normal rate, then recognizing that this is an endangered - or nearly endangered species - it should not be disturbed nor should its food base be disrupted.	See the response to comment AD-9 regarding fledgling success rate.
EW-13	8) What are the predicted land use patterns and their effects on the non-SRP sites? Most of the non-SRP areas used by the Birdsville colony are probably on private lands. These sites may be in danger of conversion into agricultural lands over the next decade or so. The SRP wetlands, on the other hand, are part of the buffer area around the reactors and should be unaffected by changing land use patterns.	See the response to comment AD-10 regarding predicted land-use patterns and their effect.
EW-14	9) Why were there no wood storks recorded using the Steel Creek area after July 12? Had the colony dispersed or were the cold water releases (as mentioned in the Environmental Assessment as being standard) responsible for the storks' absence? If raised water levels were created artificially this suggests a strong bias in the data in terms of the actual amount of	See the response to comment AD-11 regarding observations of wood storks after July 12th.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	usage that Steel Creek might have received without the raised water levels. If this is so, why weren't the fluctuating water levels mentioned in the DEIS as a possible source of bias in the data?[4]	
EW-15	10) On page 3-52 of the DEIS it says that the SRP wetlands appear to be important post breeding feeding habitat. Table C-7 shows heavy usage of SRP wetlands during June and July. Page C-37 states that birds were nesting in July 1980. On what data were the "post breeding" conclusions drawn?	See the response to comment AD-12 regarding "post breeding" habitat.
EW-16	11) Is it possible that the observed number of wood storks seen using the SRP wetlands in 1983 is a minimum number, due to variation in the timing of surveys? For instance, if a feeding site is surveyed early in the morning it may show fewer birds than a similar survey conducted in the early afternoon after thermals[5] have had a chance to develop.	Based on surveys from 23 June to 31 August 1983, a total of 238 breeding adults was counted at the Birdsville rookery. Surveys on the SRP, which were conducted from as early as 9:01 a.m. to as late as 9:00 p.m., showed a maximum single observation of 147 individuals and a cumulative total of 478 observations. Also, see the response to comment AD-15 regarding the timing and methodology of the surveys.
EW-17	It is necessary to bear in mind that this colony of wood storks is the northernmost in the world, and for purposes of genetic diversity, it is therefore vitally important. Any adverse effect on this colony may cause irreparable damage to the entire species. Congress has recognized the importance of preservation of the world's genetic diversity as an important goal. Preservation of the diversity within species is also recognized as necessary. This is shown by the extension of the Endangered Species Act to cover subspecies and local populations. Besides mere genetic factors, protection of peripheral colonies of a rare species also helps to insure against the impact of a local catastrophe (such as hurricanes or prolonged drought). The effect of the reactor on the wood stork population would be considerably reduced if some provision could be made to reduce the amount of thermal effluents released into the wetlands and the Steel Creek area. The problem here is that, since 1980 when President Carter decided to increase the production of	See the responses to comments AD-16 and AD-17 concerning the Birdsville rookery. In addition, alternative cooling systems are addressed in Section 4.4.2 of the EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	nuclear materials, there has been an apparent presumption that the L-Reactor could be restarted without any control of the thermal discharge. This presumption was apparently based on the prior operation of the plant and did not account for pollution laws enacted subsequent to the reactor being placed on standby status in 1968. Since then, the area has recovered to a great extent. The proposed startup, with no provisions for treatment of the thermal discharges, would reverse the recovery.	
	OFF-SITE TRANSPORTATION	
EW-18	The DEIS notes that the startup of the L-Reactor will increase both on-site and off-site transportation of radioactive materials. Although these shipments are subject to DOT shipping regulations, they are not subject to the NRC pre-notification requirements. The fact that increased amounts of radioactive materials will move through numerous states with no notification to the respective state governments should be addressed in the FEIS.	See the response to comment AY-10 regarding transportation of radioactive materials.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	FOOTNOTES	
	1. In May 1983, 278 members of the U.S. House of Representatives and 40 members of the U.S. Senate voted in support of HJRes 13 and SJRes 2, respectively, the Nuclear Freeze Resolutions, calling for a bilateral nuclear freeze between the Soviet Union and the U.S. In September 1983, 77% of the U.S. public polled by Louis Harris and Associates said they would "favor Congress passing a resolution that would call upon the U.S. to negotiate a nuclear freeze agreement with the Soviet Union that would encourage both sides to ban the future production, storage and use of nuclear weapons."	
EW-19	2. While DOE maintains that a closed loop cooling system at the L-Reactor would cost $39 million and take more than three years to install, the Chicago consulting firm of Patterson Associates, Inc. estimates that such a system would cost 8 to 9 million dollars with an installation time of 10 to 16 months. 3. The DEIS inadequately addresses the impact of the startup of the L-Reactor on the biologic systems in the affected area. The DEIS asserts that 1,000 acres of wetlands will be affected by thermal discharges. This information is based on an early biological assessment which was based on insufficient data. An independent study by Patterson Associates, Inc., for the Beaufort/Jasper Water Authority found that in fact 28,000 acres of wetland would be affected. This divergence should be addressed in the FEIS. 4. Wood storks require areas with lowered water levels, where their prey (fish) have been concentrated. By adding water to Steel Creek, the water levels may be raised too high for the storks to forage successfully. 5. Wood storks, like other soaring birds, use thermals (columns of heated rising air) in order to easily travel long distances. Thermals do not normally develop until mid- to late-morning.	Responses to the Patterson Associates, Inc., report were submitted at the February 9, 1983, Senate Armed Services Committee hearing. With respect to the costs estimates of cooling towers, the Patterson Associates, Inc., report did not account for several significant cost elements and is thus in error. With respect to wetlands, the Patterson report erroneously included upland areas in the estimate of wetlands.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF BASIL G. SAVITSKY Basil George Savitsky Post Office Box 50228 Columbia, SC 29250 November 12, 1983 Mr. M. J. Sires Assistant Manager for Health, Safety and Environment U.S. Department of Energy Savannah River Operations Office Post Office Box A Aiken, SC 29801 Dear Mr. Sires: I am a graduate student in the Department of Geography at the University of South Carolina. My area of interest is agricultural remote sensing, but I am concerned about all forms of resource management.	
EX-1	As a student of the earth sciences, I've been following with interest reports about the Savannah River Plant, particularly the draft EIS concerning the status of the L-Reactor. It appears to me that the EIS should take into account all possible consequences of an operational L-Reactor. One such consequence is the actual use of nuclear weapons, and the potential purpose of the L-Reactor in such an environmental catastrophe cannot be overlooked. Although it would be easy to pass the responsibility for such an action from the realm of science to the political and military decision-making process, I recommend that scientific knowledge available on the environmental effects of nuclear war not be excluded from the EIS. I have enclosed a summary of findings from the recent Conference on the Long-Term Worldwide Biological Consequences of Nuclear War. The large number of participants in the conference and the eminence of the scientists representing the	The national policy on nuclear weapons, their deployment, and the need for increased weapons is beyond the scope of this EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

physical and biological disciplines gives an extremely high level of validity to the findings of the conference.

Research was done on biological damage from various scales of nuclear war, so findings on the effects of a limited nuclear conflict could prove especially significant. Results of research on atmospheric dust content, lethal temperature changes, and the impact on the food supply represent new environmental hazards to those previously recognized such as radioactive fallout and fire. I strongly urge that the Proceedings from the conference be obtained, since they represent years of research on the environmental impact of the catastrophic use of what the L-Reactor would produce. And I would submit these summarized findings as enclosed for the record.

Sincerely,

Basil G. Savitsky

Enclosure

Comment number	Comments	Responses

THE WORLD AFTER NUCLEAR WAR
CONFERENCE ON THE LONG-TERM
WORLDWIDE BIOLOGICAL CONSEQUENCES
OF NUCLEAR WAR
OCTOBER 31-NOVEMBER 1, 1983

Summary of Conference Findings

CONFERENCE FINDINGS INDICATE STARTLING
CHANGES IN EARTH'S CLIMATE AFTER NUCLEAR WAR
COULD HAVE DEVASTATING IMPACT ON SURVIVORS

Embargoed until Midnight October 30, 1983.

INTRODUCTION

The world's nuclear arsenal today stands at over 12,000 megatons (MT), enough to destroy one million Hiroshimas. Recent studies estimate that anywhere from 300 million to 1 billion people would be killed outright in a large-scale nuclear war (5,000-10,000 MT yield) and an equal number would suffer serious injuries requiring immediate medical attention--which would be largely unavailable. But what of the longer-term effects of nuclear war? What kind of world would survivors face? New evidence suggests that the lingering atmospheric and biological consequences may be even more serious than the immediate ones.

These findings will be presented at the Conference on the Long-Term Worldwide Biological Consequences of Nuclear War being held in Washington, D.C. October 31 - November 1, 1983.

The findings are largely the result of studies done over the last two years by Richard P. Turco; Owen B. Toon, Thomas P. Ackerman and James B. Pollack, of NASA Ames Research Center; and Carl Sagan, of Cornell University, on the optical and climatic impacts of the dust and smoke particles which would be generated in nuclear war. Their work has been critically reviewed by some 100 eminent physicists, atmospheric scientists and biologists from the U.S. and other countries who participated in a series of meetings held earlier this year in Cambridge, Massachusetts.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

The atmospheric findings, which augment earlier studies and introduce previously unforeseen consequences of nuclear war, have been reported in a paper entitled "Global Atmospheric Consequences of Nuclear War" (referred to as the "TTAPS" paper, after the names of its authors). The authors conclude that a nuclear war, even at the level of 100-1,000 MT could cause profound climatic and meteorological disturbances, including darkness and extreme cold, and that exposure to radioactivity would be much greater than previously projected.

Some 40 biologists reviewed the atmospheric findings, determined the biological consequences and also considered other potential ecological effects not caused by atmospheric changes. Their conclusions are outlined in a separate paper entitled "The Long-Term Biological Consequences of Nuclear War."* Their unanimous view is that the atmospheric stresses resulting from nuclear war could so disrupt the earth's biological support systems that the extinction of a significant proportion of the earth's animals and plants would occur. They conclude that the possibility of human extinction cannot be excluded.

At the Conference, Dr. Sagan will present the atmospheric and climatic consequences and Dr. Paul R. Ehrlich of Stanford University will present the biological consequences. The Conference begins at 2 P.M., Monday, October 31, in the Cotillion Ballroom of the Sheraton Washington Hotel.

METHODOLOGY

To study the optical and climatic effects of dust and smoke clouds generated in a nuclear war, the physicists ran computer models of dozens of different nuclear war scenarios. They adopted as a baseline case a 5,000 MT exchange with 20% of the explosive power (yield) expended on urban or industrial targets in the Northern Hemisphere. Given current arsenals, this is a realistic possibility for a full-scale war. Other cases studied ranged in total yield from 100 to over 10,000 MT.

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*See Appendix 1 for names of the principal authors.

Comment number	Comments	Responses

In each case, the scientists calculated:

1. How much dust and smoke was generated;
2. How much sunlight was absorbed by the dust and smoke;
3. How much the temperature changed;
4. How the dust and smoke spread, and how long before it all fell back to the surface;
5. The extent of radioactive fallout over time;
6. How much ultraviolet light reached the surface after the soot and dust fell out.

The following conclusions reflect aggregate data from the baseline scenario in the original TTAPS paper and from the paper on "The Long-Term Biological Consequences of Nuclear War." They have been substantially edited. Complete scientific and technical support data will be provided at the Conference.

CONCLUSIONS

1. Unbroken Pall of Darkness Would Cover Northern Hemisphere

Within a week after the war, the amount of sunlight at ground level could be reduced to just a few percent of normal; an unbroken gloom could persist for weeks over the Northern Hemisphere. The light would be absorbed primarily by sooty smoke from nuclear fires ignited by surface bursts and airbursts. The total amount of smoke released in the baseline model is 225 million tons (released over several days). Smoke particles are extremely small, which lengthens the time they remain in the atmosphere. The soil dust raised by surface bursts, while important, would have less climatic impact since it is typically poorly absorbing.

- o Low light level would disrupt photosynthesis, food chain.

In the early months following a substantial nuclear exchange, the amount of light filtering through the cloud cover might not be adequate to sustain photosynthesis. Even assuming that plants would be otherwise undamaged, which is unrealistic, the lack of light would severely limit growth, and the consequences would cascade through all food chains.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	2. Effects on Southern Hemisphere Greater Than Previously Assumed Large disturbances in global circulation patterns could greatly accelerate the interhemispheric transport of smoke, dust and radioactivity. Rapid interhemispheric mixing means that the Southern Hemisphere could be subjected to massive injections of nuclear debris soon after an exchange in the Northern Hemisphere. Possible rapid transport of dust and smoke from the Northern to the Southern Hemisphere may involve the entire planet in after-effects. Previous studies have assumed that Southern Hemisphere effects would be minor. 3. Harsh "Nuclear Winter" Would Prevail Contrary to the conclusions reached in most earlier studies, nuclear war probably would have a major impact on climate lasting for several years. It would be manifested by a dramatic drop in land temperatures to subfreezing levels for several months, large disturbances in global circulation patterns, and dramatic changes in local weather and precipitation. Even if *the war were to occur in the summer, many areas might be subject* to continuous snowfall for months. o Subfreezing temperatures would substantially reduce chances for human survival. Except for areas near coastlines, land temperatures would plunge from -15°C(+5°F) to -25°C(-13°F), with dire consequences for survivors. The impact of dramatically reduced temperatures on plants would depend on the time of year at which they occurred, their duration, and the tolerance limits of the plants. The abrupt onset of cold is of particular importance, though, since plants that normally can withstand subfreezing temperatures would have no time to develop tolerance. A spring or summer war could kill or damage virtually all crops in the Northern Hemisphere. Most uncultivated food sources also would be destroyed, as would most farm animals. Many animals that survived would die of thirst, as surface fresh water would be frozen over *the interior of continents. Available food supplies would*	

Comment number	Comments	Responses

be rapidly depleted. Most of the human survivors would starve.

o Non-target areas that import food directly affected.

Nations that now require large imports of foods, including those untouched by nuclear detonations, would suffer the immediate cessation of incoming food supplies. These countries would be forced to rely on their local agricultural and natural ecosystems. This would be especially serious for many less-developed countries, particularly those in the tropics.

4. Exposure to Radioactive Fallout Worse than Expected

Exposure to radioactive fallout would be more widespread than is predicted by standard empirical exposure models because of the intermediate fallout which would extend over many days and weeks. With unprecedented quantities of fission debris released into the atmosphere, even areas remote from the explosion sites would be subject to large doses of fallout radiation.

o Radiation doses approach lethal dose for humans.

In the baseline case, roughly 30 percent of the land at Northern mid-latitudes (30°N to 60°N) would receive a radioctive dose greater than 250 rads over several months. About 50 percent of the Northern mid-latitudes would receive a long-term dose greater than 100 rads. (This dose includes radionuclides ingested from contaminated food.) These doses are roughly ten times larger than previous estimates. A 100 rad dose is the equivalent of approximately 1,000 medical x-rays. A 400 rad whole-body acute dose is usually considered lethal. Doses this large can affect the immune system and increase the probability of infectious disease, cancer and genetic and embryonic defects.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	5. No Ice Age, but the Ocean Would Not Provide Relief Because the climatic effects would not last longer than a few years, an Ice Age would probably not be generated. Subfreezing temperatures will freeze most freshwater systems to considerable depth, leaving survivors without surface water. The oceans will not freeze due to their enormous reservoir of heat. It has often been thought that the coastal areas would be a major source of food for survivors of a nuclear war. However, the combined effects of darkness, ultraviolet light, severe coastal storms due to enormous land-sea temperature differentials, run-off of silt and toxic chemicals from the land, destruction of ships and concentrations of radionuclides in fish and other marine life cast strong doubt on this contention. 6. Fire Would be a Major Problem With Serious and Unanticipated Consequences About one-sixth of the world's urbanized land area, or about 240,000 km^2 would be partially burned by about 1,000 MT of explosions in the baseline scenario. The remaining 4,000 MT of yield could ignite wildfires and firestorms. Uncontrolled fires could sweep over large areas. For example, multiple airbursts over California in the late summer or early fall could burn off much of the state, leading to catastrophic flooding and erosion during the next rainy season. o Urban fires would generate large amounts of deadly toxins. Cities hold large stores of combustible, synthetic materials that would release large quantities of toxic gases (pyrotoxins) as they burn, including carbon monoxide, cyanides, dioxins and furans. These pollutants might have only limited immediate effect on vegetation, but they would certainly hinder the recovery of vegetation devastated by nuclear blast and fire. Transport by winds to distant, initially unaffected ecosystems could be an important additional adverse side effect. This problem had not been addressed in previous studies.	

Comment number	Comments	Responses

7. Ozone Depletion Would Increase Exposure to Ultraviolet Light (UV-B)

High-yield explosions would inject nitrogen oxides (NO_x) into the stratosphere, which would result in large reductions in the ozone layer. The ozone layer, only 3 millimeters thick if it were brought down to sea level, shields the earth from UV-B, a damaging type of radiation. In the baseline case, dust and soot would absorb the increased UV-B at first. But when the dust and soot cleared a few months later, UV-B doses roughly 1.6 times normal would be transmitted to the surface.

Increased levels of UV-B can harm biological systems in several ways. The immune systems of humans and other mammals are known to be suppressed by relatively low doses of UV-B. Given the conditions of increased radioactive fallout and other stresses, such suppression of the immune systems leads to an increase in the incidence of disease. Protracted exposure to increased UV-B also may lead to widespread blindness among humans and other mammals.

8. Tropical Forests Could Disappear

Tropical plants are less able to cope with even short periods of cold and dark than those in temperate zones. If darkness or cold, or both, were to become widespread in the tropics, the tropical forests, which are the major reservoir of organic diversity, could largely disappear. This would, in turn, lead to the extinction of a majority of the species of plants and animals on earth.

- o Dependence on imports threatens survivability in tropical and developing countries

The dependence of urban populations in many tropical and developing countries on imported food would lead to severe effects, even if those areas were not affected directly by the war. Large numbers of people would be forced to leave the cities and attempt to cultivate the remaining areas of forest, accelerating their destruction and the consequent rate of extinction. Regardless of the exact distribution

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	of the immediate effects of the war, everyone on Earth would ultimately be profoundly affected.	
	9. Even Small Nuclear Exchanges Could Trigger Severe After-effects	
	Relatively large climatic effects can result from small nuclear exchanges (100 to 1,000 MT). A scenario involving 100 MT exploded in the air over cities could produce a two-month interval of subfreezing land temperatures, with a minimum near -23°C. In this scenario thousands of fires would be ignited and the smoke from these fires alone would generate a period of cold and dark almost as severe as in the baseline (5,000 MT) case.	
	IN SHORT:	
	In the aftermath of a 5,000 MT nuclear exchange, survivors would face extreme cold, water shortages, lack of food and fuel, heavy burdens of radiation and pollutants, diseases and severe psychological stress -- all in twilight or darkness.	
	It is clear that the ecosystems effects alone resulting from a large-scale thermonuclear war would be enough to destroy civilization as we know it at least in the Northern Hemisphere. These long-term effects, when combined with the direct casualties from the blast, suggest that eventually there might be no human survivors in the Northern Hemisphere. Human beings, other animals and plants in the Southern Hemisphere would also suffer profound consequences.	
	The scenario described here is by no means the most severe that could be imagined with present world nuclear arsenals and those contemplated for the near future.	
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Comment number	Comments	Responses

The World After Nuclear War
Conference on the Long-Term
Worldwide Biological Consequences
of Nuclear War
October 31-November 1, 1983

George M. Woodwell
Chairman

Carl Sagan
Physical Sciences

Peter H. Raven
Biological Sciences

Chaplin B. Barnes
Executive Director

Appendix 1

THE LONG-TERM BIOLOGICAL
CONSEQUENCES OF NUCLEAR WAR

This paper was prepared following a meeting of biologists on the Long-Term Worldwide Biological Consequences of Nuclear War (Cambridge, Massachusetts, 25-26 April 1983). The consensus of the 40 scientists at the meeting is presented here, assembled by the following committee.

Principal authors: Paul R. Ehrlich, Stanford University; Mark A. Harwell, Cornell University; Peter H. Raven, Missouri Botanical Garden; Carl Sagan, Cornell University.

Committee: Edward S. Ayensu, Smithsonian Institution; Joseph Berry, Carnegie Institute of Washington; Anne H. Ehrlich, Stanford University; Thomas Eisner, Cornell University; Stephen J. Gould, Harvard University; Herbert D. Grover, University of New Mexico; John Harte, University of California, Berkeley; Rafael Herrera, IVIC, Venezuela; Robert M. May, Princeton University; Ernst Mayr, Harvard University; Christopher P. McKay, NASA Ames Research Center; Harold A. Mooney, Stanford University; David

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Pimentel, Cornell University; John M. Teal, Woods Hole Oceanographic Institution; and George M. Woodwell, Marine Biological Laboratory, Woods Hole.	

Comment number	Comments	Responses

TABLE 1

TEMPERATURES AND LIGHT LEVELS FOLLOWING A 10,000 MEGATON NUCLEAR WAR IN THE NORTHERN HEMISPHERE
(Severe But Not Implausible Scenario)

NORTHERN HEMISPHERE CONTINENTAL SURFACE TEMPERATURES*

Predicted Value	Duration	Area Affected	Possible Range
-45°F (-43°C)	4 mo	Midlatitudes	-63 to -9°F
-9°F (-23°C)	9 mo	Hemisphere	-27 to +27°F
27°F (-3°C)	1 yr	Hemisphere	+9 to +45°F

SOUTHERN HEMISPHERE CONTINENTAL SURFACE TEMPERATURES*

Predicted Value	Duration	Area Affected	Possible Range
0°F (-18°C)	1 mo	Midlatitudes	-27 to +27°F
27°F (-3°C)	2 mo	Midlatitudes	-9 to +45°F
45°F (+7°C)	10 mo	Midlatitudes	+9 to +55°F

NORTHERN HEMISPHERE SUNLIGHT INTENSITY AS PROPORTION OF NORMAL

Predicted Value	Duration	Area Affected	Possible Range
.01	1.5 mo	Midlatitudes	.003 to .03
.05	3 mo	Midlatitudes	.01 to .15
.25	5 mo	Hemisphere	.1 to .7
.50	8 mo	Hemisphere	.3 to 1.0

SOUTHERN HEMISPHERE SUNLIGHT INTENSITY AS PROPORTION OF NORMAL

Predicted Value	Duration	Area Affected	Possible Range
.1	1 mo	Midlatitudes	.03 to .3
.5	2 mo	Tropics & Midlatitudes	.1 to .9
.8	4 mo	Hemisphere	.3 to 1.0

*Coastal areas warmer but very stormy

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

The World After Nuclear War
Conference on the Long-Term
Worldwide Biological Consequences
of Nuclear War
October 31-November 1, 1983

George M. Woodwell
Chairman

Carl Sagan
Physical Sciences

Peter H. Raven
Biological Sciences

Chaplin B. Barnes
Executive Director

PANEL PARTICIPANTS
November 1, 1983

Atmospheric and Climatic Effects Panel

Thomas F. Malone, Moderator (See Program)

Paul J. Crutzen

Dr. Crutzen is currently Director of the Max-Planck-Institute for Chemistry in Mainz, Federal Republic of Germany; he previously headed up the Institute's Atmospheric Chemistry Division. He also serves as Affiliate Professor at the Atmospheric Science Department, Colorado State University, Fort Collins. He was previously Senior Scientist and Director of the Air Quality Division of the National Center for Atmospheric Research, Boulder, Colorado. In 1977, while serving at the Environmental Research Laboratories of the National Oceanic and Atmospheric Administration in Boulder, he received the NOAA Special Achievement Award.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Georgiy S. Golitsyn Dr. Golitsyn is Senior Scientist at the Institute of Atmospheric Physics of the Academy of Sciences of the USSR in Moscow. He is an expert in large-scale climatic dynamics, in planetary atmospheres and in turbulence theory. Dr. Golitsyn is a Corresponding Member of the Academy of Sciences of the USSR and is a member of the Joint Scientific Committee for World Climate Research Programs of the International Council of Scientific Unions and the World Meteorological Organization. John P. Holdren Dr. Holdren is Professor of Energy and Resources and Acting Chairman of the Energy and Resources Group, University of California, Berkeley. He holds concurrent positions as Participating Guest in the Energy and Environment Division of the University's Lawrence Berkeley Laboratory, Faculty Consultant in the Magnetic Fusion Energy Division of the Lawrence Livermore National Laboratory, and Senior Investigator at the Rocky Mountain Biological Laboratory. He is Vice Chairman of the Federation of American Scientists and is currently Chairman of the U.S. Pugwash Group and a member of the Executive Committee of the International Pugwash Council. He is a Fellow of the American Academy of Arts and Sciences and serves as Vice Chairman of its Committee on International Security Studies. In 1981 he was awarded a five-year MacArthur Foundation Prize Fellowship for distinction in the fields of physics, energy and environment. Stephen H. Schneider Dr. Schneider is Deputy Director, Advanced Study Program, National Center for Atmospheric Research. At NCAR he also serves as Senior Scientist and Head of the Visitors Program. He has written and consulted extensively and has participated in numerous forums on issues of climatic change, food and energy.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	He is a Founding Member of the Council on Science and Technology for Development and is Editor of the Journal Climatic Change.	
	Richard P. Turco	
	Dr. Turco has been a Research Scientist in atmospheric chemistry and physics at R&D Associates, Marina del Rey, California since 1971. Dr. Turco has made research contributions in areas of atmospheric science related to: stratospheric ozone photochemistry, aerosol physics and chemistry, and the chemistry of planetary atmospheres. He has served as a member of several national workshops and has written extensively on topics concerned with air pollution of the upper atmosphere. He is currently a member of the National Research Council's Committee on the Atmospheric Effects of Nuclear Explosions.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

PANEL PARTICIPANTS
November 1, 1983

Biological Effects Panel

George M. Woodwell, Moderator (See Program)

Joseph A. Berry

Dr. Berry is a Staff Member, Department of Plant Biology, Carnegie Institution of Washington, Stanford, California, with which he has been affiliated since 1972. He also serves as Assistant Professor, Department of Biological Sciences, Stanford University. He holds degrees in Chemistry, Soil Science and Botany. His research interest is the physiological basis for plant-environment interaction.

Thomas Eisner

Dr. Eisner is Jacob Gould Shurman Professor of Biology at Cornell University, at which he has taught since 1957. He is an ardent naturalist, whose research deals with the behavior and ecology of insects, and with photographic and cinematographic documentation of little-known aspects of these animals. He has served as a director of Zero Population Growth, The Nature Conservancy, the National Audubon Society and The Federation of American Scientists and is currently a member of several committees of the American Association for the Advancement of Science. He is a Member of the National Academy of Sciences and a Fellow of the American Academy of Arts and Sciences.

John Harte

Dr. Harte is currently Professor of Energy and Resources, University of California, Berkeley, where he has taught since 1973. He also holds the position of Faculty Senior Scientist at the Lawrence Berkeley Laboratory. His research has ranged from theoretical elementary particle physics to environmental issues such as acid precipitation, water resource scarcity and toxic substance testing. He is the author of numerous papers

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	and is a member of and Principal Investigator at the Rocky Mountain Biological Laboratory. He has been a member of three National Academy panels concerned with problems of energy and environment. Mark A. Harwell Dr. Harwell is Research Associate, Ecosystems Research Center, and Assistant Professor, Natural Resources Department, Cornell University. He has initiated a number of activities related to the evaluation of the human and natural systems consequences of nuclear war, among them serving as a member of the Ecological Society of America's ad hoc committee on this topic.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF MAUREEN K. MURRAY Grade 8 Student of H.E. McCracken Middle School 13 Warbler Lane Hilton Head, SC 29928 Dear Mr. Sires:	
EY-1	I do not think that you should restart the L-Reactor because you and the DOE don't really know the risks and we, the people of the surrounding areas, do not want to be part of the death toll that makes up those statistics on risks. Most of us would like it very much if we could live our whole lives and go on living without the fear of a spill or explosion. I speak for everyone I know and for H.E. McCracken Middle School in South Carolina (about 74 miles away from the Savannah River Plant). The school did not make me write this. I went to one of your hearings and listened to both sides. In the beginning I was neutral, but later on as I heard more public speakers, I realized that the public was correct: The L-Reactor plant should stay closed. Sincerely, Maureen K. Murray Grade 8, Student of H.E. McCracken Middle School	The EIS contains thorough discussions of risks to the public health and safety and to the environment as a result of the restart of L-Reactor. Any exposure of the public to radiation resulting from L-Reactor operation would be minimal compared to exposure from natural or other manmade radiation sources. The risks due to possible reactor accidents are also small.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF DR. JUDITH E. GORDON November 14, 1983 SIERRA CLUB South Carolina Chapter To: Dept. of Energy, Savannah River Plant Operations From: Dr. Judith E. Gordon Re: Draft EIS, L-Reactor Operation, SRP. In my oral presentation at the Augusta hearings, October 31, 1983, I indicated that I would be submitting additional written comments. These are as follows:	
EZ-1	1. Impingement, p. 4-3, and 5-31. The EIS indicates a cumulative total of about 19 fish/day. However, more recent data suggest this figure is more likely to be 41.3 fish/day (ECS-SR-5, Sav. Riv. Aquatic Ecology Rept, Prelim 83).	Estimates of impingement, as calculated from the most recent available data, are presented in Section 4.1.1.2 and Appendix C of this EIS.
EZ-2	2. Thermal discharge, 4.1.1.4. This entire section is extremely confusing because of the different delta T's used in the charts and tables, along with varying river flows. How do Tables 4-4 and 4-5 relate to the suggested maximum delta T of 9° C? On p. 4-8 why were the most severe 5-day meteorological conditions only based on the short time span, 1976-1980?	See the response to comment AA-1 regarding cooling-water mitigation alternatives. Also note that due to other comments received the analysis of the reference case thermal discharge in relation to the August 1982 draft NPDES permit has been has been deleted in Section 4.1.1.4. An analytical procedure similar to that required by the NRC for establishing adverse heat dissipation criteria for the design of ultimate heat sinks was used to select the most severe 5-day meteorological conditions for evaluating the biological effects of alternative cooling water systems.
EZ-3	3. Fish management programs, p. 4-116. This approach is of questionable value to anadromous species, especially when they appear to show preferences for particular streams in the river drainage as reported in ECS-SR-5, see above. Further, this approach offers nothing for endangered fish species nor does it address other problems associated with loss of wetlands.	Section 4.4.2 of the Draft EIS described both the feasibilities and limitations of fishery management alternatives for anadromous and endangered species, i.e., shortnose sturgeon. Both the American shad and striped bass spawn primarily in the river. The blueback herring uses several creeks and adjoining floodplains for spawning throughout much of the Savannah River basin. The shortnose sturgeon is a bottom river spawner and is not adversely affected by the restart of L-Reactor based on the biological opinion from the NMFS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
EZ-4	4. Wetlands, p. 5-24. The 1982 EA and this draft EIS show a discrepancy in wetlands acreage figures. For example, the EA says that SRP contains 39,000 acres, the draft EIS says 37,000. The wetlands acreage impacted in the EA is 2000, but it is 1600 in this EIS. Which figures are correct?	The land area of the SRP is 192,323 acres; standing water or seasonally moist areas total 39,870 acres (Du Pont 1983). Wetlands are addressed in Sections 4.1.1.4, 5.2.4, and Appendix I of the EIS.
EZ-5	5. As indicated in 3 above, it is not necessarily true that other suitable spawning habitat exists in other streams along the Savannah River (p. 5-30). Also, since many areas are privately owned, their protection is less likely than that for properly managed government holdings.	Recent fisheries surveys indicate that Steel Creek is one of several streams used along the Savannah River by resident river species such as yellow perch and crappie as well as the anadromous blueback herring. The floodplains below Augusta have been modified more by government activities such as flood control, channelization, and dredging than from SRP thermal effluents and from modification by private ownership. The wetlands (orginally floodplains) above Augusta have been modified extensively by several government-operated reservoirs. Appendix C of this Final EIS contains additional data from recent fisheries studies.
EZ-6	6. ANSP studies, p. 4-18. Given the infrequency of these studies, it is unlikely that they have much relevancy to the health or status of the Savannah River.	In addition to the ANSP studies that were performed for 6 years, more extensive quantitative ecological studies are currently being performed. Monitoring programs are discussed in Chapter 6 of the EIS.
EZ-7	7. River temperatures, p. 3-20. In comparing River mile 156.8 and 118.7, the number of times the temperature exceeded 28° C was given for River mile 156.8. What are these figures for River mile 118.7?	Records are not kept on the number of exceedances of various temperatures such as 28°C at the Highway 301 bridge monitoring station (River Mile 118.7).
EZ-8	8. Radiation levels, p. 3-60. Are the 66 mrem/year cited in addition to background radiation or is this included?	The 66 millirem per year includes background gamma radiation due to cosmic and terrestrial sources, which account for virtually all of it.
EZ-9	9. Dose to average individual, p. 3-59. A value of 195.3 mrem may be average, but it hardly represents the dose to an average individual. Most "average" persons do not receive 92.5 mrem of medical radiation each year, and these figures are thus misleading.	The "average" individual referenced is meant to provide a representative case for comparing levels of radiation exposure with those associated with L-Reactor restart and operation. By definition, the 92.5-millirem value is the average medical radiation exposure per person in the United States, not the medical exposure to an average person. It is recognized that the radiation dose to any specific individual will vary from the average depending on that person's exposure to controllable sources of radiation such as medical X-rays. In any case, even

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		If medical radiation was completely deleted as a consideration, the doses due to L-Reactor restart and operation still represent a small percentage of background radiation levels.
EZ-10	10. Probabilities, p. 4-54. What is the source of the probability figures used in this section?	See the responses to comments AY-9 and BL-12 regarding probabilities.
EZ-11	11. N-Reactor, p. 2-5. There is no discussion in this draft EIS as to why less-than-6-percent plutonium production at N-Reactor at Hanford was not a viable option to restart of the L-Reactor. Is this also classified information?	See the response to comment EW-1 regarding partial production options.

Comment number	Comments	Responses
	STATEMENT OF L.L. GADDY L.L. Gaddy, Consulting Biologist Rte. 1, Box 223 Walhalla, South Carolina 29691 [803] 638-2863 November 12, 1983 Mr. M.J. Sires, III Assistant Manager, Health, Safety, & Environment Dept. of Energy Savannah River Operations Office Aiken Mr. Sires: This letter is to register my opposition to several of the cooling water alternatives proposed in Section 4.4.2 (Volume 1) of the Draft Environmental Impact Statement for the L-Reactor Operation: Savannah River Plant, Aiken, S.C. 1. Direct Discharge of Thermal Effluents into Steel Creek.	
FA-1	I am opposed to this alternative because of the known consequences. High water temperatures would make most of Steel Creek and some of the Savannah River floodplain uninhabitable by most life forms. The endangered American alligator and the Wood Stork (proposed endangered), both of which are now present here, could not survive in such a thermally-stressed environment.	See the responses to comments AA-1 and AB-13 regarding cooling-water mitigation alternatives.
FA-2	Secondly, direct discharge of thermal effluent would possibly transport contaminated alluvium--radiocesium accidentally released from the L-Reactor in 1954-1968--downstream in suspended solution, reintroducing this now-buried radiocesium into the food chain.	Section 4.4.2 describes each alternative cooling-water system considered. The remobilization and transport of radiocesium has been considered for each alternative. Consideration is given to radiocesium transport in relation to the timing of mitigative action implementation, before or after restart of L-Reactor.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	II. All "Once Through" Systems Proposed.	
FA-3	I am especially opposed to the diversion of thermal effluent into Pen Branch, parts of which are relatively pristine. In 1981, I surveyed Pen Branch for endangered and threatened plants for the Savannah River Ecology Laboratory. I found no such plants; however, I did observe several interesting bogs and floodplain communities along the branch. These communities--some of which were dominated by relatively mature trees--would be destroyed under the "Once Through Cooling by Diversion to Pen Branch" plant.	Alternatives to direct discharge, other than diversions to Pen Branch are considered; they are compared in Section 4.4.2.5. Also see the response to comment AA-1 regarding cooling-water mitigation alternatives.
FA-4	I found much of the DEIS too general, with little or no hard data cited in some cases. In light of the statement in the press that the entire EIS process will cost around 1.5 million dollars, I was surprised to find that most of the studies cited were done prior to 1982. It seems that none of this money went for the collection of additional environmental data. In the final EIS, I think it would be interesting to see an itemized account of the costs of the EIS.	As described in the EIS, DOE has expended about $204 million in modernizing and renovating L-Reactor. The Department has also spent over $5 million in environmental studies and reports. Twelve public hearings have been held in South Carolina and Georgia, and an extensive support document library has been assembled. DOE will continue to conduct extensive environmental studies, including assessment of ground-water impacts and thermal mitigation. Also see the response to comment CO-2 regarding additional data that have been included since the Environmental Assessment.
	Respectfully submitted,	
	L.L. Gaddy	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF KERRY COOKE The Snake River Alliance Box 1731 Boise, ID 83701 208/344-9161 November 14, 1983 Mr. Melvin Sires U.S. Department of Energy Savannah River Operations Office Post Office Box A Aiken, South Carolina 29801 SUBJECT: COMMENTS ON DEIS FOR L-REACTOR Mr. Sires:	
FB-1	The Department of Energy and the management of the Savannah River Plant have consistently downplayed the effects of the start-up of the L-Reactor on the Savannah River area. The environmental impact the Savannah River Plant will have on the future of the Savannah River area should dictate a high level of honesty and a willingness to do whatever can be done to protect the total environment from pollution and eventual damage.	Specific, quantitative evaluations of the impacts of the L-Reactor restart were developed and published in the Environmental Assessment. These impacts are further detailed in the EIS.
FB-2	However, it seems clear that the DOE does not share in this thinking. The DOE avoided doing a complete EIS until legally hardpressed to let the public comment on this project. Further, the DOE's attitude throughout this process has been one of eliminating hurdles to start up the L-Reactor. Never at any time in the months surrounding this controversy has the DOE given any sign that there was any significance placed on the concerns expressed by the public and state and local entities. Cost and time factors have consistently outweighed concern for the future.	DOE was charged by the President with restarting L-Reactor. DOE has consistently expressed its intention that the restart will be in accordance with all applicable Federal and state environmental protection regulations.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FB-3	The Snake River Alliance, an Idaho citizens' group, requested a copy of the L-Reactor draft EIS in a letter to you dated October 7. You chose to respond to our letter on October 25, stating that a copy of the Draft EIS was enclosed. No EIS was enclosed, and we mistakenly assumed it would be coming under separate cover. As of November 14, the last day for comments, the EIS has not arrived. This sort of disregard for public involvement is indicative of the Department of Energy's attitude about the L-Reactor start up in general. The NEPA process was formulated to "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation..." The DOE has chosen to disregard the intent of this policy and has violated the public trust in their handling of the L-Reactor start-up. The people of the Savannah River area live under the double threat of death by nuclear war, and death by nuclear material contamination. The abuses of shortsighted management must stop if we are to survive. The L-Reactor should not be restarted. Kerry Cooke for the Snake River Alliance	DOE distributed copies of the EIS to more than 750 individuals and groups and placed copies in 19 libraries. A copy of the EIS was intended to be sent to the Snake River Alliance on October 25, per their request; however, an error in the distribution of this copy occurred. DOE has corrected the problem and has again sent another copy of the draft EIS to the Snake River Alliance.

Comment number	Comments	Responses

STATEMENT OF PAUL F. WALKER, PH.D.
Klein Walker Associates, Inc.
68 Holworthy Street
Cambridge, Massachusetts 02138
Telephone: (617) 497-6360

11 November 1983

Mr. M.J. Sires, III
Assistant Manager for Health, Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29801

Dear Mr. Sires:

The purpose of this letter is to provide written comments on the draft Environmental Impact Statement, "L-Reactor Operation Savannah River Plant, Aiken, S.C.," dated September 1983.

For your information, I am a national security analyst and president of a social science consulting firm, Klein Walker Associates, in Cambridge, MA. For additional personal background, I would refer people to a recent article, "Smart Weapons in Naval Warfare" (Scientific American, May 1983), and a book, Winding Down: The Price of Defense (1st ed: New York Times, 1979; 2nd ed: W.H. Freeman, 1982). I will restrict my comments to the "need" requirement for L-Reactor.

FC-1 The draft EIS posits in Chapter 1 that L-Reactor is required in order "to increase the supply of weapon-grade plutonium to a level that will satisfy near-term requirements" for modernization and improvement of existing stockpiles as well as for new weapons systems (pp. 1-1 - 1-2). Dr. Robert L. Shoup, author of Chapter 1, explains that these plutonium demands are driven by former President Jimmy Carter's 1980 Nuclear Weapons Stockpile Memorandum (NWSM), later updated by President Ronald Reagan in November 1982. He also states that congressionally delayed or non-funded weapons systems "do not significantly

See the responses to comments BL-16, BL-18, BL-19, and EW-1 regarding need and production alternatives and the scope of this EIS.

The Nuclear Weapons Stockpile Memoranda (NWSM) reflect the latest requirements for plutonium; these requirements are based on efforts to modernize and improve stockpiled nuclear weapons and to provide warheads for new weapons systems scheduled for deployment during the next decade. The program to modernize existing weapon systems involves replacing older nuclear

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	change short- and intermediate-term requirements that L-Reactor must help to satisfy" (p. 1-2). Such a cursory explanation for the fundamental rationale behind the restart of L-Reactor is inadequate and must be more fully explained in the final report. Political and military delays and cutbacks, both past and proposed, in the major nuclear weapons programs have been considerable in recent years. They have either not been taken into account here or the NWSM has recently increased its demand for plutonium for existing warhead testing and modernization (as compared to new weapons procurement). There are currently at least nine major nuclear weapons in production (production goals in parens). Three of these are bombs: B-61 Mods 3 and 4 (1000) and B-83 (2500). One is an 8-inch artillery shell: W-79-1 (800). Three are cruise missiles: W-84 GLCM (560), W-80-0 SLCM (758), and W-80-1 ALCM (3500). And two are ballistic missiles: W-85 Pershing II (380) and W-76 Trident C-4 SLBM (1440). There are also at least another six nuclear weapons in RDT&E phases: W-87 MX ICBM (1055), W-87 Trident II SLBM (1440), W-82 155mm artillery shell (1000), W-81 SM-2 ship defense missile (500), and possible anti-submarine and anti-ballistic missile systems (2000±). One of these systems, MX or "Peacekeeper," has been cut back from a projected deployment of 200 missiles carrying 2000 MIRVs to half this number. Several other systems have been delayed in program development and production due to funding, political, and/or technical problems. Defense Department Program Acquisition Reports show, for example, the following five major delays/reductions: Pershing II - Procurement of 91 postposed from FY83 to FY84. Tomahawk SLCM - Procurement reduced in FY82 from 88 to 61 and ~~in FY83 from 120~~ to 51. ALCM - Procurement reduced in FY 83 from 440 to 330 and ~~cancelled~~ for FY84 and FY85. GLCM - Procurement reduced in FY83 from 110 to 84.	nuclear warheads and existing delivery systems with modern, safer, and more effective warheads. Modernization, in many instances, has led to replacing older warheads that used uranium enriched in the isotope uranium-235 with new warheads that use weapons-grade plutonium.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	MX - Procurement reduced in FY83 from 9 to 0.	
	These figures indicate a clear reduction of 1000 warheads and delays of 1-4 years duration of another 1200±. (See Annual Report of the Secretary of Defense, and the Defense Department's Program Acquisition Costs by Weapon System for fiscal years 1980-1984.)	
	If the planned production of L-Reactor is plutonium sufficient for 15± warheads annually (as reported by a Department of Energy official, New York Times, January 16, 1983), then it is clear that further evidence is required in order to adequately justify L-Reactor's restart.	
	In addition to real past production delays and cancellations of nuclear weapons, the EIS needs assessment must also address itself to arms control and disarmament plans of the current U.S. Administration. This is essential, given the integral nature of arms control to national security and the sensitivity of near- and intermediate-term weapons projections to arms negotiations.	
	President Reagan has proposed reducing deployment of Pershing II's and GLCM's in Europe to 420 or less, some 150 less than presently predicted. In strategic arms negotiations, U.S. proposals have included a one-third reduction (about 2500 warheads) in deployed MIRVs and a fifty-percent reduction (about 4000 warheads) in planned cruise missile deployments. In addition, Secretary of Defense Casper Weinberger announced in October, 1983 the withdrawal of about 1400 tactical nuclear weapons from Europe over the next five years.	
	Should these reductions, both unilateral and negotiated, be realized, the procurement of nuclear weapons over the next decade may be reduced by as much as 45%. In addition, the availability of weapons-grade material from decommissioned weapons will rise.	
	In light of such past program reductions and delays, and of future likely arms control and other drawdowns, the current and	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	future stockpile of nuclear weapons would not be in need of plutonium production capacity of L-Reactor.	
	Sincerely,	
	Paul F. Walker, Ph.D. President	
	PFW/fl	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

UPDATED STATEMENT OF PAUL F. WALKER, PH.D.

Klein Walker Associates, Inc.
68 Holworthy Street
Cambridge, Massachusetts 02138

14 November 1983

Mr. M.J. Sires, III
Assistant Manager for Health, Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29801

Dear Mr. Sires:

FC-2 Please change my 11 November 1983 letter to you regarding the L-Reactor draft EIS as follows:

> Strike the last sentence on page 2, "President Reagan has...," and insert: "President Reagan has proposed reducing deployment of Pershing II's and GLCM's in Europe to 420 or less, some 150 less than presently predicted."

Comment noted.

Thank you.

Sincerely,

Paul F. Walker, Ph.D.
President

PFW/fl

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF GARY H. WHITAKER, ROBERT H. WHITAKER, AND DOROTHY J. WHITAKER Gary H. Whitaker 214 Pine Lane Cayce, SC 29033 U.S. Department of Energy Post Office Box A Aiken, S.C. 29801 To whom it may concern:	
FD-1	As a citizen of S.C. I must protest the start up of the L-Reactor, since it threatens our environment. I feel we must demand that DOE facilities be required to comply with federal and state environmental standards applicable to commercial reactor sites; and steps be taken to avoid damage to the environment before startup, regardless of cost. Sincerely, Gary H. Whitaker Robert H. Whitaker Dorothy J. Whitaker	See the responses to comments AA-3 and AF-2 regarding DOE's commitment to comply with applicable Federal and state regulations and to take all reasonable steps to mitigate impacts, and the response to comment BF-7 regarding the differences between SRP reactors and commercial light-water reactors.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF PIXIE A.B. NEWMAN

Hydraulics Division
Civil and Environmental
Engineering Department
1269 Engineering Building
1415 Johnson Drive
University of Wisconsin
Madison, Wisconsin 53706
November 10, 1983

Mr. M. J. Sires, III
Assistant Manager for Health,
Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29801

Dear M. J. Sires:

The enclosed statement is a review of hydrogeologic sections of the Draft Environmental Impact Statement: L-Reactor Operation, Savannah River Plant, Aiken, S.C., V.I and V.II, September 1983 conducted for the Energy Research Foundation, Columbus, S.C. This review is based on the Draft EIS, supplementary references provided to me by the Energy Research Foundation, and on my knowledge of hydrogeology. The review was prepared in consultation with John S. Brasino, a fellow graduate student in hydraulics, and John A. Hoopes, Professor of Civil and Environmental Engineering, at University of Wisconsin-Madison.

I am a graduate student in the Hydraulics Division of the Civil and Environmental Engineering Department at the University of Wisconsin-Madison. I have a B.A. in geology from Carleton College in Minnesota, a M.S. in Water Resources Management from the University of Wisconsin-Madison, and a M.S. in Civil and Environmental Engineering from the University of Wisconsin-Madison. In addition, I am an applicant for Engineer-in-Training in the State of Wisconsin and a member of the

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	American Society of Civil Engineers and the American Geophysical Union. I trust these comments will be considered by DOE in preparing the final EIS. Sincerely, Pixie A.B. Newman	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

REVIEW OF THE HYDROGEOLOGY SECTIONS
OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
L-REACTOR OPERATION,
SAVANNAH RIVER PLANT, S.C.

Prepared by
Pixie A.B. Newman

For the Energy Research
Foundation

November 10, 1983

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FE-1	A primary objective of an environmental impact statement is to assess and clearly state the environmental impacts associated directly and indirectly with the proposed project or activity. The sections of the Draft EIS: L-Reactor Operation, Savannah River Plant, Aiken, S.C. devoted to the effects of proposed L-Reactor startup on groundwater resources falls short of this objective. It does not quantify the anticipated effects of the L-Reactor startup on groundwater flow and groundwater quality conditions at the Savannah River Plant (SRP). Although the report recognizes that increased pumpage due to proposed L-Reactor startup will affect the vertical piezometric head relationships between primary on-site aquifers (see p 5-9 and 5-12) and specifies in Table 5-6 (p 5-10 and 5-11) the additional drawdown under seepage basins caused by this pumpage, it does not provide a complete interpretation of the impacts associated with these changes in vertical head relationships on groundwater and surface water flow rates and quality. In addition, I have three major criticisms: 1) current hydrogeologic relationships and groundwater flow rates are not fully presented; 2) original data are not presented in a meaningful and easily digestible manner; and 3) past modeling efforts appear to be inadequate and poorly documented. *The following comments are made in relation to criticisms 1)* and 2). Although the pre-SRP hydrogeology and hydrogeochemistry of the area was studied and characterized by Siple (1967) using data collected in the 1950s and early 1960s, recent water use and waste management practices have altered the vertical hydrogeologic gradients and groundwater quality in the aquifers at the SRP site. (This is evidenced by Figure 3-11, which shows the piezometric head declines due to increased SRP pumpage, and by the existence of contaminant plumes beneath SRP seepage basins at the M-Area (see Figures F.32 and F.33) and possibly elsewhere.) The magnitude of these effects and future impacts due to the L-Reactor startup cannot be assessed without sufficient, up-to-date, site-specific data. The following information must be included in the EIS:	Section 5.1.1.4 presents a tabulation of the geohydrologic effects, particularly the changes in vertical head relationships, caused by L-Reactor startup, and provides an assessment of the impacts associated with these changes in the quality of ground water. The changes will have very little effect on surface-water flow rates and quality (also see the response to comment DA-8). The central theme of the subsurface hydrology discussions in Section 5 and Appendix F is to provide the current hydrologic relationships and ground-water flow rates. These are fairly well understood throughout SRP. Apparently the comment stems from the belief that the hydrologic system is rapidly changing. This is not the case. Much of the original data is provided in the references given in Appendix F. Further modeling efforts are in progress but it is not anticipated the results will affect the conclusions of the EIS. The need for sophisticated ground-water models for assessing the effects of L-Reactor operation is discussed in the responses to *comments EN-47 and EN-49.*

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FE-2	1) large scale (e.g., an overall scale of 1:48,000 and subarea scale of at least 1:6000) plan with view maps showing: a) the current (1982-1983) piezometric surfaces of each major aquifer present at SRP and surrounding area; b) the locations of data points used to generate these surfaces and the date of water measurement collection; c) the recharge and discharge areas of each aquifer; d) the locations of existing and planned pumping wells and associated cones of depression; e) the locations of active and inactive seepage basins, pits, and landfills; f) the areal extent of contaminant plumes as they presently exist; g) lines showing the locations of cross-section maps provided;	A detailed discussion of the subsurface hydrology at SRP, which is summarized in Section 3.4.2, is provided in Appendix F. Table F-1 of Appendix F has been revised to provide a detailed summary of the characteristics of the hydrogeologic units at SRP. Water table levels and piezometric surfaces for the major aquifers (Congaree and Tuscaloosa) are shown. Water level contour maps and cross sections of shallow aquifers in the vicinity of those waste facilities which will be impacted by L-Reactor startup are also shown. The locations of these facilities are identified on the maps and cross sections provided in the EIS. Additional sitewide information on the waste disposal sites (including active and inactive seepage basins) at SRP is presented in Du Pont (1983; DPST-83-829). This reference contains exact locations of all waste disposal sites, areal extent of contaminant plumes as they have been defined to date, and cross-section maps. A subsequent NEPA review will address the SRP "Ground-Water Protection Implementation Plan," which is currently under review by the State of South Carolina and the U.S. Environmental Protection Agency--Region IV.
FE-3	2) cross-section maps (along and orthogonal to the predominant horizontal flow direction) showing: a) vertical head gradients within and between each aquifer (indicating the name and location of wells used, their screen lengths, and the date of data collection); b) hydraulic head relationships beneath each seepage basin or pit which could be affected by L-Reactor startup (pumpage effects and/or loading effects); c) present and predicted contaminant plume development and migration due to additional pumpage and/or additional loadings to support L-Reactor startup;	Hydraulic relationships for the geologic formations beneath SRP are given in Appendix F. Sufficient information is presented to determine the magnitude of any direct and incremental impacts on those waste facilities affected by resumption of L-Reactor operation.
FE-4	3) mass balance analysis, with estimates of the amount and distribution of recharge to and discharge from the groundwater system (e.g., recharge from rainfall, seepage basins and leakage through confining clay layers and discharge to streams, swamps, pumping wells and leakage through confining layers), based on measured hydraulic conductivities and gradients in confining layers as well as aquifers;	A detailed water budget for all aquifer systems underlying SRP is not considered essential in the evaluation of L-Reactor operation. Sufficient information on rainfall recharge, seepage basin flow paths and travel times, discharges to onsite streams, and ground-water pumpage is presented in the EIS to determine the magnitude of any direct and incremental ground-water impacts resulting from the operation of L-Reactor. An independent NEPA review will address the SRP "Ground-Water Protection Implementation Plan."

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FE-5	4) contaminant mass balance analysis based on mass loadings to seepage basins and contaminant concentrations measured beneath and downgradient of seepage basins.	The seepage basins in L-, F-, H-, and M-Areas will be impacted by L-Reactor operation. The spatial extent of ground-water contamination in the vicinity of these basins is discussed in the EIS. Mass balances are not included because of uncertainties in actual quantities of materials released to the basins in early years of operation. However, the key factors are what species and concentrations have reached the shallow aquifer systems. These data are presented from water quality analyses that have been made (Section F.5).
FE-6	The Draft EIS contains general statements regarding flow directions, general recharge and discharge areas, and relative permeabilities but the specific, support data are often lacking, particularly when representing the hydrogeology of clays. The Draft concludes that "[o]nly in the M-Area where downward flow paths are known to exist[is there significant potential for water table discharges to reach the major regional aquifer (the Tuscaloosa)" (p 3-32). The underlying premise is that vertical recharge into the Tuscaloosa does not and will not occur in the L or other L support areas and that on-site contamination of shallow aquifers does not constitute a significant environmental impact. The omission of a thorough assessment of these impacts is contrary to the philosophy and purpose of an EIS. The characterization of shallow aquifer contamination must be expanded.	The fact that there is interest in protection of the regional aquifer (Tuscaloosa) should not be interpreted to mean that the shallower sediments are neglected. The EIS provides an extensive discussion of potential impacts to the shallow ground waters beneath the SRP from the operation of L-Reactor. An assessment of impacts to surface-water quality and dose commitments for liquid releases following a shallow ground-water to surface-water path are presented in the EIS (Sections 4.1.2.3, 5.1.1.2, and 5.1.2).
FE-7	As presently written, the Draft EIS contains some contradictory data and/or figures and leads the reader to believe that the quality of the Tuscaloosa aquifer (outside the M-Area) is protected from contamination due to the "extensive upward vertical gradient between the Tuscaloosa and the Congaree hydrostratigraphic units and the impermeability of the green and pisolitic clays. In addition, the report claims that the Tuscaloosa and Congaree aquifers discharge into the Savannah River and that this discharge prevents potentially contaminated waters, originating on-site, from causing off-site contamination of the Tuscaloosa aquifer in Georgia. This statement seems to ignore the off-site effects of discharges into and transport downstream in the Savannah River.	Although seepage basins have been in service at SRP since the Mid-1950s, drinking water from the Tuscaloosa wells in the central portion of SRP has never been found to be contaminated by radionuclides or by chlorinated hydrocarbons. Thus, the combination of hydrostratigraphic characteristics and upward head differential in this area of the SRP are effective in protecting the Tuscaloosa Aquifer. As discussed in response to comment EN-24, the basal clay of the Congaree and upper clay of the Ellenton form an effective confining unit throughout the SRP for the sands in the underlying Tuscaloosa Aquifer. Most recent testing of A- and M-Area wells suggests that chlorinated hydrocarbons in the contaminated Tertiary sediments have migrated into the annulus of wells producing from the Tuscaloosa and that the contamination reported earlier was not from generalized contamination of the Tuscaloosa. The contaminated production wells have been shut down.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		The depression in ground-water head due to discharge in the Savannah River valley prevents ground water from moving from South Carolina to Georgia through a ground-water pathway. It is well recognized that the Savannah River is a ground-water sink (Sections F.2.3 and F.4).
FE-8	Data presented in Figure 3-8 show that upward vertical gradients are, at least locally, being significantly reduced due to present pumping practices. Pumpage in the H-Area has reduced the vertical head difference between the Tuscaloosa and the Congaree to less than or equal to 0.6 m (2.0 ft). Figure 3-9 (p 3-29), which is supposed to show the 1982 vertical head difference between the Tuscaloosa and the Congaree, misrepresents the magnitude of this difference at the H-Area.	It is true that the head in the wells in Figure 3-8 of the draft EIS shows a 0.6 m head difference but these wells are within the line of depression of the H-Area production wells. Figure 3-9 opf the draft EIS shows the regional pattern of head relationships without including the details of the several areas of depression which are generally small in area. This is why Figure 3-9 was constructed by subtracting the contours in Figure F-18 from those in Figure F-9.
FE-9	Insufficient data limit the reader's ability to assess the accuracy of this figure in other areas at the SRP. Figure 3-9 (also Figure F-29) was not generated from data collected at nested observation wells which measure piezometric head at 2 or more depths within each hydrostratigraphic unit; instead, it was generated by subtracting one interpolated piezometric surface (Figure F-18) from another (Figure F-9). The credibility of this figure is further weakened by the fact that data used to generate the 2 original piezometric surface maps were "somewhat sparse" (p F-71). Nevertheless, this figure is included in the Draft EIS anyway, thus perpetuating the possible misconception that the Tuscaloosa groundwater is protected. In the text, the figure is improperly used to assess the actual vertical head difference between the Congaree and the Tuscaloosa. Clearly, the magnitude and the horizontal domain overwhich the upward vertical gradient exists and will continue to exist after L-Reactor startup needs to be better documented. Similarly, the protective powers provided by "impermeable" green and pisolitic clays, which do not impede downward flow in the M-Area (see Figure F-11) and are proported to impede flow elsewhere, need to be quantified. Furthermore, the hydraulic conductivity of these clay layers may be reduced by organic solvents and other seepage chemicals and these effects need to be examined.	As mentioned in the response to comment FE-8, Figure 3-9 was constructed to portray the regional nature of the head relationships. Clusters of piezometers do not exist on a regional basis although wells have been drilled in certain operating areas for special studies. Additional monitoring wells to provide broader regional coverage are planned. The data for Figures F-18 and F-9 of the draft EIS are sparse but they have been separated on an aquifer basis in order to provide a better understanding of geohydrology than previous authors. As an example, it is better to have fewer data points for the Tuscaloosa than to mix heads from the shallower Tuscaloosa with those from the deeper Tuscaloosa Aquifer. Thus, it is believed that these maps more accurately depict the head in these aquifers than previous maps. These maps are included because they represent the most advanced understanding of the hydrogeologic system and not to "perpetrate a possible misconception." Protection of the Tuscaloosa Aquifer is discussed in the response to comment FE-7.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FE-10	The hydrogeologic data collected to generate the areal and cross-section maps should provide enough information upon which modeling efforts may be based (criticism 3). At the very least, a mass balance relating inflows, outflows, and aquifer storage should be developed for each aquifer. Past modeling efforts referred to in the EIS were limited in scope, focusing solely on a 2-dimensional representation of the Tuscaloosa aquifer. As could be discerned from available documentation (Marine and Routt, 1975), little effort was made to determine the seepage or leakage between the Congaree and the lower Ellenton and Tuscaloosa aquifers. Groundwater flow at the SRP occurs within and between multiple hydrostratigraphic units. Piezometric head relationships change both horizontally and vertically. Hence, models of this area's hydrogeology must attempt to accurately represent the entire 3-dimensional system.	A detailed discussion of the hydrogeologic properties of the subsurface units at SRP is provided in Appendix F; this information is summarized in Section 3.4.2. For the previous modeling of the Tuscaloosa a two-dimensional model was adequate for the desired objectives. It has been recognized since 1975 that to model the entire geohydrologic system, a three-dimensional model is required. SRP began to develop a code for that purpose in 1975. However, the USGS made available a three-dimensional code in 1973 which has been used for specific modeling in operating areas. Two-dimensional modeling of the relation between Tuscaloosa water levels and ground-water withdrawal has been performed; this is described in this final EIS in Section F.4.2 and in the appropriate section of Volume I. A regional model of the entire geohydrologic system at SRP has been initiated. The need for sophisticated ground-water models for assessing the effects of L-Reactor operation is discussed in the responses to comments EN-47 and EN-49.
FE-11	Given sufficient hydrogeologic data, predictions of groundwater flow conditions and contaminant transport impacts can be assessed under the new environmental stresses associated with the L-Reactor startup. In addition to the information previously noted, an adequate environmental impact statement must include: 1) a comparison of flow rates beneath seepage basins before and after additional L-Reactor support pumpage; 2) contaminant plume development and migration before and after L-Reactor support loadings; and 3) groundwater contaminant discharge rates to creeks and the Savannah River before and after L-Reactor startup.	A discussion of the hydrologic characteristics of the different water-bearing formations are discussed in Section 3.4.2 and Appendix F. Additional information on the current knowledge of the areal extent and characteristics of the known contaminant plumes are discussed in Du Pont, 1983; DPST-83-829. The impact on the known source areas in L-, F-, H-, and M-Areas and in the burial grounds are discussed in Sections 4.1.1.3, 4.1.2, 5.1.1.2, 5.1.1.4, and 5.1.2.1. Ground-water travel times from seepage basins to on-site streams are discussed in the response to comment EN-44.
FE-12	From the little data presented in the Draft EIS, it appears as though continued and increased loadings from the L-Reactor startup will contribute to the development and migration of the contaminant plumes below several of the active seepage basins. Conceivably, effects of additional L-Reactor pumpage may induce flow and spread contamination away from inactive as well as active waste sites. There is little doubt that L-Reactor startup will accelerate contamination problems in the F- and	As discussed in Sections 4.1 and 5.1, impacts to the different aquifer systems beneath L-, F-, H-, and M-Area seepage basins due to L-Reactor operation are expected to be small. This assessment is based on the existing physical models provided by the F- and H-Area basins, and SRP burial ground plumes and extensive studies of the movement of radioactive materials in the ground water and their contribution to onsite streams. Section 5.1 has been expanded to include a more thorough discussion of

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	H-Areas (nitrates and mercury) and in the M-Area (degreaser solvents - tetrachloroethylene, trichloroethylene, and 1,1,1-trichloroethane).	the chlorinated hydrocarbon contamination in M-Area, the protection of public health and active program for the clean-up of this contamination. This topic is also discussed in the response to comment FE-13, below. Also see the response to comment FE-1.
FE-13	Groundwater contamination by chlorocarbons in the vicinity of the sewer line and the seepage basin in the M-Area is very serious and efforts are being made to cleanup and contain this contamination. Since the efficiency of M-Area cleanup activities has yet to be demonstrated, it remains to be seen whether further contamination associated with L-Reactor startup will cause more extensive post-cleanup groundwater contamination. However, by all accounts, the additional L-Reactor loadings will increase short-term and may potentially increase long-term groundwater contamination at the M-Area.	The L-Reactor incremental discharge to the M-Area settling basin is expected to be at most 0.12 cubic meter per minute; thus additional ground-water impacts from incremental M-Area operations in support of L-Reactor will be minor. The groundwater contamination currently found in the vicinity of M-Area is confined to the Tertiary age formations which are not very transmissive due to the interbedded and intercolated nature of the sediments. Horizontal flow velocities are slow, on the order of 7.6 meters per year. None of the contaminants have migrated off the plant site and no immediate offsite hazard exists. The vertical gradients from the Tertiary formations to the Tuscaloosa Aquifer are downward in the M-Area vicinity. Additional withdrawals from the Tuscaloosa as a result of L-Reactor would increase this gradient only slightly. Current plans call for discontinuing the use of M-Area seepage basin by April 1985 and constructing a process wastewater treatment facility (Section 5.1.1.2). Remedial action to remove the ground water which contains hydrocarbons from beneath M-Area has begun and will reduce the potential for further contamination of the aquifer systems in the area. Also see the response to comment DA-4.
	In summary, the Draft EIS representation of present hydrogeologic conditions and groundwater environmental impacts associated with L-Reactor startup is inadequate. The potential for significant groundwater contamination due to L-Reactor startup exists. An assessment of the seriousness of these impacts cannot be determined from the data provided in the Draft EIS document. The EIS must include the results of studies to: 1) develop a sound basis of comparison for impact assessment, -- fully characterize present groundwater flow relationships and quantify flow rates (see listing on page 2 for information required), take out all old and possibly misleading data, comment on seasonal effects and on the existence of the Millet fault	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	and its effect on groundwater discharge rates; -- fully characterize the extent of present groundwater contamination in shallow as well as deep aquifers (see listing on page 2); 2) conduct mass balance analysis for waters in each aquifer and for each contaminant plume identified; 3) make predictions of environmental impacts of L-Reactor startup on groundwater flow rates and quality, base predictions on mass base calculations, supplement these with 3-D model predictions if possible.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

References:

1) Faye, R.E., and D.C. Prowell, 1982. "Effects of Late Cretaceous and Cenozoic Faulting on the Hydrology of the Coastal Plain near the Savannah River, Georgia and South Carolina," U.S.G.S. Open-File Report 82-156, U.S.G.S., Doraville, Georgia, 80p.

2) Marine, I.W. and K.R. Routt, 1975. "A Groundwater Model of the Tuscaloosa Aquifer at the Savannah River Plant," Savannah River Laboratory Environmental Transport and Effects Research Annual Report-1974, DuPont, Savannah River Laboratory, Aiken, S.C., 10p.

3) Siple, G.E., 1967. "Geology and Ground Water of the Savannah River Plant and Vicinity, South Carolina," U.S.G.S. Water-Supply Paper 1841, U.S. Government Printing Office, Washington, D.C., 113p plus plates.

4) U.S. Department of Energy, 1983. Draft Environmental Impact Statement: L-Reactor Operation, Savannah River Plant, Aiken, S.C. V.I and II.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF THE HONORABLE JOE FRANK HARRIS

Office of the Governor
Atlanta, Georgia 30334

November 9, 1983

Mr. M. J. Sires, III
Assistant Manager for Health,
Safety, and Environment
Savannah River Operations Office
Post Office Box A
Aiken, South Carolina 29801

Dear Mr. Sires:

This will acknowledge the receipt of the Draft Environmental Impact Statement DOE/EIS - 0108 D, for the L-Reactor Operation at the Savannah River Plant. We appreciate the opportunity to review the document and provide comments on this important proposed action.

As you will recall, the State of Georgia's position which was presented at the February 9, 1983 field hearing in North Augusta, South Carolina addressed three areas of importance to our State. The first issue contained in my position statement is our opposition to the bedrock storage of high level nuclear waste at the Savannah River Plant. Our concern in this area has been mitigated by the Department of Energy's assurance at that Hearing that the concept has been dismissed and will not be reactivated again in the future.

FF-1 The second issue contained in our position statement is the recommendation that the Department of Energy should identify and submit for public review the cumulative effects of all the present and proposed facilities at the Savannah River Plant including the contiguous commercial operations. In reviewing the Draft Environmental Impact Statement for the L-Reactor we note that Section 5.2, entitled "Cumulative Impacts," is presented. However, the substantive information contained therein is insufficient to project the total combined environmental contamination levels during and after operational periods.

The cumulative radiological effects of all nuclear facilities expected to be operating within an 80-kilometer radius of L-Reactor are presented in Section 5.2.6 of the EIS. This analysis includes a tabulation of offsite doses (Table 5-19 of the draft EIS) and expected offsite concentrations of radionuclides in air, milk, and water (Table 5-20 of the draft EIS). Source terms for L-Reactor and associated support facilities are given in the EIS. Source terms for other nuclear facilities are not listed in the EIS to avoid overburdening

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	(See attached comments.) Therefore, this section needs to be strengthened in the final document to provide an adequate assessment of contaminant levels.	the average reader with details but are provided in the following documents: o Savannah River Plant - Average of 1978, 1979, and 1980 releases published in the Annual SRP Environmental Monitoring Reports, i.e., DPSPU-79-30-1, DPSPU-80-30-1, and DPSPU-81-30-1. o Fuel Materials Facility-SRP - Environmental Assessment, Naval Reactor Fuel Materials Facility, U.S. Department of Energy, DOE/EA-0170 (1982). o Defense Waste Processing Facility-SRP - Environmental Impact Statement - Defense Waste Processing Facility - Savannah River Plant, U.S. Department of Energy, DOE/EIS-0082 (1982). o Vogtle Nuclear Power Plant - Final Environmental Statement - Alvin W. Vogtle Nuclear Plant, U.S. Atomic Energy Commission (1974).
FF-2	A third area discussed in our February 9, 1983 position statement relates to the thermal aspects of the discharge from the L-Reactor.	Section 4.4.2 of the EIS, which discusses cooling-water mitigation alternatives, has been revised based on public comments received on the draft EIS. Specifically, Section 4.4.2 has been revised to provide a detailed discussion of additional combinations of various cooling-water systems. In Section 4.4.2, each of the cooling-water mitigation systems is evaluated for attaining the thermal discharge limits of the State of South Carolina. Section 4.4.2 and a revised Appendix I, Floodplain/Wetland Assessment, discuss the wetland impacts of each of the systems considered. The Department of Energy has been reviewing and evaluating alternative cooling-water systems for L-Reactor. Based on these reviews and evaluations, and consultations with representatives of the State of South Carolina regarding a mutually agreed upon compliance approach, a preferred cooling-water mitigation alternative is identified in this EIS. This preferred cooling-water alternative is to construct a 1000-acre lake before L-Reactor resumes operation, to redesign the reactor outfall, and to operate L-Reactor in a way that assures a balanced biological community in the lake. The Record of Decision prepared by the Department on this EIS will state the cooling-water mitigation measures that will be taken which will allow L-Reactor operation to be in compliance with the conditions of an NPDES permit to be issued by the State of South Carolina.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FF-3	We continue to view this as a matter between the State of South Carolina and the Department of Energy. Georgia will continue to support South Carolina's efforts to ensure protection of valuable groundwater resources of the region. We urge the Department of Energy to move forward expeditiously with the various studies, including groundwater contamination, that have been agreed to with South Carolina.	As noted in the opening remarks to the public hearings on the L-Reactor EIS, the DOE is committed to (1) an expanded program of sitewide ground-water monitoring and study; (2) the involvement of the State of South Carolina in onsite and offsite ground-water monitoring activities; and (3) mitigative actions at SRP to reduce pollutants released to the ground water and to establish with the State of South Carolina a mutually agreed-on compliance schedule. Current plans call for discontinuing the use of the M-Area seepage basin before April 1985 and constructing a process wastewater-treatment facility (Section 5.1.1.2.). The phaseout of the seepage basins in F- and M-Areas is planned for late 1988; the phaseout of the low-level waste burial ground is planned in the late 1990s. The "SRP Ground-Water Protection Implemention Plan" was recently developed to examine strategies and schedules to implement mitigative actions required to protect the quality of the ground waters beneath SRP. Implementation of mitigative actions would be accomplished under DOE's Resource Conservation and Recovery Act requirements, and would be compatible with the State of South Carolina's hazardous-waste management regulations. This action plan will be the subject of a separate NEPA review (Section F.6). The State of South Carolina and Federal agencies are reviewing plans for impeding the growth of the contaminant plume and the removal of the chlorinated hydrocarbons using a combination of recovery wells, a large air stripper, and injection wells and/or a spray irrigation system. A pilot air stripper is currently operating in M-Area. In addition, the health of onsite personnel will be protected by changes in the water distribution system, which will obtain potable water only from the A-Area Tuscaloosa wells, which are unlikely to receive contamination from Tertiary aquifers.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	In conclusion, please be assured that we intend to continue working with the Department of Energy staff in a cooperative manner to ensure adequate protection of our environmental resources. In moving forward to accomplish this objective, we look forward to the inclusion of a thorough and more detailed cumulative effects section in the Final Environmental Impact Statement. With kindest regards, I remain, Sincerely, Joe Frank Harris	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATE OF GEORGIA'S REVIEW COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR THE L-REACTOR OPERATION	
FF-4	1. In Section 5.2, "Cumulative Impacts", radiological source terms (release rates in Curies per year) are not presented for any of the facilities listed. The absence of release rate information prevents thorough technical review of this Section.	See the response to comment FF-1.
FF-5	2. The incremental radiological release data presented in Tables 4-10, 4-11, 5-7, 5-8, 5-9, and 5-10 for L-Reactor and support operations appear to be inconsistent in several cases with earlier release data presented in the SRP Annual Reports. For example, Tables 4-11, 5-7, and 5-9 show incremental Co-60 releases to surface streams of 7.8×10^{-2} Curies while Table 42 of the 1982 SRP Annual Report (DPSPU 83-30-1) shows that the total Co-60 release from the entire SRP operation was 1.1×10^{-4} Curies in 1982.	Cobalt-60 releases to streams were based on 1978, 1979, and 1980 operating experiences, adjusted to reflect the planned mode of operation in L-Reactor. Releases of radiocobalt in 1979 were higher than average for SRP (0.41 curie) and dominate the average for the 3-year period. Releases in both 1981 and 1982 were below the 3-year average.
FF-6	3. Section 5.2, "Cumulative Impacts", does not address the discharge of non-radioactive wastes to the environment, yet Table 5-1 presents incremental non-radioactive releases to on-site seepage basins. It is difficult to assess this incremental information on its own merit. The release of non-radioactive wastes from current SRP operations should be addressed in this Section. Also, the Summary (page S-5) states that use of the M-Area seepage basin will be discontinued by March 1985. Information should be presented in the final EIS for the projected disposal of chemical and radiological wastes after that date.	Incremental releases of non-radioactive releases to the environment as the result of operation of SRP facilities supporting L-Reactor are discussed in Section 5.1.1.2. All non-radioactive discharges from SRP will meet the conditions set forth in an NPDES permit issued by the State of South Carolina. Closure of the M-Area seepage basin by April 1985 is discussed in Sections 5.1.1.2 and 5.1.1.4. As noted in Section 5.1.1.2, process wastewater from M-Area will, after treatment, be released to surface waters in accordance with the limits of an NPDES permit. DOE plans to conduct a separate NEPA review of the ground-water protection program and thermal mitigation of currently operating reactors (K and C). Additional information on the NEPA review of the "SRP Ground-Water Protection Implementation Plan" is provided in Section F.6 of the FEIS.
FF-7	4. In Table 2-2, the DEIS states that about 80,000 Curies of radioactivity, primarily tritium, will be released annually to the atmosphere from L-Reactor. This figure does not account for the incremental increase in discharges from L-Reactor support operations. For example, the total radioactive release for tritium (H-3), Kr-85, and Ar-41 from current operations,	Table 2-2 of the darft EIS lists releases to the atmosphere only from L-Reactor. Atmospheric releases from support operations are listed in Table 5-10 of the draft EIS. It is true that the total amount of H-3, Ar-41, and Kr-85 expected to be released from L-Reactor plus support operations will be about 280,000 curies. The total of these three radionuclides for

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	not including the L-Reactor, to the atmosphere is about 1,000,000 Curies per year. With the addition of the L-Reactor and incremental support operations the total release of radioactivity for these same three radionuclides will increase to 1,280,000 Curies per year.	current SRP operations (average of 1978, 1979, and 1980) was approximately 900,000 Ci, for an overall total from SRP of about 1,170,000 Ci.
FF-8	5. Several of the radionuclides, presented in Tables 4-11 and 5-8, which are discharged into seepage basins in liquid form are volatile. No information is presented in the DEIS concerning the atmospheric release of radionuclides such as iodine from the seepage basins.	Of the radionuclides released to seepage basins (Tables 4-11 and 5-8 of the draft EIS), only tritium and I-131 are normally volatile. The evaporation of tritium oxide to the atmosphere is accounted for in the EIS. Since very small amounts of I-131 are to be discharged to seepage basins, volatilization of a small fraction was not accounted for because of its insignificant contribution to offsite dose.
FF-9	6. In Section 3.7.1.2, the DEIS states that recent on-site monitoring showed Cs-137 levels in soil up to 53 millicuries per square kilometer. Table 13 of the 1982 SRP Annual Report shows Cs-137 levels on SRP property of up to 109 m Ci/km^2 compared to a background level at 100 miles radius of 36 mCi/km^2. This report also shows Pu-238 and Pu-239 levels on SRP property which are significantly higher than background levels. The final EIS should contain a discussion of the impact the L-Reactor and support operations will have on these levels in soil. The effects of long-term deposition and rainwater washoff of these materials need to be discussed.	Doses related to airborne radioactive releases from L-Reactor and its support facilities are described in the EIS, as is the remobilization of cesium-137 and cobalt-60 in Steel Creek. L-Reactor lies in the Steel Creek watershed. Washoff of radionuclides, which may exist in L-Area and the Steel Creek watershed as a whole, has resulted in very minor cesium-137 transport, typically less than 0.25 curie per year including cesium-137 remobilized in Steel Creek. This release would result in a dose to the hypothetical maximally exposed individual of less than 0.2 millirem per year. Levels for fallout radioactivity are measured annually in soil from onsite and offsite. Fallout concentration measurements vary from year to year because samples are not obtained from the exact same location each year and because of the inhomogenous nature of the soils. Table 14 of the 1982 SRP environmental monitoring report (a summary of 10 years of soil analysis data) shows the extent of this variability. Section 3.7.1.2 of the EIS will be changed to show that the average of onsite Cs-137 deposition (1976-1982) is 50 millicuries per square kilometer. The average deposition offsite was 48 millicuries per square kilometer during this same period. The years 1976-1982 were selected to calculate the average because the data for this period all represent analyses of 5-cm depth soil cores. Cs-137 of onsite soils is not expected to differ significantly from offsite soils because only about 2.5 curies

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		have been released to the atmosphere from SRP since startup and would not be a measurable increase above the estimated deposition of about 80 curies from weapons test fallout on the plant site (104 millicuries fallout per square kilometer). On the other hand, Pu-238 and Pu-239 levels on the SRP site are higher than offsite as shown in Tables 13 and 14 of the 1982 site report. This is to be expected because the 0.7 curie of Pu-238 and 3.0 curies of Pu-239 released since plant startup is larger than the estimated deposition of about 1.6 curies of weapons test Pu-239, 240 fallout per square kilometer. Most of the plutonium releases at SRP occurred prior to 1970. Releases to the atmosphere in recent years have made an insignificant contribution to either the onsite or offsite soil inventory. Likewise, the operation of L-Reactor and support operations will have an insignificant effect on levels of these radionuclides in soil. The effect of rainwater washoff of radionuclides deposited from weapons test fallout and prior SRP releases is not an effect of the proposed restart of L-Reactor and is beyond the scope of the EIS. Measurements of environmental Cs-137, Pu-238, and Pu-239 are reported in the annual SRP environmental monitoring report.
FF-10	7. No monitoring data are presented to support the assessment of individual and population doses due to the commercial harvest of fish and shellfish (Section 5.2, Appendix B). Due to the long life-span of such fish as American Shad and Striped Bass, as well as their positions in the food chain, DOE needs to make a commitment in the final EIS to initiate a sampling program to determine the levels of radionuclides and other potentially toxic chemicals in these fish.	The comprehensive monitoring programs for SRP are summarized in Chapter 6 of the EIS and in the publicly available annual monitoring report Environmental Monitoring in the Vicinity of the Savannah River Plant. DOE has initiated a program to obtain commercially important fish and shellfish for radiological analyses.
FF-11	8. In the discussion of the "Radiation Environment" (Section 3.7) several data concerning the average annual whole body doses due to fallout (external exposure, inhalation, ingestion of food and water) are presented. The final EIS should also present the concentrations of radionuclides in the environment leading to these exposures. (mCi/km^2 deposition for external radiation, Ci/m^3 in air for inhalation dose, pCi/g in food products, and pCi/l for water and milk).	Information on the dose to individuals from weapons test fallout (Section 3.7) was included in the EIS to help characterize the radiation environment in the vicinity of the Savannah River Plant. Doses given for fallout are typical for this latitude and were obtained from the reference given [Sources and Effects of Ionizing Radiation, United Nations Scientific Committee on the Effects of Atomic Radiation (1977)]. More detailed data on local fallout measurements are given in the annual SRP environmental monitoring reports. The most recent report in this series, for 1982, is DPSPU-83-30-1.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FF-12	9. In section 5.2.4.2, the DEIS states that Plant Vogtle will *discharge blowdown water through a diffuser to the river.* This statement is incorrect. Plant Vogtle will not use a diffuser but will use a single point discharge pipe. (Georgia Power Company, Vogtle Electric Generating Plant - Operating License Stage Environmental Report (VEGP-OLSERT) Section 3.4.5). This may or may not impact the conclusion reached in the DEIS related to the interactions of the Vogtle and SRP thermal plumes.	This statement has been corrected and will not impact the conclusion concerning interrelations of the Vogtle and SRP thermal plumes.
FF-13	10. In the discussion of alternatives to the discharge of waste-water to the L-Area seepage basin, it is stated that "The values presented in Table 4-38 are only those associated with disassembly basin purge water and do not include releases from other sources such as heat exchanger leakage, process sumps, and evaporative loss from process water leaks." The values presented in Table 4-38 are identical to the values presented in Table 4-11 for liquid releases to the L-Area seepage basin due to all L-Reactor operations. Is one then to assume that all liquid releases other than disassembly basin purges will be direct to Steel Creek? If this is not the case, then the other releases to the seepage basin should be factored into the release calculations. If it is the case, it should be clarified that all liquid releases other than disassembly basin purges discharge directly to Steel Creek.	As noted in the first paragraph of Section 4.1.2.2 of the draft EIS, radioactive materials will be discharged in liquid effluents from L-Reactor to Steel Creek during normal operation of the reactor. Sources of these discharges include small process leaks into the cooling water discharge and releases to the process sewer. Only disassembly basin purge water is discharged to the seepage basin. The doses presented in Section 4.1.2 include these sources as well as radionuclides reaching the creek via a ground-water path from the L-Reactor seepage basin. Table 4-38 of the draft EIS repeats information contained in *Table 4-11 to provide a ready reference in Section 4.4.3 to the* radiological source term associated with the L-Area seepage basin.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF THE HONORABLE RICHARD L. OTTINGER

U.S. HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON ENERGY CONSERVATION
AND POWER
OF THE
COMMITTEE ON ENERGY AND COMMERCE
WASHINGTON, D.C. 20515

November 14, 1983

The Honorable Donald P. Hodel
Secretary
Department of Energy
Forrestal Building
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Re: Comments on the Department of Energy Draft Environmental Impact Statement on L-Reactor Operation, Savannah River Plant (DOE/EIS-0108D)

Dear Mr. Secretary:

My comments will be confined to the issue of assurance of the safety of the proposed reactor operation, raised by DOE's departure from its established, long-standing policy to operate its nuclear facilities in conformance with applicable regulations for commercial nuclear facilities.

FG-1 The operations of nuclear facilities for defense purposes are not regulated by the laws or regulations which apply to commercial nuclear facilities, or the workers' health and safety protections of the Occupational Safety and Health Administration. This exception for defense-related nuclear facilities is granted because these facilities are owned by the U.S. government, through the Department of Energy, and because the Department, and its predecessors, have had a long-standing commitment to operate its nuclear facilities in conformance with applicable environmental and safety regulations for commercial

The restart of L-Reactor will be in compliance with all applicable Federal and state environmental protection regulations. As noted in the comment, L-Reactor is excluded from NRC licensing requirements in accordance with Section 110(a) of the Atomic Energy Act, as amended. DOE is responsible for regulating the health and safety programs for its facilities. The radiation protection standards of DOE are comparable to those established by the NRC (10 CFR 20) for a production facility (i.e., 500 millirem to the whole-body in any one calendar year). In addition, like the requirements of NRC, the engineered safety features of SRP reactors are based on the need to limit potential radiological consequences in the event of an accident.

Comment number	Comments	Responses
	nuclear facilities. This arrangement has proven to be useful in meeting the needs of all concerned. National security information is guarded, public health and safety is assured to approximately the same level of risk from commercial reactors, and operational information useful to both the Nuclear Regulatory Commission and the Department of Energy can be easily exchanged. In my view, the continued commitment of the Department to the policy of conformance to the spirit, if not the letter, of commercial regulation, is vital to the continuation of this policy and in this instance, to health and safety of the people of South Carolina.	
FG-2	To date, the Department has had a relatively successful nuclear program. However, now when the commercial nuclear industry is attempting to recover from the Three Mile Island accident and indictments, and the widespread concern over quality assurances, it is not the time to depart, or appear to depart from the Department's commitment to safe operation of its nuclear facilities. In this context, it is difficult to conceive of the Commission sanctioning the operation of a 2350 MWT reactor (DEIS, Vol. 1, p. 2-14) in the absence of a containment or confinement system as an independent and final barrier to the release of airborne radioactivity in the event of a severe accident. Regulations adopted in 1962, applicable to both commercial and defense-related facilities regarding site suitability and reference dose values, require the identification of three tables (10 CFR 100). The first establishes the "source term", or the amount and composition of radioactivity which may be released in a severe accident; the second is meteorologic data and site configuration to determine atmospheric dispersal; and the third would establish the prospective dose which could be absorbed by an individual at the site boundary.	DOE has not departed from its prior commitment to safe operation of its nuclear facilities. L-Reactor is equipped with a confinement system which, coupled with the large plant site, effectively mitigates the consequences of all credible reactor accidents. The confinement system filters all air leaving the reactor building; it traps particulates and radioiodine in the event of an accident. Although noble gases and tritium would not be trapped, the offsite radiation doses would be within the dose guidelines(10 CFR 20 if it were to apply). The dose would represent a very low risk to the public health and safety as a result of both the confinement system and the long distance to the plant boundary.
FG-3	Since these figures, particularly the source term, are the basis for the safety evaluation of the reactor, it is particularly important to clearly establish how these figures were selected and justified. Of great concern to me is the statement that "no mechanisms have been identified that will cause a reactor accident resulting in core damage (fuel melt) greater than 3 percent." (DEIS, Appendix G, p. 3) This assumption is	The source term used for evaluation of the L-Reactor confinement system was established in accordance with the requirements of 10 CFR 100. This requirement of the NRC does not assume or require that the source term be based upon the assumption of a full-core meltdown; instead, 10 CFR 100 clearly states that the source term be based on an accident that "would result in potential hazards not exceeded by those from any accident

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	crucial to finding that only small amounts of radiation could be released, and therefore, to DOE's assertion that additional containment or confinement technology is not needed, since it would provide only a small increment of containment.	considered credible." The 3-percent core-melt accident was selected as the appropriate accident for comparison to 10 CFR 100 dose criteria because it is a major accident, postulated from the consideration of known possible accident events, that would result in potential hazards not exceeded by the hazards of any other accident considered to be credible. The statement quoted from page G-3 of the DEIS is incorrect. The statement has been corrected in this final EIS to read "No credible accident sequences have been identified that will cause a reactor accident resulting in core damage greater than 3 percent." Accident sequences that potentially could result in more than 3-percent core melting have been identified; however, such sequences have been judged to not be credible initiators based upon over a 100 years of SRP reactor operation and over 30 years of research and development specific to the safety of SRP reactors.
FG-4	This assumption is a radical departure for DOE. In the past, for other Savannah River heavy water production reactors, and even for the Clinch River Breeder Reactor, DOE has utilized the usual source term for light water reactors--based on an assumption of 100 percent core damage. (Memorandum from W.S. Durant to E.C. Nelson, "Proposed Containment Shell for Building 105-C," Tech. Div. Savannah River Laboratory (SRL), DPST-64-423, Jan. 29, 1965; Roger E. Cooper and Bernard C. Rusche, "The SRL Meteorological Program and Off-Site Dose Calculations," SRL, DP-1163, Sept. 1968; Memorandum from S.P. Tinnes to G.F. Merz, "Airborne Activity Confinement System Base Case Design Basis Accident," Tech. Div. SRL, DPST-79-441, July 19, 1979; "Site Suitability Report in the Matter of Clinch River Breeder Reactor Plant," NUREG-0786, June 1982, p. III-8.) A full discussion of the explanation and justification for this radical departure from usual DOE practice is necessary in the DEIS. I am aware of the research programs underway to reevaluate the source term at the NRC, but as yet it is my understanding that these studies have not indicated the need for revision.	The use of a 3-percent core-melt accident for assessing the adequacy of the confinement system relative to 10 CFR 100, is not a departure from past practice, but it is consistent with past practices. It is also consistent with respect to the requirements of NEPA in not including the impacts of speculative information or potential impacts with an extremely low probability of occurrence.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Such a discussion of the selection of a new source term is a necessary prerequisite to evaluating the conclusion that additional containment is not necessary, or that the national security needs for additional plutonium and tritium production are sufficient to overcome the need for new containment or confinement technology due to time constraints.	
FG-5	Alternative materials production options identified in the DEIS appear to be sufficient to provide needed materials pending the 36 months necessary for the addition of a containment or confinement mechanism from the options identified in Table 4-31. (See testimony of Dr. Thomas B. Cochran, at DOE Public Hearings, November 3, 1983.) The five month schedule advance achieved by the Purex processing facility at the Hanford site occurred after the preparation of the DEIS. This advance contributes nearly one-half of the amount of materials expected to be needed but not produced if the L-Reactor restart were delayed the 36 months required for containment/confinement installment. In summary the DEIS is defective in that it inadequately addresses or justifies a radical departure from estimates of a maximum credible accident and source term description. This unjustified departure leads DOE to the as yet unwarranted assumptions regarding the need for radionuclide containment or confinement technologies. Finally, if DOE were to find that additional containment or confinement technologies are required, sufficient options have been identified in the DEIS or are available due to the five month schedule advance for start-up of the Purex facility that has been achieved that national security needs could still be met. The DEIS should be revised to address these concerns. Sincerely, Richard L. Ottinger Chairman	Alternative material production options are not sufficient to provide needed nuclear weapon materials. Specific response to the suggestions of Dr. Cochran, including the impact of the early restart of the PUREX facility and the viability of delaying restart of L-Reactor, are contained in this appendix for comment letter "BL."

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF R. LEWIS SHAW, P.E. South Carolina Department of Health and Environmental Control 2600 Bull Street Columbia, S.C. 29201 November 14, 1983 Mr. M.J. Sires Assistant Manager for Health, Safety and Environment DOE, Savannah River Operations Office Post Office Box A Aiken, South Carolina 29801 Re: Comments on draft EIS. Dear Mr. Sires: This office has completed its review of the Draft EIS for restart of L-Reactor, dated September 1983. In this connection, the Department offers the following comments from various program areas for your consideration. <u>Bureau of Solid and Hazardous Wastes Management.</u>	
FH-1	1. Page 4-22. A permit should be required for disposal of sludge from the sanitary waste treatment plant in the sludge pit near Central Shops area. I assume no other waste is handled here.	The disposal of sludge from the sanitary waste treatment plant is covered under the Clean Water Act. The sludge pit was in operation in 1979 when a construction permit was requested from SCDHEC under the provisions of the Clean Water Act. A resubmittal of this permit request was made in early 1984.
FH-2	2. Page 4-37. Are any liquids handled in the low level waste burial area? Radiological Health should be directly involved with this area in light of their experience at Chem-Nuclear in Barnwell.	No liquids containing radioactivity are buried in the low-level-waste burial ground.
FH-3	3. Page 5-4. It appears from ground-water monitoring data that the seepage basins in the F and H areas (fuel fabrication) have already contaminated ground water above IPDWS for Hg. These basins are under interim status as hazardous waste	The State of South Carolina has been notified about the nature and extent of ground-water contamination resulting from the use of seepage basins in F-, H-, and M-Areas. A ground-water monitoring report is submitted quarterly to SCDHEC. In

Comment number	Comments	Responses
	facilities. Owners and operators of such facilities are required to: a. Notify, in writing, the State within seven (7) days of such finding; b. Determine the cause, if possible, and; c. Determine the extent or potential of contamination and discontinue operation until the Department determines what action is to be taken. In light of the above, the Department cannot concur with any incremental increase of Hg levels in the ground water. The EIS states that the increased level of Hg in the ground water is estimated to be 0.008 ppm.	addition, SCDHEC has just completed its review of the SRP "Ground-Water Protection Implementation Plan." This action plan will be the subject of a separate NEPA review. The continued use of the F- and H-Area seepage basins is being evaluated and this topic will be covered in the separate NEPA review of the SRP "Ground-Water Protection Implementation Plan." Also see the responses to comments DA-6 and DA-7.
FH-4	4. Page 5-6. Coal ash disposal activities should be permitted by the State.	Coal ash disposal activities are regulated by the Resource Conservation and Recovery Act of which activities controlled by the Atomic Energy Act are exempt. Therefore, these activities are not subject to state permitting under RCRA. Also see the response to comment FH-1. DOE practices will be compatible with SC requirements.
	Bureau of Radiological Health.	
	Paragraph 4.1.2.1	
FH-5	It is stated that there will be "more frequent" target discharge from the L-Reactor than from the other operating reactors. Will the increased activity make a qualitative difference in the level of safety of the reactor operations? Has the increased level of operations been reflected in the dose projections given in Appendix B? In particular, is it reflected in the incremental effects of the L-Reactor compared to the overall emissions of the Plant?	More frequent target discharges anticipated from L-Reactor (Section 4.1.2.1 of the EIS) will not make a difference in the level of safety of reactor operations. The releases of radioactivity from L-Reactor and associated support facilities are based on the planned operating mode of the reactor. Dose projections in Appendix B are based on these anticipated releases and are reflected in the incremental effects of L-Reactor as compared to the overall emissions of the plant.
	Paragraph 4.1.2.2	
FH-6	Has any consideration been given to reducing the discharge of tritium from the discharge basins into Steel Creek? What are the alternatives?	The source of most of the tritium expected to be discharged from L-Reactor to seepage basins is the purge water from the disassembly basin. The disassembly basin is the location where fuel and target elements are temporarily stored following discharge from the reactor. Tritium and other radionuclides are carried into the disassembly basin as process water adhering to fuel and target assemblies and as water of hydration in aluminum oxide on the assemblies. DOE has implemented measures to minimize carryover of contaminated moderator to the disassembly basin.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		Alternative methods of disposal of disassembly basin water are described in Section 4.4.3 of the EIS. The methods considered were: o Discharge to seepage basins o Direct discharge to Steel Creek o Evaporation of tritium to the atmosphere o Detritiation of reactor moderator, the source of the tritium.
	Paragraph G.4.1.19	
FH-7	Have any modifications to the fuel charging and discharging machine been required as a result of the recent incident during which an irradiated fuel element was stuck between the reactor and the discharge canal for several hours? Are the conclusions of this section still valid?	No modifications were made; none were required. The safety system functioned as designed. The conclusions in the section are valid.
	Paragraph G.5.5	
FH-8	Are the Pillinger and Marter (1982) dose conversion factors comparable to the dose conversion factors in Reg Guide 1.109? Are they comparable to other standard dose conversion factors?	The dose conversion factors of Pillinger and Marter (1982) are the same as those described in Reg. Guide 1.109. However, the factors were obtained from a more recent Nuclear Regulatory Commission publication, i.e., G. R. Hoenes and J. K. Soldat, "Age-Specific Radiation Dose Commitment Factors for a One-Year Chronic Intake," U.S. Nuclear Regulatory Commission NUREG-0712, (1977).
	Paragraph H.2	
FH-9	Have the size and shape of ingestion planning zones been calculated? The State will determine what areas should be included in any emergency planning zones in order to provide a level of protection which is comparable to that provided by EPZs around commercial power plants. Given that State agencies have no direct control over Plant operations, we are necessarily dependent on	The ingestion pathway EPZ discussion has been expanded in the EIS. The zone now includes a corridor 2 km wide down the Savannah River, the Port Wentworth water service area, the Savannah River delta and the Beaufort-Jasper Counties Water Authority area (essentially all of Beaufort and Jasper Counties).

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	information from Plant officials in order to determine a basis for planning and to recommend protective actions in the event of an accident. Will a fifty-mile ingestion EPZ provide an adequate margin of safety?	
	Appendix J	
FH-10	The list of Studies in Progress includes several issues which have concerned the Department. What progress has been made toward installing systems to reduce or prevent emissions of noble gasses? Are methods to reduce tritium releases available? What alternatives exist to the present system of discharge to Steel Creek (and other Plant streams)?	Alternatives to improve the existing SRP airborne activity confinement system are discussed in Section 4.4.1 of the EIS. Studies in progress for all the alternatives except low temperature adsorption are aimed at the development of more accurate cost estimates and measures of effectiveness of the alternatives. Experimental research is in progress to determine the effectiveness and feasibility of the low temperature adsorption technique. Approximately two years will be required to complete the experimental program. A moderator detritiation facility to reduce tritium releases is discussed in Section 4.4.5 of the EIS. In Section 4.4.4, alternative disposal methods for disassembly basin purge water are discussed. Alternatives include direct discharge to seepage basin, evaporation, discharge to Steel Creek, and moderator detritiation.
	Conclusion	
FH-11	The Draft EIS contains information about the release of radioactive material from routine operations and from accidents. The analysis of projected doses to members of the public is consistent with similar calculations of the Bureau. On the other hand, there is less information to compel the conclusion that the proposed action can only be done in one way. The Bureau concurs that the operations, as described, will probably not result in excessive exposures outside the Plant boundary, although we are not convinced that further reductions are impossible.	Further reductions are always possible at some price, e.g., dollars, efficiency, and production. All timely, cost-effective alternatives have been considered in preparing L-Reactor for operation.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Bureau of Water Pollution Control.	
FH-12	1. The direct discharge to Steel Creek (reference case) is and would continue to be a thermal violation of the State water quality standards. 2. The once-through spray canal system would result in cooling the discharge by only 3°C (5.4°F) before entering Steel Creek. This system would cause a thermal violation of the State water quality standards in Steel Creek. Wetlands and habitat would still be reduced, as per the direct discharge. 3. The small impoundments-rubble dams system utilizes a series of small dams on Steel Creek for cooling and, hence, is no different from the direct discharge alternatve except that the water is cooler by the time it reaches the Savannah River Swamp. Water quality standards would still be violated in Steel Creek. Habitat reduction would be significant. 4. The small impoundments - 500-acre lake system would utilize larger lakes on Steel Creek than the rubble dam alternative but the water quality standards would be violated in Steel Creek. Habitat reduction would be significant. 5. Once-through cooling by diversion to Pen Branch would result in no thermal impact upon Steel Creek. However, it would impact the upper unaffected reaches of Pen Branch. This would " solve" L-Reactor's problem in regard to Steel Creek but it would just transfer to another creek system. Water quality standards would be violated in Pen Branch. 6. *The lake-canal diversion to Pen Branch would use a lake on* Steel Creek for first cooling, then send it over to Pen Branch. Water quality standards would be violated in Steel Creek and Pen Branch. Lake temperature would be greater than 90°F. 7. The 500-acre lake or rubble dams combined with spray cooling would still use Steel Creek for cooling purposes and water quality standards would be violated in Steel Creek.	Section 4.4.2 of the EIS, which discusses cooling-water mitigation alternatives, has been revised based on public comments received on the draft EIS. Specifically, Section 4.4.2 has been revised to provide a detailed discussion of additional combinations of various cooling-water systems. Section 4.4.2, each of the cooling-water mitigation systems is evaluated for attaining the thermal discharge limits of the State of South Carolina. Section 4.4.2 and a revised Appendix I, Floodplain/ Wetland Assessment, discuss the wetland impacts of each of the systems considered. The Department of Energy has been reviewing and evaluating alternative cooling-water systems for L-Reactor. Based on these reviews and evaluations, and consultations with representatives of the State of South Carolina regarding a mutually agreed-upon compliance approach, a preferred cooling-water mitigation alternative is identified in this EIS. This preferred cooling-water alternative is to construct a 1000-acre lake before L-Reactor resumes operation, to redesign the reactor outfall, and to operate L-Reactor in a way that assures a balanced biological community in the lake. The Record of Decision prepared by the Department on *this EIS will state the cooling-*water mitigation measures that will be taken which will allow L-Reactor operation to be in compliance with the conditions of an NPDES permit to be issued by the State of South Carolina.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	8. The mechanical draft recirculating cooling towers alternative would not meet the 90°F stream temperature limit, thus, water quality standards would be violated in Steel Creek. But is does appear that a cooling tower combined with a spray canal system alternative (not evaluated) would meet State standards. The delta 5°F criteria might not be met though, owing to the flows involved.	
	9. The cooling tower (once-through) with pipeline to the Savannah River Swamp (Steel Creek Delta) alternative could be an approvable alternative in that water quality standards would be met and only a "minor" impact on wetlands would occur.	
	10. Recirculation through creation of L-Pond would use Steel Creek for cooling purposes and would violate the State water quality standards.	
	11. Recirculation through KAL Pond created by the damming of Steel Creek, Pen Branch, and Indian Grave Branch would still violate water quality standards for these streams.	
	12. Recirculation through creation of High-Level Pond would involve the damming of Pen Branch and would violate water quality standards in the stream and have a discharge from the pond of higher than 34°C (94°F).	
	13. Recirculation through PAR Pond would lead to increased thermal stress on the fish in PAR Pond and increase its summer temperature to over 90°F, thus violating water quality standards.	
	14. The direct discharge with fish management alternative "writes off" Steel Creek and simply uses restocking Savannah River fish as a means of replacing the Steel Creek environment.	
	15. Direct discharge with power reduction would still lead to minimum discharge temperature of 40°C (104°F) to Steel Creek. Water quality standards would be violated.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	If you have any questions regarding these comments, please contact us. Very truly yours, R. Lewis Shaw, P.E. Assistant Deputy Commissioner Environmental Quality Control	

Comment number	Comments	Responses

STATEMENT OF JAMES A. TIMMERMAN, JR.

South Carolina
Wildlife & Marine
Resources Department

November 14, 1983

Mr. M.J. Sires, III
Assistant Manager
Health, Safety & Environment
Department of Energy
Savannah River Operations Office
P. O. Box A
Aiken, S. C. 29801

Re: Draft EIS - L-Reactor Operation, Savannah River Plant, Aiken, S.C.

Dear Mr. Sires:

Personnel of the South Carolina Wildlife and Marine Resources Department have reviewed the Draft Environmental Impact Statement - L-Reactor Operation, Savannah River Plant and offer the following comments.

The Draft EIS adequately describes the existing environmental conditions and the expected impacts on fish and wildlife resources from the restart of the L-Reactor. These impacts are summarized as follows:

....withdrawal of 4% of the average annual riverflow, and 7% of the 7-day, 10-year low flow of the Savannah River.

....entrainment of 7.7 million fish eggs and 7.6 million fish larvae annually.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	....destruction of approximately 730 acres of wetland habitat in Steel Creek and the Savannah River swamp. ....an additional loss of 7 to 10 acres of wetland annually. ....growth of the Steel Creek delta at a rate of 3 acres/year. ....restricted access by fishes to approximately 2,500 acres of wetlands as a result of the thermal plume. ....release of radiocesium to the aquatic environment and the potential contamination of downstream fish, shellfish and other organisms. Thus, it is apparent from the data presented in the DEIS that the restart of the L-Reactor as proposed will have a significant adverse impact on fish and wildlife resources in the project vicinity.	
FI-1	The DEIS states that "Studies during the last two decades have indicated that no major changes in aquatic species in the Savannah River have occurred as the result of operations of SRP." The studies conducted by the Academy of Natural Sciences of Philadelphia and reported in Thermal Effects on the Savannah River (October 23, 1981), state that "from this study of the species which have been collected since 1951 in the vicinity of the Savannah River Plant, there was no definite evidence that the addition of heat, either by Four Mile Creek or by Steel Creek, has been detrimental to the aquatic communities at our Stations 3 and 5. Because each of these stations were located about 6 miles downstream from the source of heated effluent (Four Mile Creek and Steel Creek), the effects of the heated plumes were not studied. The stations were beyond the area where a plume effect might have been damaging." The report also found that there were substantial shifts in aquatic species at the sampling stations during the course of the study,	Aquatic ecological monitoring studies have been expanded to include areas and quantitative studies of representative aquatic species. These studies are described in Chapter 6 of the EIS. In addition, further studies will be implemented as part of the comprehensive cooling-water program.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	but that these shifts could not be definitely related to impacts caused strictly by temperature effects. It also appears that no evaluation was made of potential impacts on population levels of important aquatic species.	
FI-2	When the cumulative impacts of the SRP operations are considered, the populations of aquatic organisms could be adversely impacted. Approximately 19% of all fish eggs and larvae passing the SRP intakes would be entrained and destroyed. Approximately 1,600 acres of wetlands in the corridors of the thermally impacted streams would be adversely impacted, as well as 5,000 acres of the adjacent Savannah River swamp. Therefore, the extent of the adverse impacts on fish and wildlife resources is much greater when the entire SRP operations are considered.	The cumulative effects of all SRP operations are addressed in Sections 5.2.4 and 5.2.5 of the EIS. DOE is conducting thermal mitigation studies to select cooling-water systems for the currently operating SRP reactors (K and C) to effect mitigation of the environmental effects of thermal discharges from these reactors.
FI-3	The DEIS considers the restart of the L-Reactor, as scheduled, to be the only viable alternative that will produce the quantity of weapons material desired on the time schedule desired. We do not feel that this is a proper approach to the evaluation of potential alternatives, and more consideration should be given to the other production alternatives.	Section 2.1 describes production options to the L-Reactor; this section has been expanded. The DOE has analyzed all possible full-production options; basically, the only option to the L-Reactor to produce equivalent amounts of plutonium is another production reactor. Existing production reactors were considered, as was a new production reactor. A new production reactor was dismissed because it would have no effect on the near-term need for plutonium, which the L-Reactor restart will satisfy. In addition to full-production options, Chapter 2 also analyzes partial-production options (1) from the standpoint of offsetting the plutonium production that would be lost if the L-Reactor restart is delayed because mitigation alternatives are being implemented and (2) as an alternative to the L-Reactor itself. The potential combinations of partial-production options that provide the greatest material production still provide only a small fraction of the needed defense materials that could be produced by L-Reactor.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FI-4	A number of alternatives were presented as possible mitigation measures for the adverse impacts resulting from the restart of the L-Reactor. However, it is clear that these mitigation alternatives are intended to be after-the-fact measures to compensate for resource losses. We believe that they should be given full consideration as means of avoiding adverse impacts prior to the restart of the L-Reactor. While a variety of possible mitigation measures are discussed, the DEIS does not propose that any of these alternatives be implemented. In fact, we do not believe that any of the presented alternatives will adequately mitigate for wetland and fish and wildlife losses resulting from the restart of the L-Reactor with once-through cooling as proposed.	Section 4.4.2 of the EIS, which discusses cooling-water mitigation alternatives, has been revised based on public comments received on the draft EIS. Specifically, Section 4.4.2 has been revised to provide a detailed discussion of additional combinations of various cooling-water systems. In Section 4.4.2, each of the cooling-water mitigation systems is evaluated for attaining the thermal discharge limits of the State of South Carolina. Section 4.4.2 and a revised Appendix I, Floodplain/Wetland Assessment, discuss the wetland impacts of each of the systems considered. The Department of Energy has been reviewing and evaluating alternative cooling-water systems for L-Reactor. Based on these reviews and evaluations, and consultations with representatives of the State of South Carolina regarding a mutually agreed upon compliance approach, a preferred cooling-water mitigation alternative is identified in this EIS. The Record of Decision prepared by the Department on this EIS will state the cooling-water mitigation measures that will be taken which will allow L-Reactor operation to be in compliance with the conditions of an NPDES permit to be issued by the State of South Carolina.
FI-5	Therefore, we would have to recommend that an appropriate cooling-water alternative (i.e., cooling towers, etc.) be implemented prior to the restart of the L-Reactor as a means of avoiding the adverse impacts on fish and wildlife resources and that appropriate fish stocking be conducted to mitigate for fishery losses from entrainment and impingement. Sincerely, James A. Timmerman, Jr. Executive Director JATjr/sa	Comment and recommendation noted. The Record of Decision prepared by DOE on this EIS will state any mitigative measures, including cooling-water mitigation alternatives, that will be taken. DOE has committed to attain acceptable compliance for all major thermal discharges at SRP.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF DR. E. W. MURBACH	
	I am Wesley Murbach. I am a resident of Aiken.	
	Based on what you said, my comments are probably not really in order. However, it is my understanding, from what we've said earlier, that the L-Reactor has been operated for years, so we should have a good idea what the environmental impact is. Therefore, I think this document (indicating) is far more than adequate.	Comments noted.
	I'd just like to go on record as a taxpayer that I think we spent far too much money on this sort of thing. I realize I'm probably a voice crying in the wilderness, but as to the credentials, I was involved in our environmental study in 1947, so I feel I know something about the environment, too.	
	Thank you.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF BRUCE BLANCHARD United States Department of the Interior Office of the Secretary Washington, D.C. 20240 ER-83/1211 Nov 28 1983 Assistant Manager for Health, Safety and Environment Savannah River Operations Office Aiken, South Carolina 29801 Dear Mr. Sires: Thank you for the letter of September 12, 1983, transmitting copies of the Department of Energy's (DOE) draft environmental impact statement for the L-Reactor Operation, Savannah River Plant (SRP), Aiken County, South Carolina. Our comments are presented according to the format of the statement or by subject.	
	Fish and Wildlife Resources	
FK-1	The draft statement clearly and accurately addresses baseline fish and wildlife resource conditions and anticipated individual and cumulative adverse impacts arising from the base case and a host of alternative measures. It is clear that the identified preferred alternative, operating L-Reactor with direct discharge of cooling water into Steel Creek and subsequent mitigation measures, will result in significant impacts to fish and wildlife resources.	Section 4.4.2 of this final EIS has been revised to provide a discussion of a number of additional combination of potential thermal mitigation measures. Based on the review and evaluation of these alternatives, and consultations with representatives of the State of South Carolina regarding a mutually agreed upon compliance approach, a preferred cooling-water mitigation alternative is identified in this EIS. This preferred cooling-water alternative is to construct a 1000-acre lake before L-Reactor resumes operation, to redesign the reactor outfall, and to operate L-Reactor in a way that assures a balanced biological community in the lake. The Record of Decision on this EIS will state any mitigation measures that will be taken prior to or after the restart of L-Reactor.
	Thermal Effects and Mitigation	
FK-2	The draft statement acknowledges on pages 4-8 to 4-10 that the effects of releasing hot cooling water to Steel Creek at	See the response to comment FK-1.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	temperatures ranging up to 80°C (176°F) and at a rate of about 12 times its natural average flow would eliminate this stream and its associated wetlands as a living environment as far down-stream as the Savannah River. We concur with the conclusion on page 4-12 that, among the alternatives considered, complete recirculation through cooling towers would be preferred. This alternative would reduce both the temperature and quantity of flow discharged to Steel Creek to within the non-lethal range and would also avoid resuspension and transport of radiocesium to the Savannah River.	The Record of Decision prepared by the Department of Energy on this final EIS will consider a number of factors in reaching a decision on the implementation of a specific thermal mitigation measure. These factors will include the impacts from thermal discharge as well as costs and the need for defense nuclear materials. The restart of L-Reactor will comply with the conditions of an NPDES permit issued by the State of South Carolina, and radioactive releases from L-Reactor will meet DOE radiation protection standards that are comparable to those of NRC (10 CFR 20) for a production facility (i.e., 500 millirem to the whole body in any one calendar year).
FK-3	The other alternatives, which would not reduce temperature and quantity of flow at the point of discharge to the environment, would simply shift the lethal effects to other streams and apparently would be more expensive than cooling towers.	A number of factors are delineated in this EIS with respect to thermal mitigation measures. The information provided demonstrates that the sum of the capital, operating/maintenance, and power loss costs averaged over a 20-year period for lakes with spray cooling and the diversions to Pen Branch, for example, are less than half of those for cooling towers. The cooling-lake alternatives, which would afford some protection to wetlands and fisheries and reduce the transport of radiocesium, are less costly in comparison with cooling-tower options. The diversions to Pen Branch are the only two thermal mitigation alternatives considered in this EIS that would divert the thermal discharge to another stream. These two alternatives are markedly less expensive than cooling towers having complete recirculation.
FK-4	The likelihood of the seasonal occurrence of fog and/or any other micro-climatic changes caused by the direct discharge of the heated cooling water into Steel Creek should be presented in the final statement.	Section 4.4.2 of the EIS has been modified to reflect the maximum range of range of fogging, icing, and salt deposition conditions resulting from cooling tower blowdown. These impacts are minor and bound similar effects from the other cooling-water alternatives.
FK-5	The draft statement does not clearly indicate the range of mitigation alternatives being considered as "subsequent mitigation measures under DOE's preferred alternative." If only the "other alternatives" listed in Section 4.4.2.4 are candidates for subsequent mitigation (i.e., thermal cogeneration, low-head hydropower, modified reactor operation, fish management and/or restocking programs, protection of similar wetlands, or support	In the draft EIS the reference to "subsequent mitigation measures" was intended to reflect all of the thermal mitigation measures in Section 4.4.2 (i.e., alternative cooling-water systems and other alternatives). This reference has been clarified in the final EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	of fisheries research), then adequate compensation for lost resources would not be available. Should the range of "subsequent mitigation measures" be wider in scope than indicated above, certain of the predicted impacts could be reduced in the long-term. For example, switchover to full recirculation cooling towers would indicate wetland recovery again and reduce impingement and entrainment. However, a direct discharge restart, even with implementation of this environmentally "best" subsequent mitigation measure, would result in immediate loss of 15 years of post-recovery succession in the Steel Creek system. It also would add to the permanent impact associated with delta growth. Scoured sediment from Steel Creek would be deposited over wetlands, increasing elevations and changing substrate types, such that post-shutdown recovery would not necessarily reflect pre-operation communities or values.	The EIS presents the predicted impacts of implementating the thermal mitigation measures either prior to or after the restart of L-Reactor. Implementation of a cooling-water mitigation system after the restart of L-Reactor identifies the loss of the post recovery succession in Steel Creek in the EIS. Some increased sedimentation from flow effects would occur and primarily effect the rate of delta growth. Implementation of an alternative cooling-water system after the restart of L-Reactor would again allow successional recovery of impacted areas.
FK-6	Certain of the mitigation options presented in the draft statement do not conform to the Fish and Wildlife Service's Mitigation Policy as published in the Federal Register on January 25, 1981. The policy establishes four resource categories to establish mitigation levels consistent with the fish and wildlife resource values involved. The floodplain habitat to be impacted by the L-Reactor restart falls into Resource Category 2 as habitat "of high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the ecoregion section." The mitigation goal for this category calls for no net loss of in-kind habitat value. None of the replacement mitigation alternatives which include restocking impacted fish species, protecting wetlands similar to the Steel Creek Swamp system, and conducting or supporting fisheries research meet the stated mitigation criteria. However, certain of these mitigation options, particularly restocking of impacted fish species, would be a viable option to pursue as mitigation for the projected impingement and entrainment impacts.	The Fish and Wildlife Service's Mitigation Policy provides a framework for mitigation recommendations by Service employees. This policy does not preclude or condition the "balancing" of potential environmental consequences and other considerations by other Federal agencies in their decisions based on NEPA documentation. To ensure that the Department of Energy in reaching its Record of Decision on this EIS is aware of the Service's classification, this final EIS has been modified to include appropriate statements that the floodplain habitat to be effected is considered by the Service to be a Resource Category 2. Also see the response to comment FK-1.
FK-7	Therefore, we do not concur with the preferred alternative of operating L-Reactor with direct discharge of cooing water into Steel Creek and subsequent mitigation measures. The fish and wildlife resource impacts associated with this alternative are clearly identified in the draft statement and include the loss of 1,000 acres of wetlands and associated functions and increases in impingement and entrainment of Savannah River fishes.	See the response to FK-1 regarding cooling-water mitigation alternatives.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FK-8	We recommend the complete recirculation of cooling water through mechanical-draft cooling towers which is identified in the draft statement as the "preferred alternative to minimize the adverse environmental effects of use of river water, impact of thermal effluents, loss of habitat and wildlife, water contamination and loss of archeological resources."	The recommendation is acknowledged. The direct discharge of cooling water as documented in the EIS is not expected, however, to result in the loss of archeological resources. Also see the response to comment FK-2.
FK-9	We strongly recommend this alternative coupled with interim implementation of the two most efficient partial options (accelerated use of the Mark 15-lattice at SRP and production of 5 percent plutonium-240 at N-Reactor) as the only alternative that would avoid significant environmental damage before start-up.	The partial production options, or combinations of options, can neither provide the needed defense nuclear materials requirements nor fully compensate for the loss of the material that would be produced by L-Reactor.
FK-10	If, however, DOE retains their selected alternative because of documented overriding national security concerns, then we request that they develop an appropriate plan to mitigate project impacts. We recommend that DOE contact the Field Supervisor, Charleston Field Office, Fish and Wildlife Service, Post Office Box 12559, Charleston, South Carolina 29412 (803-724-4707; FTS 677-4707) to discuss and develop a mitigation plan.	The Department of Energy is cooperating with the Fish and Wildlife Service to develop a Habitat Evaluation Procedure (HEP) plan for the Steel Creek system with the implementation of the preferred thermal mitigation system for L-Reactor. The HEP will identify the value of habitat to be gained or lost with implementation of the preferred L-Reactor cooling-water alternative for use in assessing further mitigation. If required, DOE will implement additional mitigative measures that might be identified through the HEP process dependent on Congressional authorization and appropriation.
	Groundwater Contamination	
FK-11	It is stated on page 4-55 that an analysis has been made of the consequences of a class 9 accident; i.e., one having low probability but potentially great severity. The analysis was reportedly made on a basis comparable to that currently used to assess such accidents for light-water reactors. However, the results of the analysis as reported in the environmental statement (App. G) do not include the potential for a meltdown of the core through the basemat of the reactor. If such an	Reference Durant and Brown (1970), cited on page 4-45, provides an "Analysis of Postulated Core Meltdown of an SRP Reactor." This reference specifically addressed on page 60 the possible minor penetration of concrete floor surface and demonstrated that no significant depth of concrete floor would be penetrated. In particular, partial cooling of any molten fuel mass at elevation - 40 ft could be provided by five separate systems identified on page 35 of Durant and Brown (1970), and would preclude the possibility of penetrating the concrete basement floor.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	occurrence is evenly remotely possible, the statement should evaluate potential groundwater impacts and their mitigation. If such an event is completely impossible, this should be stated.	These systems include the confinement heat removal system installed in 1979 as noted in Appendix J.
FK-12	A scoping letter by Alfred H. Vang, Executive Director of the South Carolina Water Resources Commission, on page K-127, refers to the existence of a large number of wells on the project site prior to the establishment of the SRP. Mr. Vang writes that the current status of these wells is unknown; there is concern that if they were improperly sealed, they might provide avenues through which contaminants could move from shallow water-bearing zones into the major aquifers at greater depths. Our review of the environmental statement has not revealed a response to this concern. The statement should adequately address the current status of the pre-project wells and evaluate the potential for related groundwater impacts.	The text of Section 3.4.2.3 has been modified to reflect this concern.
FK-13	It is stated on page F-88 that uranium found in the contaminants of the M-Area seepage basin will require about 700 years to reach groundwater. The analyses of Tables F-14 and F-15 indicate that mercury and nitrate have already reached groundwater in appreciable amounts. The statement should discuss the ultimate fate of the uranium, mercury, nitrate and other significant constituents such as lead that may reach groundwater later.	Chapter 5 of the EIS has been modified to provide a clearer discussion of the incremental releases from support facilities of radioactive and nonradioactive discharges to the F-, H-, and M-Area seepage basins. With respect to the M-Area settling basin, present discharges to the settling basin will be discontinued by April 1985, and will instead be treated by a wastewater treatment plant in accordance with a State of South Carolina NPDES permit. The migration of mecury and nitrate is different than that for uranium. The quantities of uranium in the soils of the M-Area do not migrate in the same manner as nitrate and are expected to become associated with the clay materials in the subsurface because of its relatively high distribution coefficient. Ultimately the uranmium is likely to reside in the basal Congaree and upper Ellenton clay units, which are thick, effective confining units throughout the SRP. The small quantities of mercury and lead, and the quantities of nitrate that may reach the water table will be removed by interceptor/recovery wells as part of the planned remedial action program for the M-Area.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FK-14	*The total groundwater flux through the SRP area is said to be* about 100 cubic meters per minute, which is about 1.7 times the sum of any projected use for L-Reactor and the current use in the area (page 4-7, page F-71 and F-72). The statement should make clear how much of the total flux is actually available to wells without having significant effects on regional water levels and surrounding well use - particularly downgradient wells. Hydrographs of Tuscaloosa and Ellenton wells on page 3-35 suggest a fairly close correlation between increases in withdrawal rate at SRP and water-level trends. We suggest that the impact analyses should project areally extensive declines in water levels that will result from increased withdrawals and predict where water levels will eventually stabilize.	The FEIS has been revised to reflect current SRP ground-water pumpage from the Tuscaloosa, as well as incremental and cumulative use projections (Appendix F, and Chapters 4 and 5). In 1982 the SRP withdrew about 23.8 cubic meters per minute; in 1983 this value increased to 27 cubic meters per minute. Process water conservation practices and the placing of facilities on stand-by will reduce the SRP withdrawal rate to about 25.4 cubic meters per minute including pumping in L-Area and incremental pumping at facilities supporting L-Reactor operation. If L-Reactor was placed on stand-by approximately 4.9 cubic meters per minute used in support of L-Reactor operation would not be required. When the DWPF and FMF are operational the total withdrawal rate by SRP is expected to increase to about 26.4 cubic meters per minute. This compares to a value of 37.8 cubic meters per minute suggested by Siple (1967) suggested as a practical upper pumping limit for 1960 wells when SRP was pumping about 18.9 cubic meters per minute. For conservatism, the ground-water flux through the Tuscaloosa at and adjacent to SRP is estimated to be 51 cubic meters per minute, the lower bound estimate of Marine and Routt (1974). In 1983, ground-water withdrawal within their study area was about 38.5 cubic meters per minute (11.5 from offsite users and 27.0 from SRP) which is about 75 percent of the estimated flux. Thus, pumping at SRP does not appear to be depleting the Tuscaloosa Aquifer, but rather water levels are responding to pumping by developing a new equilibrium piezometeric surface. Also see the responses to comments AJ-1 and BT-7.
FK-15	The sorptive properties of sedimentary materials beneath the SRP are said to mitigate impacts of radionuclides moving through these materials (e.g., page B-31). The statement should discuss ion-exchange capacities and other pertinent properties of the various types of sediments, indicating typical values or ranges of values. In addition, previous operations have provided sufficient history of radionuclide movement at the SRP so that the significance of the sorptive capabilities of the sedimentary materials in place can be assessed separately from the mere retarding influence of groundwater flow; this distinction will be significant in anticipating delayed impacts.	Based on studies on SRP seepage basins, measured distribution coefficients (K_d) of elements in typical SRP soils are: Element / K_d Sr 100 Cs 730 U 60 Pu 1400 Am 1000 Cm 1000

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		For other elements, where K_d values are not available, K_d is conservatively assumed to be zero (i.e., elements will not be retarded by ion exchange and will move at the velocity of ground water). Ground-water velocities in the vicinity of SRP seepage basins typically range from 0.15 to 0.30 meter per day and distances to outcrop areas range from 365 to 1220 meters.
FK-16	Low concentrations of chlorinated solvents have been found in a Tuscaloosa water production well (page 5-6). High concentrations have been found in the shallower groundwater of the M-Area (pages F-88 through F-90). Mitigation at present consists of pumping the contaminated water from the shallower aquifers and using a pilot airstripper facility to improve the groundwater quality. The efficiency of this method, probable degree of recovery of contaminated groundwater and potential for increasing concentrations of the chlorinated solvents in the Tuscaloosa aquifer should be assessed.	The remedial action program for the M-Area consists of nine 200-foot deep interceptor/recovery (I/R) wells and an air stripper with a capacity of 1.5 cubic meters per minute, about 1.8 times that of the current discharges to the M-Area settling basin. This system is expected to remove about 30 tons of chlorinated hydrocarbons per year during the first few years of operation; thereafter the removal rate will decrease as the contaminant concentrations decrease. The cone of depression resulting from pumping by the I/R system will be extensive. For example, the area within the 3 meter drawdown isopleth is expected to have an area of several hundred acres after 10 years of pumping. The remedial action program is designed to prevent and eliminate any significant concentrations of chlorinated hydrocarbons in the Tuscaloosa Aquifer. Both the State of South Carolina and the EPA are actively involved in the review of ground-water protection measures including the remedial action program at SRP. The ground-water protection program will be the subject of a separate NEPA review.
	Radioactive Releases to Streams	
FK-17	We found no mention of the possibility of severe leaks in the heat exchangers in the discussion of accidents. Small leaks of reactor process water into the once-through cooling water in the heat exchangers are stated to be the cause of routine radioactive releases to Steel Creek (page 4-25). This raises the question of whether severe leaks are also possible and, if so, whether they could occur coincidentally with any accidents affecting the core and the reactor process water. In any case, accidental releases of radionuclides in liquids discharged to Steel Creek should be discussed and the maximum quantities that could enter the Creek should be estimated. Although the resulting immediate dose may be smaller than that due to airborne emission, the release of long-lived radionuclides to streams	Severe leaks of moderator to the cooling-water in the heat exchangers can be readily detected by redundant radiation detectors on the effluent side of the heat exchangers. If abnormal radiation levels are detected, the reactor would be shutdown for remedial action. The remaining heat exchangers (total of 12) would provide sufficient capacity to remove decay heat.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	will be a matter of continuing concern for years after the event (as in the earlier releases of radiocesium) and should not be overlooked.	
	Confinement	
FK-18	In general the subject of confinement versus containment systems for the L-Reactor is not within our expertise; however, one subject is significant to groundwater resources. This is the retention of particulate matter and radioiodine, for which the proposed confinement system is said to have an efficiency of more than 99 percent. If this efficiency can be preserved during and following the most severe accident possible, we have no adverse comment. The confinement heat-removal system also provided should aid in protecting groundwater by ensuring the efficiency of the airborne-activity confinement system and controlling to some extent radioactive fluids.	The efficiency of the confinement system can be preserved during and following the most severe accident possible, in particular because of the Confinement Heat Removal System which was installed in 1979 as noted in Appendix J. The operability of the confinement system has been evaluated extensively in Durant, et al. (1966) and Durant and Brown (1970) as noted on page 4-45 of the draft EIS. The probability of fission product release in conjunction with an inoperable confinement system, estimated on page 47 of Appendix G, is considered so low as to exclude it from detailed analysis in the EIS.
	Specific Comments	
FK-19	2.1.3. Information regarding the relative deficiency in production of needed nuclear materials by use of the combination of two partial options (accelerated use of the Mark 15-lattice at the Savannah River Plant (SRP) and production of 5 percent plutonium-240 at N-Reactor), as compared with L-Reactor, is needed to provide a better base from which to judge these production options. If this is not classified information, a percentage figure of projected material production deficiency should be presented here.	Qualitative and limited information on the need for weapons-grade plutonium is presented in Chapter 1; this chapter has an expanded discussion on need to the extent permitted by law. Quantitative information on defense material requirements, inventories, production capacity, and projected material shortages is classified.
FK-20	4.0. The preferred alternative is operating L-Reactor with the direct discharge of cooling water and subsequent mitigation measures. DOE should identify these subsequent mitigation measures in the final statement.	The introduction to Chapter 4 has been modified to indicate the preferred cooling-water mitigation measure.
FK-21	4.1.1.5. Cooling-water reservoir (186-Basin). Some substantiation of the statement that there is no evidence of detrimental impact from annual processing basin flushing should be presented. Although removal of sediment load from adjacent waters is a natural river swamp function, sediment loading, such as described in a massive flushing effort, could overload the system. Contribution to delta growth as predicted should not be considered as presenting no detrimental impact.	Flushing the sediment from the 186-Basin will only temporarily increase the suspended load in Steel Creek to levels similar to those experienced during periods of high runoff. As noted in Section 4.4.4, which discusses alternative methods of 186-Basin sludge removal, the total amount of sludge removed annually from the basin is about 110 tons. Flushed into Steel Creek, this sediment will not "overload the system," nor will it contribute appreciably to the delta growth.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FK-22	4.4.2.3. Some alternatives include alternative cooling-water systems that will be incorporated into L-Reactor operation after initial restart with direct discharge into Steel Creek. These alternatives should clearly identify the immediate and direct loss of 15 years of biological succession in the Steel Creek system as a significant impact.	Section 4.4.2 and Appendix I have been modified to indicate that implementation of cooling-water mitigation after the restart of L-Reactor will result in the loss of biological succession in the Steel Creek system.
FK-23	4.4.2.4. Table 4-34 - Yearly operational and total costs for mitigation alternatives. The restocking alternative should include costs associated with future studies needed to determine the success of the stocking effort.	The costs listed in Table 4-34 of the draft EIS provide a comparison between the three mitigation alternatives. The estimated 5-year cost for fishery research primarily included collection of data on selected anadromous fish species and support for development of sturgeon culture techniques. This research would be necessary to support a determination of the success of the restocking effort. Should the decisionmaker decide to adopt the restocking program as a mitigative measure, more detailed costs would be developed to assess the longer term success of the restocking program.
FK-24	4.5. If DOE considers the loss of 300 jobs as a factor in the evaluation of the no-action alternative, then consistency should be maintained throughout the document, and jobs created by the various alternatives (i.e., cooling tower construction) should also be included as factors in the evaluation of these alternatives.	Section 4.4.2 has been modified to provide an estimated maximum number of construction personnel associated with each cooling-water alterantive.
FK-25	5.2.4.1. Table 5-15 - Distribution of forested wetlands for the principal streams of the SRP. Beaver Dam Creek should be included in this table. Since this section deals with incremental and cumulative impacts, another column breaking out forested wetlands that are still recovering from thermal impacts would be appropriate.	Table 5-15 of the Draft EIS presents the distribution of forested wetlands for the principal streams of the SRP. Beaver Dam Creek is a man-made canal, and thus is not considered to be a principal stream. Forested wetlands of the Steel Creek ecosystem that are recovering from thermal impacts are discussed in Section 3.6.1.2 and Appendix C of the EIS.
FK-26	6.1. The Mitigation Study initiated by DOE in agreement with the State of South Carolina warrants inclusion and discussion in this section.	The EIS has been modified to include provide a discussion of the thermal mitigation study in Section 6.1.4.
FK-27	8.0. It should be clearly stated that this section only addresses the base case alternative and the analyses contained in the subsections that follow would be significantly different for alternative actions.	Chapter 8 of the EIS has been modified to discuss unavoidable and irretrievable impacts of the reference case and the preferred alternative.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FK-28	8.1/8.2. *Delta formation resulting from L-Reactor represents a* permanent change in the nature of the wetlands in the Steel Creek system. By virtue of changing elevation and substrate, ecological succession on the delta after termination of L-Reactor operation will not necessarily proceed to a recovery community with the same characteristics or values that existed prior to this perturbation. In this regard, delta formation constitutes both an irreversible and irretrievable commitment of resources as well as a long-term impact that should be addressed *under Section 8.1. and 8.2.*	In 1951, *prior to the establishment of the Savannah River* Plant, the vegetation of the Steel Creek ecosystem (i.e., delta and swamp) was characterized by a closed canopy of mature cypress and tupelo (Sharitz et al., 1973). These flora were adversely impacted from 1954 to 1968 by the prior L-Reactor thermal discharge. Since 1968 when discharges from the L-Reactor terminated, the Steel Creek ecosystem has become revegetated through a process of natural vegetative succession. Structurally, the post-recovery vegetation is markedly different from the closed canopy of cypress and gum, and is characterized by scrub-shrub wetlands of willow and button bush. Some remnants of the original forest, however, are still present. Although the restart of L-Reactor without cooling-water mitigation would adversely impact the existing scrub/shrub wetlands, this would not constitute an irreversible or irretrievable commitment because these flora could become established again through the process of natural vegetative succession.
	Summary	
FK-29	The operation of the L-Reactor poses unclear risks to ground-water and the preferred alternative will have significant and unsatisfactory effects on fish and wildlife resources including their habitat. If DOE neither selects mechanical draft cooling towers nor develops a plan to adequately mitigate for impacts to fish and wildlife resources, then the Department of the Interior may choose to refer this project to the Council on Environmental Quality pursuant to 40 CFR 1504. We hope these comments will be helpful to you in the preparation of a final environmental impact statement. Sincerely, Bruce Blanchard, Director Environmental Project Review	As discussed in response to comment FK-1, in this final EIS the Department of Energy has identified a preferred cooling-water alternative; to construct a 1000-acre lake before L-Reactor resumes operation, to redesign the reactor outfall, and to operate L-Reactor in a way that assures a balanced biological community in the lake. In addition the Department will be working with the U.S. Fish and Wildlife Service in using HEP to identify and implement further habitat mitigation measures in conjunction with the preferred cooling-water mitigation alternative. Further, a separate NEPA review will be conducted on the SRP ground-water protection program.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF JOHN C. VILLFORTH, DIRECTOR National Center for Devices and Radiological Health Food and Drug Administration Rockville, MD 20857 Mr. M. J. Sires, III Assistant Manater for Health, Safety and Environment U.S. Department of Energy Savannah River Operations Office P. O. Box A Aiken, South Carolina 29801 Dear Mr. Sires: The National Center for Devices and Radiological Health Staff has reviewed the Draft Environmental Impact Statement (DEIS) related to the L-Reactor Operation at the Savannah River Plant, DOE/EIS-0108D, dated September 1983. Our staff has evaluated the public health and safety impacts associated with the proposed restart of L-Reactor operations, and has the following comments to offer:	
FL-1	1. The design of the reactor systems and radiological waste management as described in Section 2.2.2.5 provide adequate assurance that radioactive materials in the effluent will be maintained as low as reasonable achievable (ALARA). It appears that the calculated dose to individuals and to the population from effluent releases from L-Reactor operations and from other nearby nuclear facilities is within current radiation protection standards.	Comments noted.
FL-2	2. The environmental pathways identified in Section 4.1.2 and depicted in Figure 4.6 cover all possible emission pathways that could impact on the populations in the environs of the facility. The dose computational methodology and assumptions (Appendix B) used in the estimation of radiation exposure to individuals and to populations within 80 km. of the Savannah River Plant have provided the means to make reasonable	Comments noted. The revised Summary in this EIS contains the cumulative total body doses from L-Reactor operations and other nearby facilities; however, these doses are contained in the narrative rather than in a table similar to that of Table 5-19 in the draft EIS.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	estimates of the doses resulting from normal operation of the L-Reactor and its support facilities. Results of these calculations are shown in Appendix B, Tables B-7 through B-48. Summary of the dose commitments are shown in Figures 4-12, 4-13, 4-14, 4-17, 4-18, and 4-19 and Tables 5-11, 5-12, and 5-19. These results confirm that the calculated doses meet the radiological design objectives. We note that the Summary contains a Table S-1 which is a summary of the maximum individual and regional population total body doses from operation of the L-Reactor and SRP support facilities and is the same as Table 5-12. We believe it would be helpful to also include Table 5-19 in the Summary which contains the cumulative total body doses from L-Reactor operations and other nearby facilities. Inclusion of this table (as Table S-4) would provide the reader with the means to readily assess the additional impact of the L-Reactor operations as it relates to the cumulative impact on total-body individual and population doses from other nearby nuclear facilities.	
FL-3	3. Discussions in Section 4.2 and Appendix G on the environmental impact of postulated accidents are considered to be an adequate assessment of the radiation exposures and health impacts of atmospheric releases. It is noted in Appendix G.3.3 that an onsite Emergency Operations Center has been established and is maintained at SRP to provide immediate and informed response to mitigate the consequences of any site accidents. The presentation in Appendix H on offsite emergency planning is considered to (1) contain the essential elements for responding to emergency situations and (2) provide for notification and coordination with the South Carolina counties and the States of South Carolina and Georgia.	Comments noted.
FL-4	4. The radiological monitoring program as presented in Sections 6.1.1, 6.2.2, 6.2.3, and 6.2.4 appears to provide adequate sampling frequency in expected environmental exposure pathways. The analyses for specific radionuclides are considered sufficiently inclusive to (1) measure the extent of emissions from the Savannah River Plants, and (2) verify that such emissions meet the applicable radiation protection standards.	Comments noted.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FL-5	We are pleased to note that DOE in July 1983 initiated a two-year program to determine the environmental effects and significance of cooling-water intake and discharge supporting operations of *all SRP production reactors* (C, K, L, *and P*) *and* the 400-D area coal fired plant. In particular, we are interested in the radionuclide remobilization, deposition, and effects and the radiation worker epidemiological studies. We would appreciate receiving copies of the study when they are available. Thank you for the opportunity to review and comment on this Draft Environmental Impact Statement. Sincerely yours, John C. Villforth Director National Center for Devices and Radiological Health	Copies of the study when it is available will be sent to your office.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF T. TRAVIS MEDLOCK Attorney General The State of South Carolina Columbia, South Carolina M. J. Sires, III Assistant Manager Health, Safety and Environment U.S. Department of Energy Savannah River Operations Office Post Office Box A Aiken, South Carolina 29801 Dear Mr. Sires: This office has reviewed the Draft Environmental Impact Statement prepared for the restart of the L-Reactor, as well as the comments submitted by other government agencies, private groups and private citizens. Based on this review, I have concluded that I concur with the recommendations of the Environmental Protection Agency and others that the Draft EIS is unsatisfactory in its present form. My areas of concern relate primarily to the impacts of reactor operations on groundwater and on the waters of Steel Creek, and to the reactor's production of hazardous waste. In my opinion, the Draft EIS should be strengthened in the following areas:	
FM-1	1. The need to obtain an NPDES permit under § 402 of the Federal Clean Water Act needs to be given fuller treatment. The prior NPDES permit did not exempt onsite streams; it ignored the reactor's impacts on those streams. The DEIS also should mention that a federal regulation, 40 CFR 122.47 (a) (2), prohibits the development of delayed compliance schedules for recommencing discharges such as the L-Reactor. In view of these deficiencies, the statement on p. 7-7 that DOE anticipates receiving the permit by the end of the year presents an inaccurate picture of the prospects for a legal restart.	Section 4.4.2 of the EIS, which discusses cooling-water mitigation alternatives, has been revised based on public comments received on the draft EIS. Specifically, Section 4.4.2 has been revised to provide a detailed discussion of additional combinations of various cooling-water systems. In Section 4.4.2, each of the cooling-water mitigation systems is evaluated for attaining the thermal discharge limits of the State of South Carolina. Section 4.4.2 and a revised Appendix I, Floodplain/Wetland Assessment, discuss the wetland impacts of each of the systems considered.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	2. Full consideration of the prospect of the L-Reactor receiving an NPDES permit is necessary to place the restart on a realistic timeframe which if followed, would permit other mitigation activities. Since it does not appear possible that the reactor restart could occur as soon as the DEIS projects, the DEIS should give further attention to mitigation in other areas.	The Department of Energy has been reviewing and evaluating alternative cooling-water systems for L-Reactor. Based on these reviews and evaluations, and consultations with representatives of the State of South Carolina regarding a mutually agreed upon compliance approach, a preferred cooling-water mitigation alternative is identified in this EIS. This preferred cooling-water alternative is to construct a 1000-acre lake before L-Reactor resumes operation, to redesign the reactor outfall, and to operate L-Reactor in a way that assures a balanced biological community in the lake. The Record of Decision prepared by the Department on this EIS will state the cooling-water mitigation measures that will be taken which will allow L-Reactor operation to be in compliance with the conditions of an NPDES permit to be issued by the State of South Carolina.
	3. The discussion of cooling-water alternatives should fully relate each proposed alternative to State temperature standards for Class B streams. A comparison of each alternative with the State standards would appear necessary for the decisionmaker or the public to understand the effectiveness of the listed alternatives.	
FM-2	4. With regard to groundwater contamination, a number of deficiencies have been noted in the comments of EPA and Dr. Sternberg, among others, which we adopt and incorporate by reference. In particular, while the DEIS mentions the 33% increase in effluent volume at the Fuel Fabrication and Chemical Processing Facilities, it should devote more attention to planned mitigation of the effects of present and future effluents. The restart should be more fully related to DOE's larger efforts to resolve groundwater problems at SRP. We would also note that Sen. Hollings, in sponsoring the bill which led to Congress' requiring an EIS, specifically suggested that groundwater mitigation options by covered in detail.	Several modifications have been made to this final EIS based on the comments received. In addition to the modifications to the discussion of cooling-water mitigation alternatives, this final EIS provides additional data concerning ground water as well as a description of the SRP ground-water programs in which the State of South Carolina is participating.
	These, in summary form, represent the comments of this office on the DEIS. We recommend that you give close consideration to the other comments submitted, especially those submitted by EPA and the various state agencies.	
	Please let me know what you plan to do with these and other comments submitted on the DEIS by State officials and others.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Thank you for your consideration. Sincerely yours T. Travis Medlock Attorney General TTM:rmr	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF V. I. MONTENYOHL January 30, 1984 Mr. M. J. Sires, III U.S. Department of Energy Savannah River Operations Office P.O. Box A Aiken, S.C. 29802 Dear Mel: First an apology. I looked over the various reports that you have sent me, but I haven't had time to write you comments until now. I'm sorry about the delay. However, I don't think a recital of all the things that kept me from writing until now would be helpful. First, a few comments about "Environmental Consequences of Restarting L-Reactor, Savannah River Plant, Aiken, S.C. - Volume 1 - August 1983:" 1. The first item listed under each topic in Section 2 might better be labelled "Allegations," rather than "Statements and Comments." A casual or careless reader might mistakenly assume that the "Statements and Comments" had some official basis. 2. In topic 2.5 "Ground Water," mention is made of the fact that new Type III storage tanks have not leaked. However, there is no mention of the solidification of the wastes in the older tanks; with the wastes solidified, the material does not leak from the tanks, even if a leak path should occur. 3. In the same topic it wasn't made clear that the chlorinated solvents that leaked into the ground water were degreasing solvents from metal fabrication, and not associated with the processing of radioactive materials. The same risk of leakage of degreasing solvents probably occurs at hundreds (perhaps thousands) of places in the country where such solvents are used.	Comments noted.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	4. The topic 2.10 "Radiation Dose Calculations" contains the usual allegations about the impact of long-term exposure to low-level radiation. DOE might well point out that most of varies with altitude, the releases from SRP can be expressed as the equivalent in radioactive exposure to an increase in local altitude. I recall having the calculation made several years ago for tritium releases; in that case, the result of the cumulative releases was comparable to increasing the altitude of SRP and neighboring area about 7 inches. If you had the calculation made for all releases, my guess would be that the total impact would be comparable to an altitude increase of a few feet. Obviously, if your critics were sincere, they should immediately urge the evacuation of Colorado and New Mexico. They should also worry about the exposure of flight crews on most airlines. My only other comments (which ties in with the other report you sent - "Draft Environmental Impact Statement, L-Reactor Operation, Savannah River Plant") is my concern over the acceptance by DOE of DHEC's point-of-origin monitoring. If this monitoring is done intelligently, it can be an advantage. However, if the matter is not handled with some skill, there is the risk of repeating the Vallecitos problem. You probably recall that GE used to have a power reactor test station at Vallecitos, California. The site was quite small. The state of California ruled that GE could not release any radioactivity beyond the site boundary. Now it happens that well water in the area has a small amount of natural radioactivity in it. As a consequence, GE could not pump water from its well and release it upon the ground, because it might run across the fence line and thus violate the control ruling, even though the water had never been in the reactor building. Ironically, the next-door neighbor could have a well that he used to water the lawn without being in violation of the regulation. Hence, one can't help who was being protected and from what by such a regulation. If the close-in monitoring is used simply to assure maximum sensitivity and to assure that no release of harmful proportions can reach the public, then it can be an advantage. However, if it is interpreted in such a fashion that the limit for the monitoring site become the same as the limit for general exposure of the public, then it may be impractical.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Thanks for sending the reports. Sincerely, V.I. Montenyohl 1050 Two Notch Road Aiken, SC 29801	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

CENTRAL SAVANNAH RIVER AREA
REGIONAL CLEARINGHOUSE MEMORANDUM
A-95 REVIEW AND COMMENT

TO:
Mr. M. J. Sires
Dept. of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29801

FROM: Mark Senn
CSRA Planning and Development Commission

SUBJECT: RESULTS OF REGIONAL CLEARINGHOUSE REVIEW

Applicant: Department of Energy
Project: L-Reactor Operation - Aiken, S.C.
Clearinghouse Control Number: GA. 83-09-27-001

The Regional - level review of the above referenced project has been completed and the following comments made: — Comments noted.

____x____ This proposal is considered to be consistent with *Regional and local plans, programs, and policies* concerning such projects.

_____ This proposal is recommended for further development subject to the following recommendations.

_____ This proposal is not recommended for further development based on the following rationale.